1. INTERNATIONAL CONFERENCE ON VIRTUAL REALITY

PROGRAM AND

EXTENTED ABSTRACTS

Hoş geldiniz

أهلا وسهلا

Welcome

Hûn bi xêr hatin

ܒܫܝܢܐ ܐܬܝܬܘܢ

(bşayno ethaytun)

1ST INTERNATIONAL CONFERENCE ON VIRTUAL REALITY

4-5 APRIL 2019, ŞANLIURFA, TURKEY

Harran University, Şanlıurfa, Turkey
July 2019
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Contents

FORWORD

We have been very pleased to have the opportunity to organize this 1st conference on virtual reality in Turkey. This conference has been conducted in the framework of the ERAMUS+ project "Strengthening of research and training capabilities for Virtual Reality applications in the private and governmental sector". The main purpose of this project is to strengthen the cooperation between the private sector and higher education institutions in order to increase the capabilities of the regional workforce and improve the overall attractiveness of the western part of the GAP region (Southeastern Anatolia Project). This project is part of the strategic initiative of Harran University to establish a Center for Virtual Reality in cooperation with stakeholders from the university, private sector and several governmental organizations. During this project the opportunities of this technology in the different vertical sectors will be shown and the necessary training requirements elaborated in detail. Partners in this project are Germany's Otto-Von-Guericke-Universitaet Magdeburg in cooperation with Fraunhofer Institute for Factory Operation and Automation, the private company Visionair3D (Netherlands) and as an associate partner, Karacadağ Development Agency/Turkey.

Virtual Reality (VR) lets our dreams become true. It is about visions and about places and times we cannot visit for different reasons. This applies to the past and to the future as well. This has been addressed during this conference by showcasing works about history and the future of city planning. While focus was on the fields of engineering, planning and medicine the presenters covered a much wider range of VR application. During the cultural program, the participants were brought back to point zero of history, the oldest assembly building in the world – Göbekli Tepe and could visit many other locations that prove the cultural and religious richness of this region. Some of them were presented as VR applications for the special field of archaeology during the conference.

We hope that this conference will have a tangible effect on the future development of virtual reality, augmented reality and other related technologies in Turkey. In accordance with the goals of this ERASMUS project, we are looking forward to broadening the cooperation with our international partners in this field by initiating new joint projects.

This conference could only be realızed thanks to the support of the European Union's ERAMUS+ program, the National Agency of Turkey, our partners in Germany, the Netherlands and here in Sanliurfa and the enthusiastic academic and administrative staff of Harran University.

Thank you again for contributing to this conference

Dr. Fred Barış Ernst
Project Manager

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SUPPORTING ORGANIZATIONS

PROGRAM

MAJOR HALL / BÜYÜK SALON

4 APRİL 2019

REGISTRATION

(08:00—08:30)

COFFEE BREAK AND NETWORKING

(08:30—09:00)

OPENING AND WELCOME SPEECHES

(09:00—10:00)

MAJOR HALL / BÜYÜK SALON
4 APRİL 2019

KEYNOTE SPEAKER

(Müh. İdris Güllüce)

(10:00—10:30)

COFFEE BREAK AND NETWORKING

(10:30—11:00)

BALIKLIGÖL HALL / BALIKLIGÖL SALONU
4 APRİL 2019 / THURSDAY / 11:00-12:00

11:00—11:15

Mehmet YILMAZ, "How big is the Virtual reality market?", Harran University, TURKEY

11:15—11:30

Gül GÜNDÜZ, "Virtual Reality: Virtual Reality Approaches In Education And Virtual Reality In Electric Motors", Sakarya University, TURKEY

11:30—11:45

Recep ASLAN, "When will we start to understand and apply the virtual reality?", Afyon Kocatepe Univrersity, TURKEY

11:45—12:00

Alptekin ÖZDEMİR, "With Virtual Reality (Vr) We Can Explain Things In A Different Way", AlpiSmartTech Nordic ApS, DENMARK

OTURUM BAŞKANI / SESSION CHAIR

Assist. Prof. Dr. Dursun AKASLAN

(VIRTUAL REALITY)

GÖBEKLİTEPE HALL / GOBEKLITEPE SALONU
4 APRİL 2019 / THURSDAY / 11:00-12:00

11:00—11:15

Deniz DEMİRYÜREK, "Using Hologramic Images in Anatomy Education", Hacettepe University, TURKEY

11:15—11:30

Mehmet YILMAZ "How will Education be changed using virtual reality?", Harran University, TURKEY

11:30—11:45

M. Vehbi BALAK, "Implementing Virtual and Augmented Reality Technologies in Technical Drawing Course", Harran University, TURKEY

11:45—12:00

Önder DEMİR, "A Sample Of Benefiting From Augmented Reality Technologies For Increasing Spatial Literacy For Primary And Secondary School Students", Anadolu Univrersity, TURKEY

OTURUM BAŞKANI / SESSION CHAIR
Assoc. Prof. Dr. Gencay SARIIŞIK

(EDUCATION)

HALFETİ HALL / HALFETI SALONU
4 APRİL 2019 / THURSDAY / 11:00-12:00

11:00—11:15

Aytaç Uğur YERDEN, "Using augmented reality for the purpose of CNC Education", Istanbul Gedik University, TURKEY

11:15—11:30

Abdulkadir MEMDUHOĞLU, "3D Map Experience for Youth with Augmented Reality Applications", Harran University, TURKEY

11:30—11:45

Nuray AT, "Making Virtual and Augmented Reality Real via Network Virtualization", Eskisehir Technical University, TURKEY

11:45—12:00

Vehbi BALAK, "The Effects of Virtual And Augmented Reality Technologies on Spatial Visualization Skills of Engineering Freshman Students", Harran University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Prof. Dr. Recep ASLAN

(EMPLOYMENT & INDUSTRY)

LUNCH BREAK / ÖĞLE YEMEĞİ

4 APRİL 2019 / THURSDAY / 12:00—13:00

MAJOR HALL / BÜYÜK SALON
4 APRİL 2019

KEYNOTE SPEAKER

(Jun. Prof. Dr. Christian Hansen)

(13:00—13:30)

COFFEE BREAK AND NETWORKING

(13:30—14:00)

BALIKLIGÖL HALL / BALIKLIGÖL SALONU

4 APRİL 2019 / THURSDAY / 14:00—15:00

14:00—14:15

Talha AKSOY, "Use Of VR Technologies In Landscape Design And Urban Design: Eskişehir, R & D, Innovation And Design Valley Design Sample", Eskisehir Technical University, TURKEY

14:15—14:30

İbrahim YENİGÜN, "Commercial Application Approaches To Virtual Reality; Case Of Construction Sector", Harran University, TURKEY

14:30—14:45

Fred Barış ERNST, "Virtual Reality for City Planning", Harran University, TURKEY

14:45—15:00

Nizar POLAT, "3D City Modelling with Airborne LiDAR data", Harran University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Assist. Prof.Dr. Nizar POLAT

(City Planning)

GÖBEKLİTEPE HALL / GOBEKLITEPE SALONU

4 APRİL 2019 / THURSDAY / 14:00—15:00

14:00—14:15

İbrahim YENİGÜN, "The Role of Virtual Reality in the True Construction of Environmental Awareness", Hacettepe University, TURKEY

14:15—14:30

Mehmet Emin TENEKECİ, "Motion Platform Design For Human-Computer Interaction In Virtual Reality Environment", Harran University, TURKEY

14:30—14:45

Pınar Naime KIRÇIN, "The Use of Virtual Reality in Cultural Landscapes", Eskişehir Technical Univrersity, TURKEY

14:45—15:00

Nalan DEMİRCİOĞLU YILDIZ, "The Formation, Development And Modeling Process Of 3-Dimensional Development Plans In The Green Infrastructure System: The Case of Üsküdar", Ataturk University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Dr. Muhammad Muzammal

(Environment)

HALFETİ HALL / HALFETI SALONU

4 APRİL 2019 / THURSDAY / 14:00—15:00

14:00—14:15

Saffet ERDOĞAN, "Artificial Neural Networks Controlled Reactive Power Compensation in the Perspective of Industry4.0", Harran University, TURKEY

14:15—14:30

Enes BAŞARIR, "Employee Training & Orientation with VR", DHL Supply Chain Turkey, TURKEY

14:30—14:45

Gencay SARIIŞIK, "Virtual Reality Applications in Occupational Work & Safety in the High-Risk Industries", Harran University, TURKEY

14:45—15:00

Mehmet Bedri DOĞRUYOL, "Employment Potential in the Sector of Virtual Reality and Augmented Reality for Our Country", Harran University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Assoc. Prof. Dr. Uğur Avdan

(EMPLOYMENT & INDUSTRY)

MAJOR HALL / BÜYÜK SALON

4 APRİL 2019

KEYNOTE SPEAKER

(Prof. Dr. Alias Abdul Rahman)

(15:00—15:30)

COFFEE BREAK AND NETWORKING

(15:30—16:00)

BALIKLIGÖL HALL / BALIKLIGÖL SALONU

4 APRİL 2019 / THURSDAY / 16:00—17:00

16:00—16:15

Jale ORAN, "AR/VR practises in finance: A proposal for financial literacy education", Marmara University, TURKEY

16:15—16:30

Arzu BALOGLU, "An Instagram Marketing Analysis", Marmara University, TURKEY

16:30—16:45

Nizar POLAT, "Low-Cost 3D Model Generation for Virtual Reality", Harran University, TURKEY

16:45—17:00

Ömer ÜNSAL, "Silhouette Analysis with 3D Development Plan: The Bosphorus Case", Üsküdar Municipality, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Prof. Dr. Alper ÇABUK

(Finance and Marketing)

GÖBEKLİTEPE HALL / GOBEKLITEPE SALONU

4 APRİL 2019 / THURSDAY / 16:00—17:00

16:00—16:15

Nizar POLAT, "The use of social media-based images in 3D documentation of historical monuments", Hacettepe University, TURKEY

16:15—16:30

Mehmet Emin TENEKECİ, "VIRTUAL APPLICATION DEVELOPMENT ENVIRONMENT FOR AUTONOMOUS CARS", Harran University, TURKEY

16:30—16:45

Uğur TURHAN, "The Performance Assessment of Air Traffic Control Trainees in 3D Aerodrome Control Simulation", Eskişehir Technical University, TURKEY

16:45—17:00

Birsen AÇIKEL, "The Scenario Development and Improvement Aspects of 3D Aerodrome Control Training Simulation", Kastamonu University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Assoc. Prof. Dr. Saye Nihan ÇABUK

(Simulation)

HALFETİ HALL / HALFETI SALONU

4 APRİL 2019 / THURSDAY / 16:00—17:00

16:00—16:15

Arif YÜCE, "Phygitally Yours: Examination of Virtual Reality Experiences in Digital Sport Games", Eskişehir Technical University, TURKEY

16:15—16:30

Batuhan BİNTAS, "Empowerment of the Imagination through Cyber Space", Cyber Rabbit, United Kingdom

16:30—16:45

Serhat SARI, "Reproduction and Experience of Bauhaus Design School's Iconic Product Design with Virtual Reality (VR) Technologies", Eskisehir Technical University, TURKEY

16:45—17:00

Dursun AKASLAN, "A Model for Grading Virtual Reality Glasses", Harran University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Assist. Prof. Dr. Dursun AKASLAN

(Application Development)

SIRA GECESİ

4 APRİL 2019 / THURSDAY / 19:30—23:00

Traditional dinner with music and dancing, free for members of organizing and scientific committees, invited speakers and presenters

MAJOR HALL / BÜYÜK SALON

5 APRİL 2019

REGISTRATION

(08:00—08:30)

COFFEE BREAK AND NETWORKING

(08:30—09:00)

KEYNOTE SPEAKER

(Dr. Muhammad Muzammal)

(09:00—09:30)

COFFEE BREAK AND NETWORKING

(09:30—10:00)

BALIKLIGÖL HALL / BALIKLIGÖL SALONU

5 APRİL 2019 / FRIDAY / 10:00—11:30

10:00—10:15

Ferhat Kuyucak ŞENGÜR, "Industry Level Effects of Information Technology: The Case of Air Travel", Eskisehir Technical University, TURKEY

10:15—10:30

Arzu BALOĞLU, "New generation SAP with industrial case studies", Marmara University, TURKEY

10:30—10:45

Mehtap Özenen KAVLAK, "Innovative Methods in Industry: Virtual Reality Applications", Eskisehir Technical University, TURKEY

10:45—11:00

Mustafa ULUKAVAK, "Virtual Reality Applications in the Follow-up of Engineering Projects", Harran University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Research Asst. Şeyma AKÇA

(EMPLOYMENT & INDUSTRY)

GÖBEKLİTEPE HALL / GOBEKLITEPE SALONU

5 APRİL 2019 / FRIDAY / 10:00—11:30

10:00—10:15

Balca AĞAÇSAPAN, "Importance of Environmental Virtual Observatories(EVOs) for Environmental Conservation", Eskisehir Technical University, TURKEY

10:15—10:30

Zehra Yiğit AVDAN, "Virtual Geographic Environments for Water Ponds Bathymetry", Eskisehir Technical University, TURKEY

10:30—10:45

Mustafa ULUKAVAK, "Photo-Realistic Environmental Modelling For Virtual Reality", Harran University, TURKEY

10:45—11:00

Mustafa ULUKAVAK, "Transferring Historical Ruins to Virtual Reality Environment Using UAV Photogrammetry: A Case Study of Şanlıurfa Castle", Harran University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Research Asst. Yunus KAYA

(ENVİRONMENT)

GÖBEKLİTEPE HALL / GOBEKLITEPE SALONU

5 APRİL 2019 / FRIDAY / 10:00—11:30

11:00—11:15

Yunus KAYA, "Building Modelling By UAV Images", Harran University, TURKEY

11:15—11:30

Mustafa ULUKAVAK, "The Availability of Geodetic Data in Virtual Reality Applications", Harran University, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Research Asst. Yunus KAYA

(ENVİRONMENT)

HALFETİ HALL / HALFETI SALONU

5 APRİL 2019 / FRIDAY / 10:00—11:30

10:00—10:15

Emine Pınar MARTLI, "Augmented Reality Technology In Nursing Education", Kırıkkale Üniversitesi, TURKEY

10:15—10:30

Recep ASLAN, "The Use Of Virtual Reality In The Veterinary Medicine Education", TURKEY

10:30—10:45

Ali UZUNKÖY, "Virtual reality in medical education. Is it a dream or a reality?" Eskisehir Technical University, TURKEY

10:45—11:00

Alper VATANSEVER, "The virtual anatomy of the temporomandibular joint" Balıkesir Üniversitesi, TURKEY

OTURUM BAŞKANI / SESSION CHAIR

Prof. Dr. Mehmet Ali ÇULLU

(MEDİCİNE)

MAJOR HALL / BÜYÜK SALON
5 APRİL 2019

KEYNOTE SPEAKER

(Dr. Rui Filipe Antunes)

(11:30—12:00)

LUNCH AT CENTRAL CAFETERİA

(12:00—14:00)

TOUR

(Göbekli Tepe and visit of Mosaic Museum of Şanlıurfa)

(14:00—17:00)

GALA DİNNER (18:00—19:30)

TRANSFER TO AİRPORT

(19:30—20:30)

EXTENDED ABSTRACTS

USING AUGMENTED REALITY FOR THE PURPOSE OF CNC EDUCATION

Aytac Ugur YERDEN[1]*, Nihat AKKUS[2], Fatih YALCIN[3]

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EXTENDED ABSTRACT

It is important in terms of the success of the education to transfer a training about manufacturing technologies to the student in a fast process. Generally, the theoretical explanation of CNC systems is not sufficient for the recognition of the device. Combining the notes in traditional education with today's technologies will have an impact on the quality of education. For this purpose, the stages of establishing a lecture note with augmented reality support for CNC training have been the subject of the study.

Augmented reality is described as real-time and interactive enabling the real world to be enriched with virtual data and information (Somyürek). The use of traditional looms in manufacturing decreases gradually and is replaced by the use of CNC machines (Kaygısız). CNC machines consist of three basic components; (i)Mechanical System, (ii)Electronic System, (iii) Control Unit (Akkus). Applying real CNC machines, can deal with various accidents. Various simulation systems are used to eliminate these problems. The corresponding meaning of the code written in the simulation environment can first be observed on the virtual CNC machine before it is applied to the actual CNC machine (Aktan). A simulator is presented for both the entire NC machine and the tool path (Ernesto). The advantage of mixed virtual reality simulators is that separate warehouses are not needed to store the large machines or physically move them for comparative testing. (Galambos). A strong and growing area is the manufacturing applications using AR technology. (Ong).

This research aims to improve the preparation of a traditional course note with the use of augmented reality application for the purpose of CNC training. A course material has been prepared including the definition, purpose and use of CNC. Students will provide an augmented reality supported CNC training application to their mobile devices (smartphone, tablet computer, etc.) with the help of a QR code on this course material. It will be ensured that a CNC machine will work with the installed AR application and provide information as a 3D model on the traditional course note. In CNC training, the advantages and disadvantages of AR application are assessed and the results are attempted to be revealed.

The training's goal, objective and training outcomes should be determined during the stages of forming a course note for training purposes. The objective of basic CNC training is to be informed about the working principle and construction properties. The 3-D models of the 2-D shapes in the course note are prepared for this purpose in the computer environment and then introduced to the development stages of the application supported by augmented reality. A pointer is set to display the 3D model. The pointer may be designed as a two - dimensional shape in course note or another shape. A package is created by registering to the Vuforia developer website(Vuforia) to identify the designed pointer. The package created will be imported into the UNITY3D software (UNITY3D). The reason UNITY3D and Vuforia are preferred is because they offer solutions that are quick and easy. In addition to these software,

it is possible to use different options. The 3D model that is generated is imported into UNITY3D. Animations, explanations and similar improvements are added to the 3D model with the help of UNITY3D and then exported as an android application. Access to the exported application is installed under a server or on an android market. In order to access the application, a QR code is created and placed on the course note. The application created with these steps is ready for the phase of testing.

In the study, the advantages of the application in CNC training will be listed: (1) Lecture notes on a 2-dimensional shape of the device, which provides them with the opportunity to examine three-dimensional model, (2) Information about the construction of CNC on the model can be learned, (3) Knowledge of the operating principle of CNC can be provided.

The disadvantages of the application in CNC training will be listed: (1) The 3D CNC model shows a uniform model, (2) Hardware requirements may exist for a realistic 3D model visualization, (3) The application may not work if the print quality of the pointer is problematic.

As a result, the educational contribution to such an application developed for the purpose of the CNC training base is quite high. When comparing the advantages and disadvantages, it is important to have a basic knowledge of the 3-dimensional model rather than the device's actual size. Occupational safety issues can be avoided in this way. The developed application will be tested on student groups in future studies, and the results will be shared.

Keywords: Augmented Reality, Virtual Reality, CNC Education, UNITY3D, Vuforia

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USE OF VR TECHNOLOGIES IN LANDSCAPE DESIGN AND URBAN DESIGN: ESKIŞEHIR, R & D, INNOVATION AND DESIGN VALLEY DESIGN SAMPLE

Talha AKSOY[1*], Serhat SARI[2], Alper ÇABUK[3]

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EXTENDED ABSTRACT

The primary objective of this study is to use the virtual reality (VR) technology during the study of landscape architecture design. The design and / or planning area can be experienced in 3-dimension by VR technology. This experience helps a better understanding of the field compared to conventional graphic expression language. The scope of the study is limited to landscape elements. It is aimed that the designer and / or the end user will experience the incomplete (or completed) design with VR technology.

Virtual reality is a computer simulation that allows one to interact with artificial 3D environment. The user uses VR applications with glasses, headphones, gloves and / or clothing. The user can experience telepresence with VR via sensors. User can see objects from different angles with head turns. It can move in 3D environment by various sensors. It is important to be able to navigate through computer simulations in a design area. This can give the designer a complete sense of experience. It is divided into 3 stages as architectural works for designers. According to Lebahar (1983):

1. Architectural diagnosis,
2. Graphic presentation of the object to be created (creation of the object in the mind)
3. Creation of construction model.

Lebahar's graphical presentation of the object to be created allows VR technology to be experienced in virtual form rather than as a graphic presentationPortman, Natapov, and Fisher-Gewirtzman (2015) reported that Virtual reality applications are experienced in people (intensive, interactive, immersive, illustrative and intuitive). Each experience is examined in terms of VR;

1. Illustrative: The information in the field designed with VR, is presented in a user-friendly way.
2. Immersive: With the VR, the user can feel himself / herself in the area, which ensures maximum interaction.
3. Interactive: With VR, user can interact with objects (via sensors).
4. Intuitive: Virtually generated information can be easily detected by human intuition.
5. Intensive: With VR, difficult to understand information / concepts / rules can be easily transferred. These experiences can help the designer perceive the field more accurately. However, in the literature, the concept of virtual reality is less effective than the real reality and augmented reality in the dimension of perception and interaction (Image 1). In spite of the visually rendered architectural presentations, it is more difficult to understand besides VR applications. Because human perceptions have been working in 3D since the day of birth. It is difficult to convey the sense of depth in the 2-dimension.

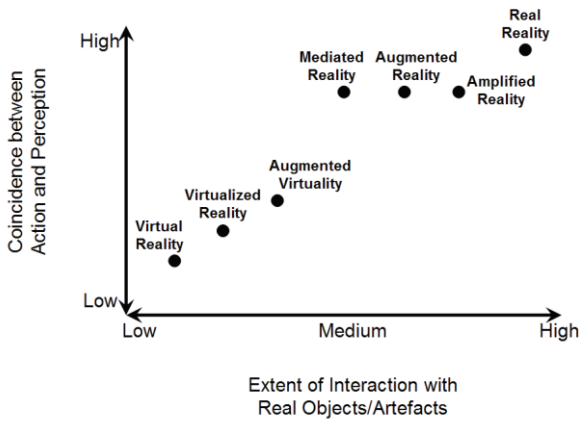

Image 1. Classification of reality concepts according to correlation between perception and action and level of interaction

VR technology is used in landscape architecture as it is used in various studies in architecture. According to the study of Lange (2011), VR technology is used in landscape planning and landscape design studies. It has been used as the final product of the design, especially in landscape restoration, green infrastructure, planning of recreation areas and many other fields of landscape architecture. The experience of users in the large-scale landscaping projects is tested by VR presentations. The feedback is intended to guide the designer. When it comes to urban planning, various advantages and disadvantages are encountered. The use of VR technology in urban planning;

- VR technology provides an easy understanding of the complex network of relationships in urban models.
- Instead of animations or visuals prepared from a single point in advance, the VR can move freely within the model. This freedom of movement can be seen from many different perspectives.
- 360 degrees generated image can be projected to 360 degree panels to create field perception.
- Users can give feedback quickly
- The ability to gather different disciplines under one roof (from real estate agents to traffic engineers, architects and city planners) can be used as an advantage.

As a disadvantage, property rights, technical difficulties and security problems are considered.

In this study, R & D, Innovation and Design Valley Design Sample are created in virtual environment by using VR technology. In landscape architecture works, computer technologies are used to create virtual environments. In VR, the models covered with 3-dimensional material were used for the virtual environment. These models are processed with rendering engines and photorealistic images are created to give a sense of reality. Google Sketchup design program and 3D models from the Google Warehouse were used. Through the software, 360 renderings of the products were taken in 3D environment. Result renderings are presented via smart phone plugged into VR glasses. In this study, the landscaping elements designed in a virtual environment was transferred to VR environment. Design studies were made with conventional methods before transfer. In the final phase of the study, all drawings were transformed into 3D models. And 3D rendering is taken from the virtual environment. There aren't any 2-dimensional objects in the design study. In this way, VR environment is defined as interactive.

Keywords: VR, Landscape Design, Urban Design, Physical Design Processes.

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REPRODUCTION AND EXPERIENCE OF BAUHAUS DESIGN SCHOOL'S ICONIC PRODUCT DESIGN WİTH VIRTUAL REALITY (VR) TECHNOLOGY

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EXTENDED ABSTRACT

The primary purpose of this study was to reproduce the iconic products that designed at the Bauhaus Design School through VR technology design. Re-production of a real product in a different perception dimension in a virtual environment through VR technology brings a different experience as a natural result. The scope of the study is limited to iconic Bauhaus products. This study aims to contribute to the presentation of design products. With VR technology, an alternative to conventional presentation methods can be established.

Virtual reality is a three-dimensional simulation model that gives the participants a realistic feel and allows mutual communication with a dynamic environment created by computers. This will significantly improve the grip and detection power of the designed systems.

Virtual reality has become a useful tool in many different areas. For example, the use of virtual reality in mathematics, science, medicine, military and aviation education is extremely important for the quality of education. Today, America and Japan are equipped with video arcades based on VR technology. Besides, it has been observed that virtual sex applications have aroused great interest and promised significant commercial successes.

A project using VR within the scope of urban studies was developed for the city of Beijing. In addition to these studies, virtual reality has been used by designers as a representation tool in the field of design. Virtual reality differs from the traditionally used representation environments, in particular from the possibilities of depth perception. Depth perception is the visual perception of the third dimension of the real universe. Depth perception is generated by information from depth information sources.

In the scope of this study, three different products were selected that produced in the Bauhaus Design School as a sampling for VR and design co-operation. All these three products are the most important examples of Bauhaus school.

At the end of the 19th century and the beginning of the 20th century, the rapid technological developments that emerged led to the emergence of new aesthetic quests that influenced the demolitions, art and thought fields created by wars. It is possible to say that the modern art that started with romance was spreading with impressionism and that it was finding its way together with Paul Cezanne. In the paintings he made in 1901, Cezanne divided nature into cube, cylinder and cone shaped geometric pieces and pioneered the Cubism movement.

The developments in art have affected science, and the technological developments brought by science have accelerated to art. In contrast to impressionist artists, cubist artists interested in the structures of objects have benefited from the possibility of analytic cubism, which has continued since the Renaissance, without being bound to a single point of view, which allows to show objects on all sides.

In the first thirty years of the 20th century, parallel to the events and cultural changes in the society, art movements such as Cubism, Fauvism, Expressionism, Futurism, Dadaism, Ready-Made, Construcism and Surrealism emerged. The developments in industry and technology experienced in this period caused the need for aesthetic styling. Bauhaus, an organization that has fundamentally influenced art education after the First World War, was founded in 1919 in Germany, at an important point in its efforts to reconstruct the association of artistic, technical and production divisions separated by industrialization. The Bauhaus concept aims to create a suitable environment for the interaction between the two fields of work by eliminating the obstacle between the applied arts and the fine arts. The purpose of the Bauhaus has never been to train craftsmen, and the basis of the education and training is based on a workshop system that will develop personal skills. Workshops are used as research laboratories, modules that are in need of industry are prepared in these workshops.

Within the scope of the study, 3 products were selected to be experienced in VR environment. The first one is the Barcelona Chair designed by Ludwig Mies van der Rohe. This product was designed for the German Pavilion at the Barcelona International exposition held in Spain in 1929. The second product is Wassily Chair designed by Marcel Breur in 1925. This product is also known as B3. This chair is one of the most important icons among modernist design samples. The last product selected for the study is Nesting Tables designed by Josef Albers in 1927. It is a good representative of Bauhaus design school with its simple and elegant design.

Three different materials were used in this study. These are respectively;

1. 3D Model
2. Software
3. and Hardware.

Google Warehouse is an open resource library for 3D models. By means of the software, video rendering of the products in 3D environment was performed. VR glasses, which can be integrated with smart phones, are the hardware side of the work and the environment in which the products are presented. The iconic products of the Bauhaus Design School selected for experience in the VR environment are as follows;

1. Barcelona Chair designed by Ludwig Mies van der Rohe
2. Wassily Chair designed by Marcel Breuer
3. Nesting Tables designed by Josef Albers

3D models of products that obtained from the Google Warehouse are prepared for rendering via Google Sketchup software. 3D models are rendered in 360-degree photorealistic style. The rendered output can be experienced with VR glasses and made ready for presentation in a virtual environment (Figure 1).

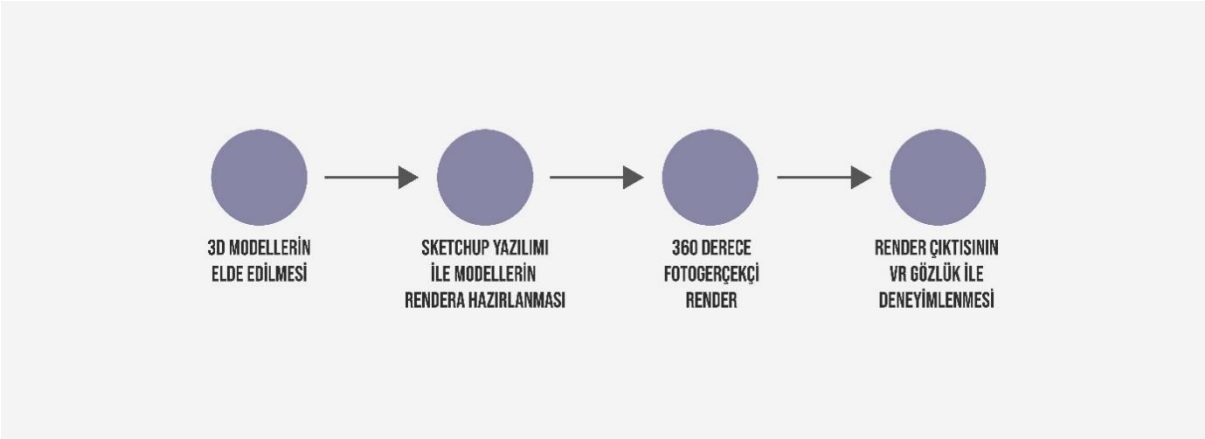

Figure 1. Flow chart

With this study, the concept of virtual reality has turned into an application in the field of design. An example of previously designed product is reproduced in a different environment through this application. The product that is reproduced in the virtual environment offers a new experience to user. In addition to reproducing and experiencing a product in a virtual reality environment, an alternative to conventional presentation techniques has been created. This application has the potential to support future studies on the experience and presentation of design product.

Keywords: Virtual reality, Product design, Bauhaus design school, Iconic design,

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A SAMPLE OF BENEFITING FROM AUGMENTED REALITY TECHNOLOGIES FOR INCREASING SPATIAL LITERACY FOR PRIMARY AND SECONDARY SCHOOL STUDENTS

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EXTENDED ABSTRACT

From our prehistoric ancestors, mankind tries to understand their environment better to avoid from its dangers and to benefit from its rich resources. To achieve this, mankind tried to mark and understand his environment. This behaviour is a basic example of spatial literacy. Success in today's world is not different either. An individual need to understand his environment better than others to get ahead. The modern human needs various of skill sets like literacy, economical literacy, healthy literacy, political literacy, spatial literacy etc. to success in our modern world. It is not wrong to assume that many career paths in our modern life needs an individual to visualize 2 dimension projection into 3 dimension . The purpose of this study is to evaluate the impact of modern high-tech technologies, especially Augmented Reality (AR), on spatial literacy learning of primary and secondary school students.

In the scope of this study a puzzle game powered by Augmented Reality technologies is created. The idea to create this game is to boost the degree of spatial literacy of secondary school students. The puzzle game is limited to a basic political map of Republic of Türkiye. Powered by Augmented Reality technology, the goal of this study is an increase the interest of secondary school students in Geography classes. In addition, it is expected to increase knowledge of political map of Türkiye and the local traits of cities of Türkiye such as traditional foods, trait animals, trait artefacts etc.

Spatial literacy is the degree to infer and interpret the location, distance, direction, relationships, change, and movement over space. Spatial literacy or spatial thinking can be described in four basic features:

- An individual to recognize, observe, record, describe, classify, remember, and communicate the two- or three-dimensional shapes, structures, orientations, and positions of objects, properties, or processes
- To be able to manipulate those shapes, structures, orientation and positions by rotating, translating, deformation or partial removing
- To be able to infer about those objects structure, shape, orientation and positions
- To be able to predict the consequences of those shapes and structures positons

To summarize, spatial literacy is the know-how of relationships of objects in environment.

Augmented reality generally can be confused with Virtual Reality. Virtual Reality is an artificial environment created by using an software. The user accepts this virtual environment as real environment. Though, Augmented Reality can be described as integration of 3 Dimensional virtual objects into 3 Dimensional real world in real time. Augmented Reality has lots of usages in our modern world such as medical, engineering, military applications, entertainment etc. an Augmented Reality application should have at least three major properties such as; combining the real world with virtual objects, should run in real time and should register virtual and real objects mutually.

The main instruments of Augmented Reality are computers and input devices. Nowadays the main devices are head mounted displays, handheld displays and pinch gloves. Head mounted displays have either one or two optical displays on eye. Pinch gloves are used to grab a virtual object with pinching gestures. Nowadays pinching gloves gives its place to image processing methods to identify the pinching gesture. On the contrary, handheld displays are the most used tools for Augmented Reality because of their affordable price and worldwide usages. The most famous ones are our everyday Smart-phones, PDAs and Tablets.

Using Augmented Reality is not a new idea in military, medical, engineering design, consumer design, gaming etc. Augmented Reality applications make an individual to interact with the real world such a way that never happened before by displaying various information about an object in real time. In Turkey the usage of Augmented Reality application has risen after the Fatih project. After that project nearly, all classes have smart boards. But the Augmented Reality applications are not enough. There are many ways of usage of Augmented Reality applications in education. For example, a student can move, dismantle, put together a 3-dimensional object as it was real. Another interesting application may be augmented reality textbooks. By using some special software and applications this written plain 2-dimensional textbooks may turn to 3-dimensional dynamic information sources. For example, a student with a smart phone can see the 3-dimensional elephant object just scanning a 2-dimensional elephant image by his smartphone camera.

The main instrument of this study is to create a classic puzzle game powered by Augmented Reality. There are two main steps. First is to create the puzzle. To achieve this the political map of Türkiye has been laser cut by the city's borders. The second part is the create the special application for android smartphones. Some special softwares are used to create the application. Unity is an award winning game engine that supports many platforms. By developing in Unity, an application could be ported to android, IOS, several headsets and several operating systems. Microsoft Visual Studio is the basic Integrated Development Environment to develop and modify Unity scripts. Vuforia is a partially free software development kit created by Qualcomm. It is mostly used to register 2-dimensional image layers or texts. In this study image registration is used. There are different usage types of Vuforia, but in this study the device database is used. To be able to use Vuforia, first an image database should be created and the images should be registered in this database.

In this study all the images of puzzle pieces, taken by camera are registered in Vuforia. After a puzzle piece is scanned by an android smartphone, a trait of that piece appears on screen as 3-dimensional object. That object can be rotated and moved by the user.

After the puzzle game is finished it will be tested on two secondary school class. And the results will be collected by using surveys for both teachers and students. The expectations of the result of this study are to increase the interest on geography class and to increase the knowledge of the cities of Türkiye.

Keywords: Augmented Reality, Spatial Literacy, primary school students, secondary school students, education game

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IMPORTANCE OF ENVIRONMENTAL VIRTUAL OBSERVATORIES(EVOS) FOR ENVIRONMENTAL CONSERVATION

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INTRODUCTION

The earth's environment is under severe stress from uncontrolled human activities. 260 million tons of plastic in the world produced each year, about 10 percent ends up in the Ocean(Greenpeace, 2006). According to The International Telecommunication Union (ITU) 2017 reports, by 2016, the world generated 44.7 million metric tonnes (Mt) of e-waste and only 20% was recycled through appropriate channels(ITU, 2017). These human caused environmental changings makes sustainability more important. The current environmental problems reveal the necessity of the adoption of the sustainability phenomenon that requires the protection of natural resources and effective use.

However, there are many difficulties in solving environmental problems. The data needed to understand the natural processes should be collected and the impact of human activities on natural processes should be understood correctly. In this process, various disciplines and related organizations that need expertise should work together. In addition, the data must be collected, stored and shared. The most appropriate decision should be made in the shortest time by using various kinds of data. In addition to all these, it is important to ensure that all stakeholders, including decision makers and practitioners, as well as citizens are involved in achieving the goal of a sustainable World.

In this regard, developing technology effectively contributes to the process of solving environmental problems and the effective use of available resources in the context of reducing environmental degradation.

Environmental observatory techniques and environmental virtual observatory techniques can be used to solve environmental problems and provide environmental awareness as tools to facilitate the access to information and to enable the processing and association of the information gathered, to make the data meaningful and to enable multiple stakeholders to work in a common platform. In this study, VOs and EVOs are explained. Where EVOs are used, it has been investigated and discussed for other purposes.

VIRTUAL OBSERVATORY TECHNIQUES

Virtual Observatory techniques is an computer based technologies which are use to visualisation of data in other words replicate an environment, real or imagined, to simulate a user's presence. Earth science includes the main disciplines (eg.engineering) that need a modelling and visualising the earth environment. Especially in environmental managemet process, obtaining earth data, integrating with different platforms, simulating environmental process and making correct desicion making is important for sustainability.

With this regard, collected earth observation data by using sattelite technology has increased considerably over the last decades. Each day several terabytes of data per day collected and transmitted to earth. Managing this huge data is the major problem for various agencies forinstance ESA (European Space Agency), NASA(National Aeronautics and Space Administration) and European National Space Agencies. To make the accesible these huge environmental observation data with end users, agencies designed and implemented Technologies for developing Environmental Virtual Observatories(EVOs). One of the example is TELEIOS which has designed and implemented technologies for developing EVOs. Virtual Earth Observatories(EO) enable satellite data together with other kinds of external data (e.g., maps or information from the Web) to be combined, to extract knowledge that is the basis for the development of applications targeting EO scientists, decision makers and the general public.

Generally, EVOs enable rapid exchange of new information and decentralisation of information flows from various data archives and sensors, whether ground-based or remote, to any web-enabled device such as computer tablets and smartphones. A review of EVOs indicates wide-ranging applications as a decision support tool for the management of water resources, natural hazards and biodiversity. These Technologies enable integrated representations of complex, multi-dimensional environmental processes, for instance, visualisation of flooded areas in multiple river basins or large scale weather systems. Table 1 describes the types of EVOs and their properties(Karpouzoglou et al., 2016).

Table 1. Types of EVOs and their properties

Types of EVOs and properties

Classification	Description	Properties of interest	Sources of uncertainty	Examples
Environmental sensor networks	Technologies that support measurements of the physical environment	Decentralised communication of observations	Measurement errors (biases, equipment failures)	Weather stations, Earth-observing satellites
Data and knowledge hubs/portals	Web-hosted platforms that allow upload and download of content	Openness, anonymity, (a-) synchronicity	Unverified content	EPA STORET/WQX[a] Data Observation Network for Earth (DataONE)[b] USGS National Water Information System[c] EarthCube[d] WeAdapt[e], Mountain Observatories[f]
Environmental data visualisation and monitoring platforms	Web-hosted platforms that enable visualisation of spatiotemporal data on real-time and non-real time basis	Openness, timeliness	Errors from interpolation and rescaling of measurements	Weather forecast websites NCSA Virtual Sensor System [12] TELEIOS [13] Mid-Atlantic Watershed Atlas [14]; World Bank's eAtlas[g]
Environmental modelling platforms/decision-support systems	Web-hosted platforms that allow exploration and analysis of data under various scenarios/decision pathways with partial or total control over the scenarios and methods of analysis	Openness, anonymity, (a-) synchronicity, feedback loops, collaborative learning	Errors from interpolation and rescaling of measurements, simplification of known processes, and non-representation of unknown processes.	EVOp [15] Water2Invest [16] eHabitat-GEOSS (Global Earth Observation System of Systems) [10] BioVel [17] Model Information Knowledge Environment (MIKE) [18] Water World [19]

[a] Source: http://epa.gov/storet/; URL snapshot, https://archive.is/OImOj [archived 09.06.15]
[b] Source: https://www.dataone.org/; URL snapshot, https://archive.is/k50Ep [archived 09.06.15]
[c] Source: http://waterdata.usgs.gov/nwis; URL snapshot, https://archive.is/A0Tp4 [archived 09.06.15]
[d] Source: http://earthcube.org/; URL snapshot, https://archive.is/1XQm [archived 09.06.15]
[e] Source: https://weadapt.org/; URL snapshot, https://archive.is/4imAV [archived 09.06.15]
[f] Source: https://www.google.com/maps/d/u/0/viewer?mid=zhfDZt-F7c_g.k9ONzFyPYChQ; URL snapshot, https://archive.is/q08Dg [archived 09.06.15]
[g] Source: http://data.worldbank.org/products/data-visualization-tools/eatlas; URL snapshot, https://archive.is/VffzZ [archived 09.06.15]

Environmental protection studies involve the processes required by various experts, especially the engineering discipline. EVOs can make significant contributions to environmental protection applications as an effective tool in data management, data analysis, simulation process and decision-making. The ability to create a platform to bring together the knowledge of scientists and people with local knowledge provides the right decision, while real-world simulations, games, interactive group exercises, etc. can be increased by increasing the number of participants, making the right decision in environmental projects and moving all stakeholders to a common goal(Yua et al,2018).

In addition, interactive groups made with observatory techniques used in the areas of education, medicine and health, travel, culture, sport and recreation, games, experiences exercises also support the production of knowledge. These practices have also contributed to environmental awareness, sustainability and environmental conservation. For example In 2016, the Virtual Human Interaction Lab (VHIL) released a short documentary and an interactive VR game about the issue of ocean acidification, or how excess CO2 in the atmosphere is turning the ocean waters more acidic, affecting marine life. The other good example is in the Museum of the City of the New York, Future City Lab Kubi Ackerman, Director of the Future City Lab, makes an innovative, interactive applications for trying to improve the environment of New York City (Future City Lab, 2019).

In this study, VO explained, its main applications were sampled, EVOs were explained and EVOs' applications in the context of sustainable resource management and environmental protection applications were examined. As a result of the research, it is seen that EVOs applications are gaining importance and increasing the data every day and it is seen that EVOs applications are an effective tool in data protection, visualization of data, sharing with decision makers and all other stakeholders, high persuasion ability and environmental protection applications.

Keywords: Environmental Technologies, Environmental Conservation, Environmental Virtual Observatories

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PHYGITALLY YOURS: EXAMINATION OF VIRTUAL REALITY EXPERIENCES IN DIGITAL SPORT GAMES

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EXTENDED ABSTRACT

The concept of marketing (Kotler, 2000), which is defined as meeting the needs of people in a profitable way with the most general form of facilitating and completion of the changes, continues to be influenced by the changes created by today's world (Yüce et al., 2017). According to this, digital marketing is the most fundamental marketing approach that stands out in the digital period.

Digital marketing can be defined as the most general form of marketing methodology performed through digital channels and bringing all marketing applications to the digital environment. The digitalization and digital world, which started about 1990s, revealed post-digital marketing. The most recent concept that developed following the digital world and took its place in human life is the phygital world (Odabaşı, 2017). The word "Phygital" has emerged as a combination of the two words: physical and digital. The concept of phygital, which expresses the inseparable integrity of digital and physical, refers to the marketing method that enables the consumer to reach the most accurate and effective way by combining physical and digital world (Moravcikova & Kliestikova, 2017; Belghiti et al., 2017; Miller, 2015). While popular applications such as Google Glass, Apple Watch, virtual reality - augmented reality, which are known by almost everyone, are among the examples that can be given in the field of Phygital marketing, the application that is the pioneer of Phygital marketing is specified as Pokémon Go (Vivion, 2016; Allison, 2017; Kozlowski, 2017).

Phygital marketing adopts the principle of combining the digital worlds of users with their physical worlds. In this context, virtual reality (VR) and augmented reality (AR) applications stand out. Although virtual reality and augmented reality applications directly affect almost every field, demand and investment for digital games, which are accepted as the exit point, are increasing day by day by both companies and consumers (Dickson, 2017; Smith, 2017; Logan, 2017; Murti, 2018; Pierce, 2018). These and similar situations present qualities that support the use of virtual reality applications that are more functional and that have the purpose of obtaining results which will contribute to different disciplines through different researches. Accordingly, determining the experiences created by virtual reality within the scope of phygital marketing is considered important for the purpose of contributing to marketing - virtual experiential marketing, marketing communications and other similar areas. In the light of all this information, the aim of this research is to examine the experiences of digital games with sports and recreation content within the scope of phygital marketing.

Within the scope of the research, judgemental and snowball sampling techniques, which are commonly preferred in qualitative research, were used to determine the respondents (Heckathorn, 2011; Tongco, 2007; Babbie, 2013). Individuals who had no previous experience of virtual reality were identified within the context of judgemental sampling and study objective, and other individuals who did not have similar experience were reached following the recommendations of these individuals. Accordingly, the study was conducted on a voluntary basis with 6 male and 2 female respondents. Sony PlayStation 4, Sony Ps4 VR and compatible games were used to provide participants with a virtual reality experience. The study was conducted in a laboratory environment isolated from the external world and the participants were asked to play; VR Worlds-Ocean Descent, VR Worlds-Danger Ball and Grand Turismo Sport respectively. Time for each game was limited to an average of 15 minutes.

Following the individuals' experiencing the games, in-depth interviews were conducted using a semi-structured questionnaire to determine virtual reality experiences. The basis and themes of the semi-structured questionnaire form, which consists of 10 questions in the light of the relevant literature, constitute the dimensions of virtual experiential marketing as presented by Luo et al. (2011). According to this, questions prepared by the researchers about sensory experience, interaction experience, pleasure and enjoyment experience, flow experience and purchase intention were asked.

Data obtained from semi-structured interviews were analysed using a content analysis methodology by 4 experts with a postgraduate degree. The reliability of the analysed contents was calculated based on the formula by Miles and Huberman (1994). In this context, a consensus was reached for all codes (α=1,00).

The themes and codes that stand out for the questions in the interviews are as follows:

Table 1. Codes Related to Virtual Reality Experiences of Respondents

Theme	Code
Sensory Experience	*Showroom feeling* *Perfect Holistic Effect* *Magic*
Interaction Experience	*Enough and Simple (Understandable)*
Enjoyment / Pleasure Experience	*Gorgeous* *Reality perception* *Competition* *Dilemma*
Flow Experience	*Time and Place Independent* *Behaviour* *Intention to Purchase*

Based on the data and findings, it was determined that individuals who had no previous experience of virtual reality related to recreation and sports games had positive experiences with virtual reality and that this might have a direct influence on their intention to purchase. In addition to this, the most important factors that stand out for individuals are determined as the perception of being independent of time and place, the change of perception of reality and the dilemmas that are reflected in the mood of individuals depending on these situations.

Keywords: Phygital Marketing, Digital Sports Games, Experiental Marketing

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INNOVATIVE METHODS IN INDUSTRY: VR APPLICATIONS

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EXTENDED ABSTRACT

Virtual Reality (VR) is "a rapidly developing computer interface that strives to immerse the user completely within an experimental simulation, thereby greatly enhancing the overall impact and providing a much more intuitive link between the computer and the human participants". The birth of VR has begun in the 1950s and 1960s with the device named "the ultimate display". The Augmented Reality (AR) and VR have reached its current state today as a result of the interest in VR and the rapid advances in technology. Today, the interest in VR continuously increases. The computer games and videos take first place amongst the sectors demanding VR applications. In addition, VR technologies have lately become popular in medical, educational and military fields. For the companies, on the other hand, VR applications are a matter of research and interest in terms of their applicability to minimize the costs during a variety of operations.

AR and VR have been seen as entertainment-oriented technologies due to their ability to bring the digital and real world together. But in reality, it is much more than that. AR and VR technologies have the potential to have more practical applications beyond a virtual game. Experts agree that AR and VR are efficient technologies for modifying information communication and sharing as a consumption activity. In the field of business, VR might have significant benefits on processes such as production, marketing, design, and communication.

In the manufacturing sector, it is possible to efficiently utilize the VR applications both for production and marketing stages. During the first phase of the production process, VR technologies can be beneficial tools to minimize the time and money losses resulting from trial and error methods. Besides, VR is supposed to provide attractive and useful solutions to market and present a diversity of products to the customers, especially in cases when the goods/products are in different types, models, volumes, designs and difficult or disadvantageous to be transported especially to the places such as product exhibition halls and trade fairs. At this point, VR applications can help the companies present most of their product ranges and give the customers opportunities to experience as many of them as possible.

The concept of virtual manufacturing was presented by researchers from the University of Maryland in 1995. The biggest problem to design and produce a new product with a marginal benefit is the long design processes and the extra cost. This kind of problem is encountered in both large and small and medium-sized enterprises (SMEs). Observed problems in SMEs are generally not solved by computer-aided technologies and this situation causes time and money losses. From this point, the integration of big companies with new and developing technologies in the AR / VR area is aimed at reducing the time and money loses associated with all processes from product design to marketing. Besides, VR allows customers to experience a product even if it is not in a physical environment. VR provides a different, catchy and impressive environment for potential consumers. The effect of this environment is beyond traditional 2D screens. Research has shown that in some cases this effect may even exceed the actual situation. The key application of VR is brand management. For example, with an exclusive partnership with Oculus Rift, Nissan IDx provide potential customers with the opportunity to design their own cars using VR at the Tokyo Motor Show in March 2018. The Volvo XC90 presents VR based driving experience to its customers before buying a new car. Honda also has a VR application to experience the use of the ultra-fast Honda motorized Dallara.

To sum up, the AR and VR technologies can provide to businesses with data that can help detect, correct, and modify flaws in product design. Additionally, businesses may

influence their potential customers by providing a more realistic approach to marketing and advertising through these technologies. Thus, the businesses which don't produce a real prototype or show a real product in the showrooms save not only time but also millions by using AR and VR technologies. Within this context, the aim of this study is to examine the possible application fields and cases of VR applications in the field of industry and administration. Accordingly, value-added solutions will be proposed to facilitate operational processes. In addition to using VR applications in the game, design, retail, industry, and marketing, the course of investments in the market has been evaluated. Specific examples have been presented for the use of these applications. As a result, the current state of these technologies has been determined. Innovative recommendations have been presented about how to evaluate this technology in the future.

Keywords: Cost Saving, Industry, Virtual Manufacturing, Virtual Marketing, VR.

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SILHOUETTE ANALYSIS WITH 3D DEVELOPMENT PLAN: THE BOSPHORUS CASE

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EXTENDED ABSTRACT

Many of the data produced in recent years have gained a spatial dimension. These data are generally used in two dimensions. In the recent past, the need for management of growing structures, the need for indoor navigation, the need for analysis and visual studies on projects and plans before being implemented in the real world has made it necessary to obtain the third dimension to spatial data. Three-dimensional spatial data are used in urban studies in a wide range of areas, from underground modeling to architecture. Local governments focus on representation and modeling of the above ground objects in the third dimension. Structures which are the essential components of cities are an important part of three-dimensional (3D) urban models. 3D urban models are used in many studies such as disaster, pollution, viewshed and silhouette analysis. Silhouette analysis which is included in the visibility analysis is of great importance to protect the urban architecture in urban planning and to make the right decisions in the production of development plans (Temuçin Kılıçer, 2018).

Since the 1950s, Istanbul silhouette has undergone many changes due to intensive urbanization. Different methods have been used to detect the silhouette changes in Istanbul. Silhouette changes in Istanbul can be determined through panoramic photographs (Şevkin, 2017). On the other hand, by developing desktop software, silhouette extraction can be performed; and it is possible to determine the buildings that distort the silhouette along with the number of floors (Temuçin Kılıçer, 2018).

In this study, it was investigated whether the buildings to be constructed according to the construction values in the development plan will cause a change in the previously determined silhouette area along the Bosphorus. At the same time, in order to prevent silhouette from being disturbed, it is investigated how high the building should be constructed and how the silhouette changes when viewed from different points. Through the study, the difference between the buildings to be built according to the development plan and the existing buildings can be visualized as 3D. The boundary of the study is the remaining part of the Bosphorus silhouette in Üsküdar. In this study, CityEngine and ArcToolbox 3D Analyst tools of ArcGIS Pro were used as software and module. Digital elevation model (DEM), existing buildings, development plan, parcel, and silhouette area were used as data. The DEM has 5-meter spatial resolution. The existing building layer was obtained from the building layer which was constantly updated in the Üsküdar Municipality Urban Information System. The existing buildings are made in 3D by using the number of floors. Development plan layer has basic attributes such as base area coefficient, floors area coefficient, pull distance of front side and back yard, building height, and the number of floors. The silhouette area layer was obtained from the Istanbul Metropolitan Municipality. In the scope of the study, the existing buildings in CityEngine were rendered in 3D on the topographic model in Level of Detail 1 (LOD1) according to the floor height. Then the construction values of the relevant planning area are calculated on the parcel layer. Parcel layer has become 3D in CityEngine according to plan construction values. This was done by writing the rule in CityEngine software. In this way, the status of buildings to be constructed according to the current and plan situation can be visualized in 3D. These buildings represent the buildings to be constructed according to the

plan. The planned buildings which were made three-dimensional were raised from the height in which they were located.

For the analysis of silhouette, observer points were created at the average height of people at the coastal area in various parts of the European side. From these observer points towards the buildings in the silhouette area that were raised according to the development plan were analyzed for visibility in CityEngine software and it was determined whether a person could see those buildings. In the ArcGIS Pro software, Construct Sight Lines (CSL), Line of Sight (LOS), and Skyline tools were used as the other method for silhouette analysis. With the CSL tool, lines of sight were formed from the observer points towards buildings that can be constructed according to the development plan in selected parcels. Then, by the LOS tool, it was determined whether these observers could see the buildings to be constructed according to the plan. With the Skyline tool (URL-1), the silhouette area was recalculated according to the buildings in the development plan. In this way, it was determined that the new buildings were changed by comparing the existing silhouette area and the silhouette area according to the plan. Some of the methods used in this study were applied for İstanbul Zincirlikuyu-Maslak region in order to determine the change of silhouette in the past (Girginkaya Akdağ, 2011).

With this study, it was determined by silhouette analysis whether the silhouette was deteriorated according to the number of floors while creating a draft of development plans. At the end of the study, it is determined that the buildings to be constructed in the silhouette area of Üsküdar cause deterioration in some places in the silhouette. The main reason for this status, in the silhouette area, mostly four-story buildings are allowed except the basement floor.

For further studies, the use of roof height of buildings and higher resolution DEM can make the study better in terms of quality. In addition, a more transparent structure can be established by publishing existing and planned buildings with CityEngine for web and mobile environments. CityEngine can be configured for virtual reality applications for the Oculus Go and Samsung Gear VR headset. In this way, the studies to be done according to the plan can be observed more realistically.

Keywords: 3D Development Plan, Silhouette Analysis, Bosphorus, Architectural Texture, City Planning

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INDUSTRY LEVEL EFFECTS OF INFORMATION TECHNOLOGY: THE CASE OF AIR TRAVEL

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EXTENDED ABSTRACT

This paper explores the effects of information technology to the airline industry It provides an overview of the airline industry structure with a focus on information and information technology and past and current airline distribution channels. On the basis of this investigation the model proposed by Parsons is used and impacts of IT on airline industry is analyzed with this model's industry level framework. Parsons identifies a three-level framework to assess the impact of IT on businesses: industry level, firm level and strategy level.

The Three-Level Impact of IT		
Industry Level	**Firm Level**	**Strategy Level**
IT Changes an Industry's:	***IT Affects Key Competitive Forces:***	***IT Affects Firm Strategy:***
Product & Services	Buyers	Low-Cost Leadership
Markets	Suppliers	Production Differentiation
Production Economics	Substitution	Concentration on Market or Product Niche
	New Entrants	
	Rivalry	

Parsons, 1983.

According to Parsons IT Changes an industry's the product and services, markets and production economics. Air transportation is one of the most rapid paced industries. It is also a global industry that links the communities, suppliers, and costumers. Today regulated industry structure has been changing due to liberalization and globalization processes. Therefore air transportation industry has becoming one of the most competitive industries of the global economic system. Airline industry is also one of most information intensive industries. Both airline product and production process are based on information. Also the industry structure is highly competitive due to liberalization and globalization for last decades. Therefore, information technology (IT) is an integral part of airline business. In this environment, information technology is not just an enabler for air transport industry; it is an essential part of it. Today complicated air transportation businesses cannot be thought without certain information technology applications.

Stemming from all of these, air transportation industry is one of the earliest practitioners of information technology applications among the other industries. Extensive use of IT is necessary to help the air transportation industry deal with larger volume of passengers and processes and more complex flight and ground operations. As an essential subsystem of air transportation system, today, airlines also face competition in a global basis. Factors like increasing costs, decreasing revenues, environmental considerations have been challenging airline companies. In this competitive business environment, information technology promises many advantages to airlines like many other businesses. In fact operational, tactic and strategic use of information technology for airlines is far from being totally new. Airlines are one of the earliest practitioners of many information technology applications among the other industries.

In the air transportation industry, IT had an impact on both business and operational dimensions. In the business dimension, IT has been used to improve both the cost-efficiency and quality of performance as well as to provide services not otherwise available. Perhaps the most significant of these services is the use of Computerized Reservation Systems (CRSs).

CRSs are a classic example of IT use that has had large-scale strategic impact on an industry. The term CRS denotes electronic airline reservation systems, used for managing flight and seat inventories for sales and operation purposes.

In 1992, World Wide Web created. The emergence of the Internet as well as the development of Intranets and Extranets forced airlines to refocus their strategy on technological innovations in order to enhance their competitiveness. Airlines identified the Internet as a major opportunity to tackle distribution costs and to reengineer the structure of the industry and it has changed the paradigm of air ticket distribution and offers new alternatives. The other basic transformation caused by the Internet is electronic ticketing (ET) for the airline industry. United Airlines was the first airline to issue electronic tickets, back in 1994. A decade later however, only 20% of all airline tickets were electronic. The industry was missing out on an opportunity to save US$ 3 billion a year. On 1 June 2008, the industry moved to 100% electronic ticketing. Together, IATA and airlines, travel agents, airports, system providers, and GDSs have moved an entire industry from the paper age into the full electronic era. The paper ticket is now a thing of the past. Initiatives such as IATA's The Simplifying the Business (StB) program ran from 2004 to 2017 has also transforming the industry. This program was an industry change program that aimed to transform the entire passenger journey through the implementation of innovative solutions and engagement all stakeholders across the industry. Mobile applications has become prevalent in the industry in this timeframe.

The last decades has witnessed the proliferations of innovative technology such as Virtual Reality, (VR), Augmented Reality (AR), robotics, and wearable products etc. in aviation operations and business. In 2017 IATA announced the launch of RampVR, the industry's first virtual reality training platform for ground operations. Although improving ramp safety and reducing damage to aircraft and ground equipment through better education and training is an industry priority, training in this extremely active environment can be a challenge. Therefore has a big potential in aviation education. IATA currently uses two modules for ramp operations: Aircraft Turnaround Inspections and Aircraft Marshalling.

In this study the impact of IT on the industry level are examined for the airline industry. Working within this frame, the study analyzes the nature and change of structure in airline industry. IT has a transforming effect in the airline industry in terms of the product and services, markets and production economics.

Keywords: Information technology, Air travel, Airline, Airport

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THE PERFORMANCE ASSESSMENT OF AIR TRAFFIC CONTROL TRAINEES IN 3D AERODROME CONTROL SIMULATION

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EXTENDED ABSTRACT

The main purpose of this study is discussing performance assessment complexity in 3D Aerodrome Control Simulation exercises to improve future air traffic controllers who are engaging high technology in aviation environment. Simulation of air traffic is main part of training future air traffic controllers which are radar control and aerodrome control. Aerodrome control simulation technologies are advancing and improving through high fidelity of 3D simulation and virtual reality. Human factors studies and experiences will be shared during the study to understand and discuss how training is complex to improve in 3D aerodrome training of student controllers in the context of individual and group performance to reflect on the future aviation operation's safety and efficiency.

Introduction

The performance of air traffic controllers has key role of safety and efficiency aspects in aviation operations. Increasing traffic demand requires their high and sustainable performance. This necessity is making air traffic controller training performance assessment more important to face desired aspects.

Advanced technologies have been used in simulation of air traffic control training. The 3D aerodrome (tower) control simulators and their developing technologies making training environment more realistic and very complex. Aerodrome control training simulation creates airport and its airspace with different aircraft and meteorological conditions including unexpected and emergency situations.

The trainee behaviors should be assessed during the simulation in all level of scenarios from basic to complex. Their behaviors are communication, traffic and related environment observation, control actions, teamwork interactions including individual differences and performance levels. High simulation technology makes the performance assessment more realistic since they behave like real air traffic controllers by the support of instructors and teammates.

Instructors observe and guide their trainees during the scenario run. Trainees are assessed in their all training phases not only in the examinations. They use structured assessment forms including all safety and efficiency aspects of operational training.

3D Aerodrome Simulation Technology

The aerodrome control system provides an advanced 3D and 360-degree simulation environment of airport including realistic movements of aircraft, ground vehicles, weather conditions, airport lights and signs etc. The system provides creating very effective airport and air traffic scenarios as well as testing even emergency and dangerous situations in the air and on the ground. The system can create, develop and test the existing or new airport models including 3D visual models of aircraft, runways, aprons, taxiways, vehicles, buildings, windsocks, signs, humans and animals quickly and easily. In addition to the tower view, the

airport environment can be visualized from any selected point of view including aircraft and vehicle cockpits or human figures.

The simulation system provides some valuable support for the assessment as simulation practice pause, replay and recording with 2D visual displays and voice communication with pseudo pilots. System also provides data about the control actions reflecting pilot position command actions for aircraft maneuvers on the ground and in the air.

Performance Factors in 3D Aerodrome Training

The expected outcome of successful 3D aerodrome simulation practices is qualified ATC graduates who will be responsible for safe, efficient and sustainable air traffic management for all passengers and stakeholders.

Safety related factors are mainly controlling aircraft maneuvers for safe separation of air traffics with others, ground vehicles, humans, live species and geographical or man-made obstacles. They manage traffics by giving required safety instructions mainly verbally or online to the pilots. They adjust safe distances between aircraft in the air and on the ground.

Human Factors for Simulation

Human factors knowledge and awareness are vital during the assessment of the trainee performance. Simulation technology, environment, ATC scenarios should be designed regarding of the human factors' aspects. All safety requirements have been emerging from the human error background resulted fatal loses in aviation. The training and performance assessment can be organized for those aspects. On the other hand, human factors and neuroscience research efforts to improve automation and artificial intelligence in aviation operation.

Once the air traffic control scenario created for the simulation training practices for all trainees does not mean that performance level will be the same for all. Every trainee behaves different reflecting their individual structure and skills by interaction with pseudo pilot positions. Their air traffic control plans, actions, communication styles and response time vary. This makes assessment of their performance is more difficult for the instructors who generate and manage air traffic scenarios.

Conclusion

In this study, simulation technology versus human factors assessment for better air traffic controller performance were discussed to understand relative information and factors. Main efforts are deployed for the future operator performance by providing better trainee assessment in the simulation practices. Neuroscience applications are the developing part of the human decision behaviors and related mechanisms. Realistic 3D aerodrome simulation systems give opportunity for the assessment of operator performance and gaining valuable data for the virtual reality tools for safe and reliable skies by providing qualified human resources.

Keywords: Performance Assessment, Air Traffic Control Trainees, 3D Aerodrome Control Simulation

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THE SCENARIO DEVELOPMENT AND IMPROVEMENT ASPECTS OF 3D AERODROME CONTROL TRAINING SIMULATION

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EXTENDED ABSTRACT

This study aims to show the complexity of creating advanced scenario development and its validation to improve realistic aerodrome control training by the high technology benefits of 3D aerodrome control simulators. The safety and efficiency aspects of air traffic management domain make the scenario development to assess trainee performance is very complex due to different variables affected by different human and system actors in aerodrome controller training. The all variables will be discussed in the study to show importance of aerodrome control training efficiency to improve air travel by advancing simulation technologies.

Introduction

The international air traffic control training standards and learning objectives are provided by precise simulation scenario design and development. Efficient air traffic controller training is depended on the realistic and measurable scenario of different level practices in the environment of advanced air traffic control simulators. When using high tech systems for creating realistic aerodrome control 3D environment, training scenarios should reflect also realistic aspects for better training purposes.

Simulation technologies gives confidence to create training scenarios by using historical operational data, future traffic estimations and imagination for the design. Scenarios should be developed by the domain experts who are experienced for the air traffic control operations and training beside safety and human factors.

The design, testing and validation of the simulation practice scenarios should be performed precisely. Once the air traffic control scenario created for the simulation training practices for all trainees does not mean that performance level will be the same for all. Every trainee behaves different reflecting their individual structure and skills by interaction with pseudo pilot positions. Their air traffic control plans, actions, communication styles and response time vary. This makes assessment of their performance is more difficult for the instructors who generate and manage air traffic scenarios.

3D Aerodrome Control Training Simulation

The aerodrome control system provides an advanced 3D and 360-degree simulation environment of airport including realistic movements of aircraft, ground vehicles, weather conditions, airport lights and signs etc. The system provides creating very effective airport and air traffic scenarios as well as testing even emergency and dangerous situations in the air and on the ground. The system can create, develop and test the existing or new airport models including 3D visual models of aircraft, runways, aprons, taxiways, vehicles, buildings, windsocks, signs, humans and animals quickly and easily. In addition to the tower view, the

airport environment can be visualized from any selected point of view including aircraft and vehicle cockpits or human figures.

The simulation system provides some valuable support for the assessment as simulation practice pause, replay and recording with 2D visual displays and voice communication with pseudo pilots. System also provides data about the control actions reflecting pilot position command actions for aircraft maneuvers on the ground and in the air.

Scenario Development Aspects

The scenarios will be used in the 3D aerodrome training simulation have a great importance to create desired trainee behaviors for air traffic management. Scenarios should be designed for all training phases and learning objectives coming from aviation operational safety and efficiency rules and needs varying for different air traffic situations including weather and unexpected events which can be faced by real air traffic controllers in live operational environment.

Human factors play important role in the scope of both instructors and trainees. The difficult part of the scenario development and validation is the human responses and related time usage. Every individual can perform different during the simulation for the air traffic controller and pseudo pilot positions. When the scenario is created experts try to adjust safety related events as aircraft collisions on the ground and in the air. While the scenario is executed human factors can change the situations to be evaluated as air traffic controller performance. The scenario events are affected by the operator's response time and alternative decisions.

Another important factor is measurement opportunity for the events in the scenario by the means of time and complexity. Events should be clearly measured by the instructors and assessors.

Conclusion

In this study, the scenario development aspects were discussed to improve 3D aerodrome simulation practices. The simulation scenarios should be designed in the context of human factors for both instructors and trainees. Individual performance differences such as response time or decision-making alternatives are making more difficult to have realistic and measurable air traffic scenarios with all variables of the operational environment. The trainee performance can be measured by precisely developed and validated air traffic control simulation scenarios.

Keywords: 3D Aerodrome control simulation, Scenario Development and Validation, Human Factors

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THE USE of SOCIAL MEDIA-BASED IMAGES in 3D DOCUMENTATION of HISTORICAL MONUMENTS

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EXTENDED ABSTRACT

Today digital 3D models are used widely in different areas such as games, tourism, city models, cultural preservation and Virtual reality. In recent years, with the rapid progress of technology such as Laser Scanners, Photogrammetry, and Computer Vision technology, it is becoming easier to generate 3D models. These technologies are classified as range based and image based. The 3D model may be needed for different disciplines in different purposes such as modeling of terrain, city, and archeological artifacts, and digital prospection or archiving of cultural heritages. Due to the laser scanning allows to get highly dense, accurate, and reliable 3d point clouds of an interested object (Rau et. Al., 2015), it has been a popular tool in recent decades. Nowadays, with the remarkable advancement of Computer Vision and Photogrammetry, the image-based modeling becomes as a rival for laser scanning (Vosselman 2012). Some remarkable advantages of image-based modeling are that: it is low cost and contains color information (Shao et. Al., 2016); any kind of camera (calibrated or un-calibrated) can be accepted (García-Gago et al., 2014; Tanskanen 2013) and it may produce point cloud denser than a laser scanner (Remondino 2014). This image-based approach, named as Structure from motion (SfM) is a newly popular low-cost Photogrammetry method compared to its competitors.

As is well known, the rapid development and widespread use of smartphones, cameras and internet technologies can provide digital images at almost any time and in any environment. So much so that people now record their moments digitally, from the places they visit to their own image (Selfie). Moreover, these images are shared in internet with social media such as Instagram and twitter with location information. This situation has become so intense that according to the Daily Mail report in 2016, 729 new images were uploaded to Instagram every second (Daily Mail Online, 2016).

Considering that the Internet is a large cloud data warehouse, these shared images also constitute a serious source of data. This data collection method can also be called unconscious crowd source. Because, those who acquired the images do not share any common purpose. There are several academic studies that are relevant to this approach. In the literature, Snavly (2009) worked on the automatic collection of images of desired locations and the calculation of photo shooting positions in the doctoral dissertation (Snavely, 2018). Basher (2017) modeled a few sculptures using video from the internet (Alsadik 2016). Tanskanen (2013) made a similar work in the museum by taking a video by smartphone (Tanksanen 2013).

This study, it is investigated the usability, advantages, and disadvantages of images obtained from the internet to produce 3D monument models. In this regard the images of three selected monuments of the UNESCO world heritage list for Turkey were obtained from social media accounts. Then, these monuments were modeled by using open source software. The scenario of the study starts from the unconditional images browsing from internet and finally ends with the 3D model generation for Virtual Reality environment.

Keywords: Photogrammetry, SfM, Social Media, Cultural Heritage, 3D modeling

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LOW-COST 3D MODEL GENERATION for VIRTUAL REALITY

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EXTENDED ABSTRACT

Nowadays, digital 3D models are widely used in different fields such as games, tourism, city models, archaeological documentation and virtual reality. In recent years, with the rapid advancement of technologies such as Laser Scanners, Photogrammetry and Computer Vision technology, 3D models have become easier to produce. Particularly thanks to photogrammetry and computerized vision technology, image-based 3D modeling, cost and color information is a serious alternative to laser scanning. As a term used in recent years, it is possible to say that, Structure from Motion (SfM) is a combination of photogrammetry and image processing. The term Structure-from-Motion has evolved from the machine vision community, specifically for tracking points across sequences of images occupied from different positions (e.g. Spetsakis and Aloimonos, 1999; Boufama et al., 1993; Szeliski and Kang, 1994). SfM owes its existence to innovations and mathematical models developed many generations ago, particularly in photogrammetry.

This method provides the opportunity for very low-cost three-dimensional data acquisition with strongly reduced user supervision and required expertise. The ability to extract high resolution and accurate spatial data using cheap consumer grade digital cameras appears truly remarkable. As in traditional photogrammetry, SfM photogrammetry employs overlapping images acquired from multiple viewpoints. However, SfM photogrammetry differs from traditional photogrammetric approaches by determining internal camera geometry and camera osition and orientation automatically and without the need for a pre-defined set of “ground control”, visible points at known three-dimensional positions (Westoby et al., 2012). Whilst the exact implementation of SfM may vary with how it is coded, the general approach has been outlined by other authors (Westoby et al., 2012; James and Robson, 2012; Fonstad et al., 2013; Micheletti et al., 2014). Most SfM platforms are now fully automated. The advantage of SfM is that it provides a black-box tool where expert supervision is unnecessary.

Since this method is image-based, the main problem is in data collection. Because the data collection procedure for model production is not always easy due to different reasons such as time, economy and accessibility. It is the ability of these techniques to generate very high-resolution datasets, whilst isolating and removing gross errors, which is now allowing such visually impressive 3-D models to be generated so easily when compared to traditional stereo based modelling (Remondino et al., 2014). Effectively, because of the ease with which sensor distortion can be modelled, all consumer grade digital cameras, including the ubiquitous “smartphone”, can acquire valuable geomorphic data (Micheletti et al., 2014). Furthermore, the recent development of low-cost, sometimes free, internet-based processing systems enable the upload, processing and download of the derived 3-D data in just a few minutes, potentially during field data collection. This is in direct contrast to traditional photogrammetric software, where the user is forced to define and to determine interior and exterior orientation parameters explicitly. Most SfM platforms are now fully automated. The advantage of SfM is that it provides a black-box tool where expert supervision is unnecessary. It may also be a disadvantage in that the user has much less involvement in data quality control and the origins of error in data may not be identifiable. Today, considering the cost of professional cameras

and laser scanning systems, smartphones can be considered as an inexpensive data source to produce image-based 3D models. In this study, the usability of mobile phone and open source software for image-based 3D model of a small object is investigated.

Key Words: Photogrammetry, 3D model, Virtual reality

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3D CITY MODELLING with AIRBORNE LiDAR DATA

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EXTENDED ABSTRACT

Nowadays 3D modelling of objects is widely used in different purposes such as city modelling, digital game industry, cultural heritage, virtual reality and medicine. According to computer technologies and data collection methods, it is possible to produce 3D models with different properties. Particularly thanks to the progress in laser scanning devices, it is possible to obtain millions of 3D location data with high accuracy in a short time. This data can be used in the production of topographic products for mapping purposes and as well as can be used in 3D model production. Airborne Laser Surveying (ALS) or LIDAR (Light Detection and Ranging) becomes more and more popular because it provides a rapid 3D data collection over a massive area. LIDAR provides an efficient way to capture 3D data; however, it is not easy to extract building information from the data.

Much research focuses on extracting building outlines, and they may combine different data sources, for example photogrammetric data or existing landline data. The traditional method for building extraction depends on the raw imagery which is carried out manually and a highly labor-intensive, time-consuming and very expensive (Sohn and Dowman 2007). To develop automatic or semi-automatic approaches for building extraction and reconstruction, the researchers in Photogrammetry, Remote Sensing and computer vision society expend energy (Gruen et al., 1997; Mayer, 1999). Depending on the approach, the inputs for extraction process are generally images and airborne LiDAR data. Maas and Vosselman (1999) used geometric moments, segments and intersect planar surfaces to extract different type of buildings. Alharthy and Bethel (2002) used an orthogonality hypothesis for building extraction on LiDAR data. Shan and Sampath (2007) use straight lines and least squares adjustment to get building boundary. Morgan and Habib (2002) separated building and tree measurements to get the plane surface of buildings. Elberink and Maas (2000) used a height measures texture for segmentation of LIDAR data. Alharthy and Bethel (2002) distinguished building and tree using the height difference between the first- and last return of LiDAR data (Vosselman, 2001; Overby et al., 2001) used the Hough transform to identify building points in a LiDAR data set. Some other researches are carried out by Wang et al. (2006), Haala and Brenner (1999), Früh and Zakhor (2003), Vinson and Cohen (2002), Weidner and Förstner (1995), Fischer et al. (1998), Baillard and Zisserman (2000).

In this study, a 3D city model produced by using LiDAR data in Bergama / İzmir is presented. In this context, firstly the LiDAR data is filtered in order to obtained noise-free dataset. This step is necessary for an accurate classification of every single point in lidar data. Secondly, the buildings, power transmission lines and trees are classified in LiDAR data and the borders are determined as vector format. In the last part of the study, building models were produced and a 3D city was created. All processes were performed in Envi Lidar software automatically with a few decided parameters.

Key words: LiDAR, modelling, 3D city

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3D MAP EXPERIENCE FOR YOUTH WITH VIRTUAL/AUGMENTED REALITY APPLICATIONS

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EXTENDED ABSTRACT

Maps were used as a tool to answer the questions What? Where? and How? by human beings since prehistoric times. These maps have been used in the past on the cave walls, animal skins, parchments and recently on papers. Nowadays, maps are benefiting from developing technologies such as computers and virtual/augmented reality applications. Virtual reality is defined by Fisher and Unwin (2002) as 'the ability of the user of a constructed view of a limited digitally- encoded information domain to change their view in three dimension causing update of the view presented to any viewer (the user)'. In addition to this definition, it can be said that virtual reality is the use of glasses, motion sensors, computer and 3D projection systems to create a virtual environment for the user's perception. On the other hand, augmented reality integrates visual objects to the actual environment of the user.

Virtual/Augmented reality technology has entered our lives for entertainment purposes and then evolved to serve other sectors such as education. Students can use the advantages of this technology since it offers to learn by doing virtually in almost all domains. Learning our world from maps is one of these domains. Geography education starts from early ages in schools. Classically young students learn the earth from 2D school atlases and wall maps. Since it is hard to perceive 3D objects from these 2D products, students can struggle to understand the earth and other spatial phenomena. Learning the portion of the earth and spatial phenomena through virtual/augmented reality technologies, which are memorable and stimulating senses, will save students from this challenge. In this context, experiencing the 3D earth by using virtual/augmented reality technology instead of the traditional 2D paper, will make a great contribution to students learning and spatial perception skills.

In this study, the 3D model of the Harran University Osmanbey Campus was prepared for use in virtual/augmented reality applications. The 3D model of the campus was created by using ESRI CityEngine software from the photographs which obtained using an unmanned aerial vehicle (UAV). In addition, infrastructure data was obtained during model creation and these data were arranged through GIS software for use in CityEngine environment. Then the facade photographs of the campus buildings were taken by fieldwork. These photographs were used to produce the building models at the LOD2 (Level of Detail 2), and for this purpose, the levels of detail of the buildings were increased on the CityEngine software. In order to take advantage of the procedural modeling technique of the CityEngine software, .cga files were prepared by writing proper codes for the models. With these codes, the buildings belonging to the campus area were modeled according to their characteristics. All of the models obtained was exported as one model file and made ready for the Unity 3D environment and then transferred to the Unity 3D -game engine software- and rendered on the tablet screen. When the pre-defined visual target (paper and cardboard) is detected by the tablet's camera, this target is displayed as a 3D model of the campus on the tablet screen and the details can be shown. The

user can explore different parts of the model by rotating the tablet's camera around the visual target.

As a second application, the campus model was transferred to a virtual reality environment and ready for use with virtual reality glasses. Thus, the user can navigate in the model using virtual reality glasses and explore the campus in 3D.

Augmented reality application was presented to young students which in the high school and their equivalent age groups as a workshop in the Sanliurfa Science Festival organized within the scope of a project which funded by The Scientific and Technological Research Council of Turkey (Tubitak No: 4007). Within the scope of the workshop, students from different high schools discovered the 3D campus model of Harran University with the application of augmented reality. The students were able to examine the Osmanbey Campus, which is 25 km away from the center of the city, in an interactive way on the tablet screen. As some students were familiar with such augmented reality applications from the games, they easily get used to the application and explored the campus virtually. These spatial models, which are presented in 3D with new technologies, have been carefully and enthusiastically studied by young students who participated in workshops. In this context, teaching maps with new technologies such as virtual/augmented reality will contribute positively to the development of spatial perception and map skills in young students. Future studies will focus on creating virtual/augmented reality games that will provide fun map learning for students of different ages.

Keywords: Virtual Reality, Augmented Reality, 3D City Modeling, Map Education

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PHOTO-REALISTIC ENVIRONMENTAL MODELLING FOR VIRTUAL REALITY

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EXTENDED ABSTRACT

Virtual reality is a term used for computer-aided three-dimensional (3D) environments where technically people feel the sense of being in the scenario. Users are included in the scenario prepared by the experts through various peripherals. From the moment when the user enters the environment, the user is disconnected from reality and the feeling of being in an environment where virtual reality is created starts to happen. In order for users to truly experience the experience of virtual reality, the scenario in which virtual reality designs are found must be flawless and be able to convey this feeling to the user better. The environment model used in the virtual reality environment is selected from the real environment/users of the users. For this purpose, photogrammetric modelling of real land surface using air photographs and transferring it to virtual reality will increase user satisfaction and credibility.

Photogrammetric modelling is a complex and multi-faceted process. To get a better reality feeling, it is necessary for determining the current state of the structure (shape and position) in three-dimensional space. There are a few techniques for 3D modelling such as traditional surveys, topographic techniques, photogrammetric surveys and scanning technique (Uysal, Toprak, & Polat, 2013). Nowadays, the reconstruction of building in the 3D model is very popular due to the developments in UAV and digital photogrammetry parallel to computer technology. UAVs are to be understood as uninhabited and reusable motorized aerial vehicles which are remotely controlled, semi-autonomous or have a combination of these capabilities, and that can carry various types of payloads, making them capable of performing specific tasks within the earth's atmosphere, or beyond, for a duration, which is related to their missions.

In this study, the TurkUAV Octo V3 UAV was used to capture images. It uses microcopter electronic. The weight of the UAV is approximately 8kg and the payload is maximum of 3 kg. Flying time essentially depends on both battery and payload weight. A lot of features of this model are available such as Altitude Hold, GPS Hold, CareFree, Coming Home, Fail Safe, Low Battery Protection, Auto Take Off and Landing, Waypoint Flight. Mikrocopter (MK Tools) software let us to view the navigation and flight status information in real time. It is possible to perform autonomous flight plan over the online maps. Moreover, some details such as horizontal and vertical speed, altitude, direction, waiting time at willing points, coordinate information, and camera angle are also can be specified. Waypoint Flight electronic is capable of autonomous flight in a 1000m radius area and 250m fly height for a standard route. The digital camera was a Sony RX100 MII. It has featured with 20.2 Megapixel and 13,2x8,8mm CMOS image sensor. Single, continuous, and self-timer drive abilities are among the digital camera features. The Body weight of the device is 281g. It was difficult to prepare a flight plan with the available software for a UAV surveying application. However, MK Tools allow us to pass this obstacle. The main advantage of this software is to require minimum user interferences. After some parameters such as overlapping of photos, waypoints, flight path, and altitude had been defined on an online map and uploaded, the UAV carried out the flight plan automatically. It is necessary to remember some precautions: Weather condition of the study area, daylight status for better photos, backup battery depends on the study area,

and controls of flight, engine, and navigation of UAV against any errors (Polat & Uysal, 2017). When all the necessary controls had finished, online maps were uploaded to OSD. The flight plan was prepared based on this map with 6 column and 28 points route and the altitude were 80 m and was uploaded to the UAV. Then the automatic flight was started. Existing software's can generate a 3D point cloud such as; Pix4D (commercial software) that has been used in this study. The software is advanced in UAV applications and allows to generate DEM and orthophoto in a willed coordinate system. For full performance of software, it is recommended to use a powerful computer due to the huge amount of data. The data processing is easy. It starts with uploading photos from camera to computer. We used 120 selected images. At the end of image processing over 8,000,000 points are obtained with a density of 14.34 (points/m^2).

In this study, the 3D model was produced by using aerial photographs of Harran University Osmanbey Campus obtained by unmanned aerial vehicle. In the end, the produced model is covered with real colour information and obtained a photo-realistic environment and it has been made suitable for use in a virtual reality environment.

Keywords: Virtual reality, Photo-realistic, three dimensions, unmanned aerial vehicle, 3D model

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BUILDING MODELING BY UAV IMAGES

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EXTENDED ABSTRACT

Unmanned Aerial Vehicles (UAV) can be defined as vehicles with no pilot and no passengers and can be controlled remotely. UAV technology which has been developing rapidly in parallel with the development of technology has been used in many areas such as field control, surveillance, inspection, map production and 3 dimensional (3D) modeling today. UAV technology has become a preferred method against classical methods in many areas due to its fast, sensitive and low cost. Works that are very difficult or impossible to obtain by using classical methods have become very easy with UAV technology. In addition, produced 3d models can be used for virtual reality because of they are realistic(photo-realistic) and scalable.

Virtual reality can simply be defined as the use of computer technology to create a simulated environment. Virtual Reality literally makes it possible to experience anything, anywhere, anytime. It is the most immersive type of reality technology and can convince the human brain that it is somewhere it is really not (URL-1). With the rapid development of computer hardware and software technologies, the virtual reality technology that has gone a long way in a short period of time provides convenience to users in many areas. The virtual reality devices used today have become quite comfortable and useful compared to the devices used in the past. Therefore, virtual reality technology is used in almost every discipline from health to industry, computer games to archeology. For example, in order to gain experience with new doctors in the healthcare sector, performing surgeries in a virtual reality environment allowed doctors to gain experience more easily. In the real estate sector, customers have been able to navigate inside their homes with the help of virtual reality glasses. One of the first areas that come to mind when talking about virtual reality is building modeling with photogrammetry. Building modeling is a very important issue both for the introduction and protection of historical artifacts and for the use of 3D building models for different purposes. Nowadays, UAV technology is a frequently used method in photogrammetry studies. Especially, it has become a common method used in image based point cloud and 3D model production studies. The fact that both field work and office work are facilitated according to classical measurements are the main reasons for this situation.

Yakar et al. (2013) in a study in the province of Afyonkarahisar Doğer Caravanserai images were obtained by terrestrial photogrammetry and the 3D model of the structure was created. In this way, the documentation of a structure that is of historical importance has been obtained. Yakar et al. (2015) modeled the Bezariye Inn in Konya province in another study. In the study, control points were used to model UAV images. The model is an important study in transferring historical and cultural heritage to the next generations.

In this study, a study on how 3D building modeling can be used on virtual reality platform is presented. In this study, UAV images of Afyon Kocatepe University Faculty of Engineering Laboratory Building were obtained and 3D point cloud and then 3D building model were formed. Then, the model produced was covered with photographs and a model with real

texture was obtained. In the first stage of the study, homogenous control points were placed on the object to be modeled. Thanks to the control points, the model balancing and scaling operations are made more easily and more precisely. The intensity of the control points is the main factor in the success of the interpolation process. Later, images of the UAV obtained through the DJI Phantom 3 Pro. While UAV images were obtained, attention was paid to ensure that the object fits properly in the photo. The images were taken at approximately sixty-seventy percent overlap rate. Obtained images are automatically balanced with high accuracy in Agisoft Photoscan software. Then, a dense point cloud was formed, the surface process was completed and the model was texture. In order to sharpen the pixel of the model, 'build tiled' was applied. After this stage, precise coordinate information can be obtained from the obtained model. In addition, the model can serve different purposes by using it in virtual reality studies.

As a result, interdisciplinary interactions are now very high and interdisciplinary studies are increasing day by day. On the other hand, virtual reality technology is used in almost all disciplines. In this context, three-dimensional building modeling and virtual reality issues interact with each other in the form of sensitive, easy-to-produce and visual presentation is created. In this way, if needed, various studies can be made by using these bases.

Keywords: UAV, 3d model, Building, Virtual reality

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TRANSFERRING HISTORICAL RUINS TO VIRTUAL REALITY ENVIRONMENT USING UAV PHOTOGRAMMETRY: A CASE STUDY OF ŞANLIURFA CASTLE

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EXTENDED ABSTRACT

Sanliurfa is a city full of historical monuments. Museums are the main places where cultural heritage is stored, preserved, and exhibited. But the museums appeal only to the people living in the city and the tourists visiting the museums. However, with the development of computer technologies, the use of virtual reality systems in daily life can be used to exhibit historical areas as well as different disciplines. In addition, to produce spatial accuracy and real-size models of archaeological sites is also very important in recording these regions. The models obtained and transferred to the virtual reality environment are used to record archaeological sites and to see the development of the excavation areas. In addition, 3D models are also used as base data for restitution projects. If the archaeological work has been damaged due to various reasons, these artifacts can be reconstructed in a realistic way thanks to the real-size model produced. The case of the archaeological site of the Palmira, Syria is a bitter example of why archaeological sites should be recorded.

Castle of Sanliurfa was built in B.C. 2000 and has played an important role in the crusades. The castle, which was restored in the Ottoman period, was also used by them. In time, the castle lost its importance and the structures on the castle area have remained under the ground. In order to reveal the past of the Şanlıurfa castle, the Şanlıurfa Museum Directorate and the Harran University Archeology Department are continuing the excavations together. Archaeological studies on this castle, which is one of the most important symbols of the city, will illuminate the period B.C. 2000. Therefore, it is important to record the archaeological excavations and the castle in structural form. In addition, with the transfer of the produced model to the virtual reality environment, the castle can be seen in the virtual environment.

The study was requested by the Şanlıurfa Museum Directorate and the models and photographs produced by the archaeological studies on the castle were added in their reports. For this reason, the necessary permissions were taken with the museum directorate before the flights made in the study area. During the study, the staff from the archaeological excavation accompanied the study team and gave information about the situation of the archaeological structure.

The basic problem is that the object or space that is planned to be transferred to the virtual environment can be modeled in three dimensions (3D). Today, there are many technologies and scientific methods used for 3D modeling. One of them is the UAV photogrammetry, can be used in the modeling of historical areas as a method which has been used very intensively in recent years.

Unmanned aerial vehicles today are often used for taking amateur aerial photographs or military espionage but are also used for ground surveys. Depending on camera accuracy

and systems located above the UAV, very detailed location measurements can be made, and the results can be obtained by modeling the terrain. In addition, these devices can be used in deformation measurements, archaeological measurements, modeling of archaeological remains, the structural works, agricultural works and city planning.

The UAV used is the 8-propeller octocopter named Octo V3 produced by Turkuav. It is equipped with a 16-megapixel camera with the other equipment of the device. For measurements made with UAV, it is necessary to draw up a good plan for the region to be researched. The heights in the area should be determined well and the flight height of the UAV should be adjusted accordingly. Persons using the devices should be the same person from the beginning to the end and thus human errors should be minimized.

There were two 34-meter tall historical towers in the area of application and 50 meters of flights were made to avoid any risk of crashing the UAV. It is important to make a constant-height flight ensure that the data obtained are consistent and easy to perform. The flights were made in the morning, where the shadow was as small as possible. Pix4d software was used for the evaluation of the photos. The application area is modeled by applying the images to the point cloud. The measurements made in the field of application were evaluated and orthophoto map, digital elevation model and digital terrain models were created.

In this study, as a result of the evaluation of the aerial photographs obtained after the flight on the Şanlıurfa Castle by an unmanned aerial vehicle, an application has been made for the infrastructure work needed to transfer the historical ruins in the region to the virtual reality environment. The 3D model obtained in this direction has been transformed into the 'obj' format, which is the appropriate format to be transferred to the virtual reality environment. Unity is a game designing software. In addition, it provides the realization of the virtual reality environment with virtual reality glasses within the virtual reality models produced by the game engine. Therefore, the obtained model was transferred to the Unity platform. It is transformed into a virtual reality environment after adding various environment arrangements on the model and adding the necessary characters for navigation. The model obtained through virtual reality glass was observed in a virtual reality environment. It was also visited within the study area with virtual reality glasses.

The resulting products, images, and models; could use as archives of historical sites, modeling of important artifacts found in archaeological excavations, and constructing bases for restitution projects. In addition, thanks to the model transferred to the virtual reality environment, for the tourists planning to see Sanliurfa Castle can be given a preview. Thanks to the ease of access to virtual reality tools today, such studies can spread and create a virtual reality environment for archaeological sites.

Keywords: Virtual Reality, Archeology, 3-D Modeling, Photogrammetry

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VIRTUAL REALITY APPLICATIONS IN THE FOLLOW-UP OF ENGINEERING PROJECTS

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EXTENDED ABSTRACT

Following the development of engineering projects at various scales is critical to the healthy progress of the project. In such large and medium-scale engineering projects, monitoring of the process takes a long time with classical methods and needs a lot of human effort. In this context, human labour can be minimized by using current technologies such as an unmanned aerial vehicle (UAV) and virtual reality. These methods, which result in faster than classical methods, make positive contributions to the project follow-up in terms of economy and time. In this context, the pre-construction status of the solar power plant project, the levelling of the land and the installed status of the panels in Harran University Osmanbey Campus were monitored with UAV and three-dimensional (3D) modelling of the project area at each phase was performed. These models were saved as an appropriate format to transfer into virtual reality environment for the use of administrators and decision makers.

The comfort of technology in daily life has been used in many business areas to facilitate practical applications. At its early stages, virtual reality applications were being used in the defense industry and entertainment sectors to reveal the visual presentation of intermediate products. This technology then expanded to many different areas. Virtual reality studies, which were introduced first in the 1950s, have been widely used by companies in the UK for the last 20 years (Steed, 2017). The virtual reality technology is developing in many areas such as construction, industry, education, health and so on. Computer systems and their monitors are under development over three decades and their capability to create more complex 3D models and displaying these visual objects is improving day by day. With the production of extremely high-performance image processing equipment, today there are applications that offer nearly real-time 3D models of these projects. Many automotive manufacturers have been using this technology since 2006. The management staff of these companies can see the changes in the production process and the resulting product of the vehicle model through virtual scenarios. A similar method can also be applied to the construction sector. Designers can create a 3D model of both the interior and the exterior of the buildings. In this context, managers can follow the positive and negative situations that may occur before the project starts. Therefore, monitoring and presenting the project process in the construction sector has become one of the most common uses of virtual reality (Bouchlaghem & Liyanage, 1996). A company that started to work in 2001 is presenting models to managers and real-time project tracking applications. Today, many of these applications are still being monitored in two dimensions with the help of computer screens or projections. The future of this and many other applications are intended to include the users in that scenario and to keep them alive in a 3D environment.

In this study, the construction phases of the 5-megawatt solar power plant built in the Harran University Osmanbey Campus were monitored in 3D and traceability of the project in the virtual reality environment was investigated. The solar power plant installed in the campus area has been set up to meet the energy needs of Harran University Research and Application

Hospital. In order to follow up the processes from the beginning of the project, in accordance with the demand from the university management, three separate flights were made with the unmanned aerial vehicle in the region while the solar power plant project was in progress. A total of 175 aerial photographs were obtained for each flight and the point cloud data of the project area were created by evaluating these images. From this 3D point cloud data, the surface models of the project region were obtained. In this way, the models from the measurement for each period were shown to the administrators from the computer monitor and the project was followed up. In virtual reality applications, it is more important to show the process of a project on this scale. Therefore, transferring the models of these three situations to a scenario in a virtual reality environment is the main element of this study. In this study, Unity Game Engine was used to visualize the scenario of the project site. These models were transferred to the virtual reality environment both to explore the project site and monitor the change in the project. Virtual reality glasses were used to show this virtual reality environment to the user. This study supports the establishment of an infrastructure that can be used for informing managers in the pursuit of large and medium-scale projects while under construction.

Keywords: UAV, Solar Power Plant, 3D Modelling, Follow-up Project, Virtual Reality

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INNOVATION IN EMPLOYEE TRAINING AND ORIENTATION WITH VIRTUAL REALITY

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ABSTRACT

This paper presents a concept for a new educational method which, develop with Virtual Reality. Technology can be used in especially repetitive and important educational process. Employee orientation is compulsory operational process in hiring. Current employee orientation programs are dull not so efficient and dull. Virtual Reality designed to create immersive experience with realistic visuals. In the globalized and technologically developing world we are living in, education becomes faster and digital. With the increasing importance of education in daily life, lots of tools have been developed. Virtual Reality, satisfy these needs with immersive and easy to use functions. With Virtual Reality tools, the long educational process becomes shorter and effective. Educational contents are developed based on scenarios, thus it is easy to understand. As an example, global companies hire lots of employees periodically. With VR solutions, the orientation processes digitalized and take less time than before. That's why educational soft wares can be developed in companies which have innovation center. With wide spreading standalone VR hardware like Oculus Go, integration of developed software becomes easier. Educational VR software developed for android operating system, due to hardware mostly works with android. According to educational contents, modelling the environment and characters with software like 3DSMax then animating with Unity. Quality of the educational process has been increasing with, users that directly included the educational contents without any middleman. Contents of VR solutions mostly focused on Health and Safety scenarios, thus users experience the accidental scenarios with as safest possible and gain essential information that needed. With this educational process, health and safety awareness of blue and white collars have been increased. As output, interactively and easily learned educational contents can be provided with Virtual Reality tools.

Orientation processes for new employees have crucial importance. Employee orientation is a way to introduce new employees with company rules and regulations, organizational culture environment and other major thing directly relates with organization. Employee retention is the first impression or perception of employee about their job organization. Employee orientation is a very constructive way to give positive feeling to newly hired employees for welcoming them and make them comfortable and provide them opportunity to absorb them within organization. (Durez, 2017). Orientation programs have big role for creation good first impression to newcomers. For getting better feedbacks, orientation programs should be fast, interactive and afar from dullness. Orientation with VR decrease the time spent to orientation besides increasing efficiency. According to DeSimone and Werner, an ASTD survey suggests that seven percent of all training and development expenditures are spent on orientation. Today, there is increasing interest in what has been termed "rapid-onboarding." That is, getting new

employees up to speed as quickly as possible. (2002) Furthermore specific health and safety scenarios should be told to the newcomers. Health and safety rules are the necessary part of the orientation program. Especially work areas like factory or warehouse have high possibility of accident. Without any information about protection methods from the accidents, accidents risks get higher. New employees or current employees who are transferred from another project must attend a project-specific new-hire safety orientation. This program provides each employee the basic information about the company worksite safety and health rules, federal and state OSHA(Occupational Safety and Health Act) standards, and other applicable safety rules and regulations. Employee attendance is mandatory before working on the construction project.(Reese, 2018, p. 365) Health and Safety rules consists possible accidental scenarios, emergency procedures and protection methods. Mostly in companies there are more than one person dedicated to orientation program. While the process is repetitive and absolutely necessary, with developing technology improved ways can be used. Virtual reality, great tool for educational process. VR was shown to be very effective for learning procedural tasks, in which students learns sequence of steps to accomplished a task requiring maneuvers in tree-dimensional space. Examples include as operating a vehicle, fixing on a complex piece of machinery and finding your way around an otherwise unfamiliar landscape. (Liu, Deijan, et al., 2018) Repetitive educational methods can be use as content. Beside, with interactivity feature education methods can be change with learners' capacity. Learners could effect and change the education scenarios according to their choice. With Virtual Reality technology, corporate life educations like employee orientation and health and safety rules will become more effective and immersive. Due to lack of the middle man with learners and education material, they can be adopting new environment and its rules more easily. VR technology that tested for orientation program and contents of it will be explained in this article.

With developing technology, educational processes evolved like everything else. Virtual Reality tools provide great opportunity for learning. Educational Contents like Health and Safety is crucial topic for employees who work in places have accidental risks like production facility or warehouses. It is the fact that experiencing is good way to learn but situations like accidental scenarios are too dangerous even practice it. Especially educational contents which focusses on practices, took digital shape. That's why Virtual Reality create new digital environment for experiencing the situations. Studies emphasized that VR does not furnish only passive copy of reality, but its reconstruction is a model where users can act. It reacts and behaves as in real environment. This important feature overcomes the inherent limitations of perception, which should be applicable only to objects physically perceptible. As technology continues to improve, VR systems will become pervasive instrumentation for research in education across the disciplines. (Choi, Dong Hwa, et al, 2016). For testing VR technology in orientation program, An application developed. This application simply, consists of the video orientation program. Nevertheless the videos designed and animated. Animation process done with Unity3D and modelling of the animations done with 3DSMax. After the application was developed in Unity3D, it was installed on the Oculus Go VR. Oculus Go VR is standalone VR device which has Android Operating System. With simply integration of application to device, orientation process can begin and user can watch whichever orientation movie he or she wants.

Application scenarios decided with Health and Safety specialists. Arrangements have done for coherence with VR. In the development process of scenarios, gamification principle is considered. For a longer using time, user should have motivation. After the creation of development planning and scenarios, visuals of location, environment and characters decided. Models created with 3DSMax. While the modelling of visuals like fire, particle effects have been used. According to scenarios, animations have been produced. The application developed in Unity 3D. In the first phase, user can only watch and react the situation around. As planned second phase, application will be developed as interactive. With interactivity feature, user will decide the way of scenario is going. Application deployed as android application. Oculus Go has been used as device for using in orientation process.

It has seen that newcomers who used VR applications for health and safety rules have justified and learned more in comparison with newcomers who attend lessons with classic teaching methods. As given feedback from VR orientation participants, increase of the employee engagement can be seen. With interactivity feature of Virtual Reality tools, scenarios can be change according to user's choices. Thus, users can experience the results of their decision just like in real life.

Keywords: Virtual Reality, Education, Innovation, Health and Safety

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WHEN WE WILL START TO UNDERSTAND AND APPLY THE VIRTUAL REALITY?

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ABSTRACT

The answer to this question is directly related to the word “perception”, which refers to the first or early meaning that occurs when the information reaches the final acceptance level. Of course, creating a perception on a subject is not the final stage, but it also uses the fact that the importance of information is being spoken, and the first step of our application is through perception. Regardless of the subject, to reach a goal, if we want to solve a problem, the first step to be taken, the perception to be created on that subject, it is a technique, the method, we call it "Perception Management". The term "perception operation", which expresses the misuse of this technique, is not within the scope of this study. Man has natural reactions to every "new" that he does not know, he does not internalize, and because of this fear and anxiety, he has a tendency to preserve the existing one. The use of virtual reality, augmented reality, and hologram technologies in the experience and acquisition processes in areas such as education, health, transportation, economics, tourism, and even widespread use can be increased, but can be increased by perception management. The dissemination of virtual reality applications in every field can be possible with the perception created in minds open to development, science and technology and innovations. The first condition of this is perception management; the realization of individual and social perceptions of virtual reality projects and applications, economic, ecological, effective, entertaining, motivating and successful. If human beings do not live by creating new techniques in every field, applying existing ones to life, and being respectful to environment and all environmental stakeholders, sustainable development is not possible. This definition is known as a global expression in the form of breathing with the world. Cannot breathe with the world, cannot produce local solutions.

For the use of virtual reality, augmented reality, hologram and real image viewing technologies, an ecosystem of these technologies must be formed. For the use of virtual reality, augmented reality, hologram and real image tracking technologies, an ecosystem of these technologies must be formed. For this reason, there is a need for real-time VR, AR and hologram ecosystem in order to achieve a performance in our country. This is only possible with the awareness of public and local administrators, academicians, civil society and students. There are not many start-ups in the world. This situation provides important opportunities in terms of VR ecosystem in our country. The most ready for this ecosystem are students. Students are expected to use this technology from their managers and schools in education. In this case, the conditions that will encourage or even force the perception of public administrators, local governments, educators and academicians to use these technologies should be provided. We have some fundamental advantages to be a true and sustainable stakeholder of the virtual reality sector on

international platforms. This technology does not require large spaces, and does not require a technology memory that began centuries ago. The conditions for competition are not challenging, but the respondent mass is open to these technologies and expects to be satisfied. For software, hardware, and applications, there is a highly visible environment and a young audience. And the investment costs are not very large. For example, compared to the automotive sector, there is a need for software infrastructure rather than capital. Considering that a minimum of $ 500 billion was planned in the automotive industry in the next decade, the virtual reality ecosystem is a modest but high-yielding start-up area. Considering favorable conditions such as international market and opportunities, global branding and competitiveness, a strong national demand area within the country, not only education but also a great expectation in all sectors, software processes and product transformation should be encouraged simultaneously with perception management. In addition, the legal regulations and incentive exemptions to promote the use of virtual reality and more advanced technologies in education, health and other sectors are very important. As a result, it is imperative that societies seeking to take part in quality, efficiency and sustainability in international competition should make and implement industrial, legal and psychological action plans so that they can see and start up the existing start up opportunities in virtual reality technologies.

Key Words: Knowledge, perception, perception management, virtual reality, augmented virtual reality, hologram virtual technologies, Z generation.

EMPLOYMENT POTENTIAL IN THE SECTOR OF VIRTUAL REALITY AND AUGMENTED REALİTY FOR OUR COUNTRY

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ABSTRACT

Virtual reality is a technology that senses the phenomena of the physical world, interacting with us in a virtual environment. Augmented reality can be also expressed as the use of virtual reality in the real world through virtual objects. In this way, virtual reality technology through the virtual world and real-world simultaneous work with each other in medicine, education, entertainment, architecture, research, etc. many areas of software and programming through the new professional fields have revealed. Growing by 72 percent in 2017, the augmented and virtual reality consumer market reached a value of $3.2 billion according to analytics firm IHS Markit. In the same report, it is predicted that the use of the global virtual reality (VR) market in terms of applications and content will increase from 28 million to 75.7 million by 2021 and accordingly the market size will increase to $ 5.9 billion. Similarly, in the report prepared by the Ecorys research firm, the VR & AR market in Europe will increase steadily and the total production value is expected to be between 15 billion euros and 34 billion Euros, and by 2020 it is expected to do directly or indirectly between 220.000-450.000 jobs. In this paper, virtual reality and software industry in Turkey's current status and future employment situation in this sector is explained.

Keywords: Virtual reality, augmented reality, employment potential

INTRODUCTION

Virtual reality is a developed technology which has lived that perception of reality simultaneously in a cyber platform by a computer, gaming, console, smartphone etc. devices. Whereby augmented reality has included the individual's own physical movement using voice, video and graphic visuals in cyber world, it wakes a feeling and an impact like physical environment on a user. The basis of virtual reality (VR) technology is based on the Sensorama produced by Morton Heilig in 1956. Sensorama had provided to us the feeling of 3D reality for the first time. The virtual reality (also known as the Sward of Damocles), which was used in 1968 by the head-mounted display produced by Ivan Sutherland, began to be used in various fields in many occupational groups with the changing world and the changing physical phenomena. At the same time health, education, military, architecture and etc. many professions were incorporated into technology and created new jobs in these areas. Virtual reality technology, which shows itself mostly in computer games in the world market, provides convenience to today's world with time and experience especially in areas where experience is risky or high costs are required. In this respect, military and military aircraft training and war simulation, parachuting training, forensic medicine and wound detection, surgical training in surgery, astronauts spacewalk simulation, pre-prototype of projects to be applied in engineering (such as infrastructure, road, bridge, and car design, production in the cinema and advertising

sectors, production stages in factories, psychological disorders, eating disorders, stress and phobia are also used in the treatment of diseases) [5]. However, it has an active field of use with applications created via smartphones through augmented reality technology. For example, the PokemonGo mobile gaming application, an augmented reality application, generated $ 2 billion in 811 days from its launch in 2016[8].

Besides, the development of the digital economy plays an important role in the development of the virtual reality sector. Since industrial revolution, production, industry, education, health and so on technology, which will bring innovation in many areas, is also referred to as the virtual reality revolution. Virtual reality technology brings employment in three areas: hardware, software and content creation. The virtual reality and augmented reality market, which has a multi-billion-euro market expectation in the context of European Union countries, is also the area of income for many firms. According to European companies working in this field;

OPTIS (FR) one of their clients in the automotive industry reduced the physical prototypes from 30 to 7 real prototypes complemented by VR 3D models, thus having a significant effect on cost reduction. Several established companies are active in 3D visualization with VR, offering solutions with different methods (photography, virtual imaging), functions (level of interactivity with the content), quality and costs. Some big companies actively offer such solutions for engineering and manufacturing, such as Fraunhofer (DE), Lumiscaphe (FR), ZeroLight (UK), TechViz (FR), Immersion (FR), PS-Tech (NL) and Light & Shadows (FR). When we look at the company practices in Europe, Jungle VR (FR), CLARTE(FR), Saint-Gobain (FR) and Antycip Simulation (UK) create such trainings and simulations. The Industrial group Bouygues (FR) uses immersive technologies to transform and upgrade construction processes, but also to view real estate property. Dreamplex (PL) combines VR with 3D printing to truly emerge a client into their real estate or architecture presentation. IKEA has also created the "IKEA virtual reality kitchen experience", made in collaboration with Allegorithmic (FR). Cityscape VR (UK), opusVR (DE), Neutral Digital (UK), TruVision VR (UK), VMI Studio (UK), and Kaouenn Studio (FR) are just some of the companies enabling architects, interior designers, property developers and their clients to immerse themselves in creations throughout different stages of the design process, and so allowing them to get a better feel of what the model could look like once finished. ZEISS (DE) also focuses on VR hardware for manufacturing and produces VR lenses. Timescope (FR) and Realtime Robotics (FR), create hardware for exploring cultural content in VR [2].

As we looked the state of virtual reality technology in the world market, growing by 72 percent in 2017, the augment and virtual reality consumer market reached a value of $3.2 billion according to analytics firm IHS Markit. Projected growth estimates the VR global install base will rise from 28 million to75.7 by 2021, and that revenues will reach $ 5.9 billion [7]. Similarly, in the report prepared by Ecorys research firm, it is expected that VR & AR markets, which are expected to grow steadily in Europe and around the world, will have a total production value of 15 billion euros and 34 billion euros in terms of software, hardware and content, and will directly or indirectly employ 220,000-450,000 people by 2020[2].

In the report prepared by the Munich Technical University Strategy and International Management Unit; According to Deutsch Bank research data, the augmented reality market is estimated to be 7.5 billion euros by 2020, while it will be 500 million euros in 2015. The VR & AR global market is expected to grow up to $ 80 billion by 2025, and the market is expected to be $ 182 billion by 2025 if it rises fast (Goldman Sachs,2016). In the report, it is stated that VR & AR technologies will increase between the years 2020 -2040 and it will be the technology

of the future considering the 41 industrial areas. In addition, in 2016, VR hardware devices sold 11.2 million units worldwide [3].

When we examine the virtual reality technology in Turkey, a virtual reality laboratory established in Bahcesehir University which is a private university and companies such as Vizera Labs, Pandora, Hangaar Lab, Blippar Türkiye, Arox Bilişim, Codemodeon, SpaceWalkerVR, Monolab, Yeti Interactive, Hologram LTD.C,Vr Otto started to take the first steps of this technology in our country with its works similar to earth in the fields of shopping, museums, games, education, architecture, cinema, construction, interior architecture, industrial education, medicine, occupational safety and health. In addition, the virtual reality gaming cafes in Istanbul, Ankara and Eskisehir serve to those who want to experience virtual reality technology.

New technologies lead to radical transformations in all areas, leading to the collapse and destruction of old technologies and companies, sectors and even economies that cannot realize this transformation. This process affects all economies in the World. It is imperative to develop new strategies and policies at the company and country level in order to minimize the destructive effect of benefiting from the p ositive aspects of the process (TUSIAD,2018). Implementation of new technologies is possible with a new digital conversion. Human resources are the most important factor in order to realize digital transformation. According to TUSIAD's 2018 report;

In the last 15 years, there has been a programming (software) sector which has the most positive and significant development among digital technology sectors. Employment and value-added in the software sector increased rapidly and regularly since 2004. At the same time the proportion of total employment of information technology professionals in Turkey in 2016 according to OECD data is at the level of 1,06%. This ratio is 6.24% in Finland employing the highest number of ICT experts in OECD countries which is average 3.64%. To maintain the current position of Turkey in the international economy, assuming that it should employ IT specialist in the OECD average 484,000 additional IT specialists are required based on the current level of employment .Therefore, information specialist is needed. In order to capture a sustainable growth pace above average for the realization of the potential of digital technologies and Turkey, assuming that Finland's ICT employment rates should be reached in 2016, the IT specialist gap is about one million people

More than half of this gap consists of professional staff of Information Communication Technologies. According to the data of the Higher Education Institution, in 2016 only 665 people received a bachelor's degree in these fields. In the same year, the number of engineers graduating in the fields of electronics and automation is 15,435 and the number of graduates of all departments of engineering and architecture is 59,137. If all the architectural and engineering graduates since 2016 employ as "information and communication professionals" they even reach the OECD average of Turkey in case of employment will last more than 8 years. As the software sector is a sector that includes low investment, high employment and high added value, the virtual reality technology which has not yet demonstrated its effectiveness for our country constitutes an innovative area to provide employment in the field of information communication technologies [1].

The virtual reality and the augmented reality market constitute a great employment potential in terms of content creation, application development, as well as mobile application development for occupational groups, given the above-mentioned market value changes. As it is understood from the statistics mentioned above, employment is needed in this field and meeting this need carries great potential for our country where middle income level is discussed. In the era of

digitalization, virtual reality technology will both raise our economy and mobilize our national software industry in domestic and world markets. Virtual reality technology of the future technology will add new horizons to the World. In the words of Ivan Sutherland; with appropriate programming such a display could literally be the wonderland into which Alice walked.

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THE USE OF VIRTUAL REALITY IN CULTURAL LANDSCAPES

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Along with the advancements in technology, new approaches and methods have been developed for the utilization of information in many fields. Especially in the information age, based on less comments, as attribute is based on unlimited images. In this context, archeology has become one of the most benefiting disciplines of technology today.

The interaction between archeology and technology, which was based on natural observations until 1930s and was included in the records with definitive definitions, entered into a significant development process thanks to the convenience of computers in our lives as well as data warehousing and analysis opportunities. Rapidly advancing technology has enabled the development of systematic, rules-based and hypothetical theories; In this way, modeling and simulation in archeology, visualization, Geographic Information Systems (CBS), artificial intelligence and webography has become important areas of use. In the light of these methods applied today, the surveys and excavation data are evaluated, and technological and visual conveniences are provided in the presentation of the ruins with museums and archaeological sites to the visitors. The virtual reality technology, which is one of these technologies, is an easy way to reflect the past-future interaction to the visitors quickly, and offers ease of detection with realistic images and sound effects. In this way, the level of awareness, awareness and awareness of the past to be directly proportional to the protection and sustainability of cultural heritage values is to increase the level of awareness.

In this research, the effect of virtual reality on archaeological science as a product of developing technology and its development process, and its impact on the cultural landscapes with archaeological value are examined through examples. In this way, it is aimed to create awareness in terms of preservation, sustainability and transfer to future generations of landscapes which can be considered as cultural heritage areas.

The research findings are based on an extensive literature on the purpose of the research reflects the example from the world and Turkey. Also, in this context, it is aimed that the notification will shed light on the future works, and it will aim to benefit from the compilation of samples.

Major improvements have been recorded about realism, immersion and interaction that virtual reality studies revealed in the development process compared to today's studies. It is expected that virtual reality systems and usage will go further and become more widespread with the development of new products and equipment planned to be used in near process in accordance with these applications. With these conditions, in the near future, the use of virtual reality in the quantitative and qualitative way in the field of cultural heritage will play an important role in the stronger adoption of the conservation phenomenon.

Key words: virtual reality, cultural landscape, landscape design, cultural heritage, reconstruction.

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THE AVAILABILITY OF GEODETIC DATA IN VIRTUAL REALITY APPLICATIONS

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EXTENDED ABSTRACT

Virtual reality is conceived as a scene where users can experiment with many applications in a realistic scenario. In order to achieve the closest visualization to the virtual reality environment, it is necessary to use models close to reality. Transferring the sense of reality to the user comes into life with the more realistic modelling of that environment. Real-world models of real-life models, such as the accuracy of modelling, the use of the type of data to be used in this scenario also needs to be knowing. As a geodetic, the acquisition of three-dimensional (3D) data in modelling real-world objects into a virtual reality environment is the first basic step of virtual reality applications. The real-size models of objects produced by classical measurement or technological imaging techniques from different terrestrial and airborne will be more easily adopted by the users in the real world, with the proportional dimensions and the actual texture of the objects they are associated within the real world. The most key point in the preparation of the models is the geodetic determination of ground and airborne measurements in three-dimensional models. In this study, the importance of obtaining the geodetic data types to be used in the virtual reality environment and giving the necessary sensitivity for the model was investigated.

Virtual reality is the environments where the scenarios are created by using realistic models created in computers and similar environments to be transferred from the minds of people to their feelings. The models designed in this environment increase the power of perception, perception and feeling in people significantly and interactively in the created scenarios. Virtual reality allows the individual to escape from the limitations of the world in which he lives and to discover a new and different universe. Virtual reality is used in many fields such as education, medicine, city modelling, industrial production and it is also used effectively in engineering application areas (Bayraktar & Kaleli, 2007; Ergün, 2010).

The most important feature that distinguishes virtual reality from many other applications is that it gives the user a sense of reality. In order to fully sense this feeling, the objects in the model must reflect the truth in terms of texture and size. The most critical point in the preparation of the three-dimensional models created by using ground or aerial photography is the true size control of these models as geodetically. For this, in order to convey the reality of the scenario to the feelings of the person, the environment and objects in the scenarios must be created on a real scale. The fact that this model to be created reflects reality depending on the data type and resolution (Çavaş, Çavaş Huyugüzel, & Taşkın Can, 2004; Kayabaşı, 2005).

Nowadays, data used in the preparation of 3D models can be classified into three groups. These are;

- Image and image-based data (Raster Data).
- Linear data produced by measuring process (Vector Data).
- Point cloud data generated by a laser scanner or photogrammetric methods.

One of the most principal issues in three-dimensional modelling is the acquisition of digital surface models. In addition to the true size models of the objects produced by different terrestrial and airborne measurement techniques, automatic or semi-automatic digital surface

model production is performed with the help of a function using the software produced especially for this job. With the models produced, objects in the virtual reality environment can be close to reality (Uçar & Ergün, 2004). It gives detailed information about the coordinate information of the points forming the real models, the geometry, and the size of the object. This ensures that objects are displayed in different environments with the dimensions they are actually in. The most obvious example is three-dimensional maps. Because three-dimensional maps based on the coordinate information of geodetic details on a certain scale of land is the representation of the structure. In this respect, the realization of three-dimensional objects in the real world is one of the basic steps to be taken. Therefore, the accuracy of the coordinate information of the points in the virtual reality is important. Models to be created with coordinate data; Measurements such as distances, areas, volumes, heights can be obtained from geodetic data. The data used in the scenario to understand the dimensional relations of the objects with their environment and to obtain information about them are significant. In this context, the geodetic data obtained from the models of the objects created by using computer technology will enable the user to feel more realistic in the virtual reality environment.

Precise creation of the basic backing, which enables the three-dimensional models to be depicted in the computer environment, is possible but possible with the use of geodetic data. Because it will be an economic burden to obtain information about the geometry and dimensions of each object and to apply them to the model. Three-dimensional modelling techniques can be created in a computer-like manner and predictions and analyzes can be made with these models. When such opportunities are achieved, virtual reality will be an application that users cannot give up with visualization in every imaginable area of life. Although this application is not possible for today, it will be ensured by increasing the quality of data in the future and improving accuracy. Therefore, the desired accuracy is very important in the three-dimensional models together with reality. Based on these recommendations, the dimensional accuracy of the three-dimensional models obtained from several types of data sets as well as the geometrically prominent objective accuracy is gaining importance.

Keywords: Virtual Reality, 3D Modelling, Geodetic Data, Object Dimensions, Surface Pattern

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COMMERCIAL APPLICATION APPROACHES TO VIRTUAL REALITY; CASE OF CONSTRUCTION SECTOR

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ABSTRACT

Technology is one of the key areas of rapid change and development in our world. The pioneering of the subject of technology stems from the fact that human beings use their knowledge and skills to produce the tools, equipment and services they need and use them effectively. The technological advances that come up with each passing day are rapidly involved in our lives and increase our quality of life and comfort. Technology is used intensively in many sectors such as communication, construction, education, health and industry, and makes important contributions to the theoretical and application areas. Among these contributions, the sectors that are benefiting from this contribution are the trade sector. The rapid change in the communication and interaction of commercial organizations with their customers necessitates technological renewal. The technology world, which progresses at the same pace, meets the new needs that arise due to social changes with effective methods. The same parallelism of the world of trade and technology has brought them together at the same intersection. The new driving force in this association is the virtual reality applications, one of the most important technological developments of recent years. Virtual reality, a new generation method for meeting the needs and expectations of the business world as in many other areas, is a new exposure tool that uses three-dimensional computer graphics based technologies that allow the individual to feel as if they are in a physical virtual environment by misleading their senses. In this context; The main objective is to convey the effects of the high and permanent interaction power of the virtual reality with the cognitive and sensory experiences and the effects of the construction sector.

Keywords: Commercial approaches, virtual reality, construction

1.INTRODUCTION

One of the basic characteristics of human beings is development. At the same time, this nature, which is a requirement of its nature, is the main reason of the engineering profession and consequently technological developments. In the 21st century, technological developments were the most intense. Many areas, especially important areas such as science, trade, medicine and communication, have benefited greatly from technological developments.

This interaction, which will continue depending on the existence of human beings, is of great benefit for the dissemination of knowledge and the discovery of new inventions. In fact, the ability of human discoveries has increased so much that it is possible to witness more than one innovation at the same time. Therefore, the technological developments that push the boundaries of intellect and witness a new one at every moment take human life to a different point.

Developments in technology provide significant contributions to numerous disciplines in the field of theory and practice. Developed countries, behind their success, benefit from these technological developments and, more importantly, their realization. At the beginning of the topics where the countries in question achieve significant success, the information is processed, evaluated and communicated. The success of the studies on this subject has led the countries that want to plan their future in the right direction to follow the technological developments in which information, sound and moving images are provided. Because tomorrow's societies build their infrastructures on technologies called today's information technologies. Therefore, the current technological infrastructure needs to be positioned in the most accurate and healthy manner. Otherwise, societies will be confronted with more complex and difficult-to-solve issues in the future. Virtual reality (VR) applications take a substantial and significant place in many sectors, given the benefits they provide, depending on these conditions.

2. A BRIEF OVERVIEW OF VR TECHNOLOGY

VR can be defined as a human-computer interface that allows the user to interact and integrate with a computer-generated environment (Liu, 2005). VR, also referred to as a type of interaction method, is a special environment that uses the capabilities of effects to enhance the user's real-world experience with computer-generated screen, sound, and text content (Loijens et al., 2017). VR is a computer simulation using a special digital system equipped with sensors that allows for a realistic interaction within a three-dimensional image or environment (Whyte, 2003).

The thesis that was prepared by Ivan Sutherland in 1963 was the biggest and first step in the name of virtual reality. As experience in the virtual environment influences one's real-life experiences, VR acts as a bridge between virtual experiences and real-life experiences. This study, which pioneered computer-aided drafting studies, has led to a significant number of researches in the business world (Bridges, 1986).

3.VR LOCATION IN CONSTRUCTION SECTOR

Although VR is generally seen as an entertainment tool, it has recently opened up new horizons for commercial applications and approaches to engineering problems (Bayraktar & Kaleli, 2007). One of the areas where VR was ambitious was the construction sector and management. Numerous application opportunities in the construction sector have led experts to research for effective use of VR. It has significant potential for successful implementation areas in the planning of construction projects, progress monitoring, work management, worker training, time and cost analysis, quality management and sales processes (Ahmed, 2019).

The construction industry is one of the largest industries in the world. The construction industry has undergone major changes from the beginning of its history. Especially in the last century, we have witnessed many developments in the construction sector. The construction sector, where major transformation and change has taken place, has gone over great distances in terms of new approaches, methods, techniques and strategies to make bigger and better activities (Escamilla and Ostadalimakhmalbaf, 2016). In this process, the construction sector, which benefited the most from the technological developments, created important usage areas

in VR. The construction industry considered the three-dimensional and realistic experience of VR as an important material used in the interactions of individuals in many ways (Dunleavy and Dede, 2014). However, VR is a modern and effective facility management system that facilitates the work of project authorities more satisfactorily than ever before (Koch et al., 2014). In recent years, focused studies on this subject have brought successful results. VR, with its solutions that respond to the desired expectations from the project owner, its executor and its workers, also makes great contributions to the future (Behzadi, 2016).

4. APPLICATION APPROACHES OF VR IN CONSTRUCTION SECTOR

VR, which offers a unique experience with its three-dimensional feature in the world of civil engineering and management, offers the same benefits for the consumer (Park et al., 2013). In this way, while allowing the consumer to have an opportunity to experience realistic experience, it enables the project authorities to see the errors and risks before the project occurs and to take necessary measures accordingly (Lin et al., 2013). Before entering VR technology into the world of construction, the error management system was an expensive and time consuming issue. However, with the help of VR technologies, error management becomes very easy and effective, and there is no need for physical labor. Thus, resource management is achieved in the management of labor, cost and time issues.

VR, which has shaped the future of the projects with its high predictive feature, also has significant gains in the training of workers working in the construction sector. The construction industry is considered to be one of the most dangerous industries due to its inherent risk and uncertainty (Rozenfeld et al., 2010). Therefore, one of the biggest concerns felt in construction projects is the training of employees. Because the quality and safety of the construction of the workers depends mostly on the correct, permanent and effective training of the employees (Demirkesen and Arditi 2015; Rumane 2016). However, this problem is not easy to achieve at the desired level or at the standard level. With its use in this phase, VR technologies are both ahelpful resource for providing effective training to employees and applying the safety management system as a specification.

The VR technologies used to reduce the accident rate on the site open large windows for the training, monitoring and control of the safety management of construction companies. Thus, VR-supported educational platforms will play an important role in avoiding serious negativities that threaten possible occupational health by provoking a sense of one-to-one (Ahmed, 2019). However, the fact that the new generation is a technology enthusiast has made it necessary to pass the training model to new technologies that offer the opportunity of engaging and experiencing instead of giving up passive teaching tools (Bhoir, 2015) Also, a research done to reveal the effectiveness of VR training has shown that VR usage provides excellent education as soon as possible. On the other hand, it has proved that the longest duration of information in individuals (Sekizuka et al. 2017).

Thanks to these highlighted qualities of VR, the definition of timing in the construction sector has also changed in recent years (Meza et al., 2015). Visualization of the studies carried out on this subject compared to the timeline is important for the follow-up of the planned process VR, which provides a visual comparison between the planned structures and

constructed shows that it is one of the most used and practical functions in project management (Park et al., 2013).

VR provides great opportunities not only in the planning and realization stages of the construction sector but also in the sales process after the completion of these stages. Competition in the construction sector and the awareness of the society made it necessary for the sector to use modern marketing strategies. Although VR is a solution that meets the necessity of this issue, it also closes a very important gap by having a promotion and marketing argument that increases the prestige of the company. In the process of introducing and selling the projects to the customer, the fact that they are close to the distance by eliminating the necessity of going to the physical environment and providing an effective and strategic marketing opportunity once again reveal the advantage of VR. In addition, the VR is an important contribution to the fact that the customers in the customer group have the opportunity to experience the features they want, to find out if they meet their expectations and to get information in advance. This practical and time-saving solution to the people living in today's societies will provide significant comfort to the buyer.

5.RESULTS

Our world, which is shaped by technological renewal, is becoming more and more computer-oriented life. This transformation, which takes place quite quickly, eliminates the possibility that our life will be the same as before. Moving from mobility to the life of today's human, the boundaries of a universe, fast access to the axis of the need to ensure the communication evolves towards the living model (Bayraktaroglu, 2008). The necessity of this change and development brings many innovations to the use of humanity.

VR technology, one of the promising innovations of today's world, can bring people to a new dimension with the fact that it provides realistic experience. This environment, which resembles real life and is digitally generated, brings experience to an important depth. Thus, VR technologies allow a project to be truly experienced before it is built. In addition, employee training, security management system, progress tracking, labor management, error management etc. It is a basic tool for subjects.

Recent research shows that VR technology will play an important role in the future of construction management. With the integration of various subjects in the construction sector, it will provide cost, time and energy savings, and will increase productivity through the permanent impact on work and worker health. Nevertheless, it will be considered as an effective communication tool in the sales phase, which is the most important process of the construction world and will eliminate the need for physical environment and provide effective time usage.

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THE ROLE OF VIRTUAL REALITY IN THE TRUE CONSTRUCTION OF ENVIRONMENTAL AWARENESS

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ABSTRACT

Mankind is an impossible entity which cannot be thought separately with the environment. This indispensable association brings a dynamic interaction. In this process, the human being, who is forced to continue his / her life, uses the various aspects of the environment in which he / she lives. However, factors such as increasing population, industrialization and change in the life perception of the last period have increased this utilization to the highest limits. In addition to the positive results, this situation has brought with them negative quandaries such as human-nature irresponsibility and ecology-economy power struggle. What is happened has been the century of environmental problems that could bring an end to the human generation. This necessitates the rational implementation of all opportunities for our planet, which gives warning signals. Within the scope of these studies, ”environment and education” topic has been one of the prominent topics. It is a controversial issue whether the person who is the lead actor of the point is to realize that the solution also needs to correct himself and environment perception . Therefore, environmental awareness to be transferred to individuals will bring a radical and effective solution to most problems. In addition, environmental awareness constitutes the boundaries of civil society behavior, including basic human rights, equality and justice. It is important that individuals in the society be educated for the correct positioning of the environmental perception that includes these values. Environmental education is an education aiming each person to know the ecology and natural balance, not to see him / herself out of this cycle and to realize the position and weight in the system, to be aware of the factors affecting the environment and to display the proper behaviors accordingly. The training model in achieving these important objectives should be comprehensive and effective, which could lead to strong change in social behavior. These conditions necessitates the environmental education models to be applied within the scope of virtual reality, away from a utopian expectation. The reality of VR that people will experience in the education process is an effective tool for creating a high environmental impact. Virtual reality, which will be an effective recipe for sustainability and knowledge, which is one of the basic problems experienced in education systems, will be able to provide significant contributions to environmental education and our future depending on the experiences it will experience.

Keywords: Environmental Awareness, Education, Virtual Reality

1. INTRODUCTION

Mankind is an entity which cannot be thought separately with the environment. This indispensable association brings a dynamic interaction. In this process of interaction, people who are obliged to maintain their lives benefit from the environment in which they live. This extremely natural operation has become a weighted model with unilateral utilization over time. This situation caused the human-environment equilibrium to unbalance unevenly. These serious problems have started to be on the agenda of national and international platforms as one of the priorities of today's globalizing world.

These environmental issues, which show a continuous increase, have been forgotten or ignored due to technological developments, and the disasters, which are increasing today, have begun to be discussed in the last fifty years, albeit late, due to urban and environmental problems. The main reasons for these problems are increased population, industrialization, excessive consumption of resources and intensive urbanization. However, lifestyles based on luxury and comfort have expanded the size of existing problems. This growth in the negative sense has hit the face of humanity in the fact that environmental problems threaten not only certain regions but also the whole planet and its future.

The history of mankind is full of deep-rooted innovations and changes, such as great discoveries, global changes, industrialization, urbanization and modernism in the world of science and technology. However, this has not always been a positive result, but also the negative dilemmas such as human-nature irresponsibility and ecology-economy power struggle. What has happened has been the center of environmental problems that could bring an end to the human generation. This situation necessitated the rational implementation of all opportunities in order to prevent environmental damage. The people who attempted to make every effort for a chain of these important problems that threatened the planet and its future began to resort to all possible remedies and evaluations. The need for effective environmental education, which is thought to be made a great contribution by taking this effort into consideration, will ensure the correct construction of environmental consciousness. By fulfilling this need, the concepts most needed by today's societies such as value, virtue, morality, balance and unity can be underlined again. At the same time, it is an important gain to raise educated and conscious with eco-individuals in society in order to re-experience human and nature's desired harmony (Atasoy and Ertürk, 2008).

2. ENVIRONMENTAL EDUCATION AND PURPOSE

In today's world, problems called environmental problems are considered as identical with the disappearance of the foundations of life (Çepel, 2006). The main actor of this dangerous situation is the human being and the main reason is unconsciousness. The first factor causing this negative situation is the lack of education and wrong education. Therefore, environmental awareness to be provided by an effective education to individuals will provide a radical and long-term solution for many problems (Karataş, 2011).

Environmental consciousness is a common understanding and obligation that covers every aspect of life. In addition, providing environmental awareness constitutes the limits of

civil society behavior, including basic human rights, equality and justice. In order to increase the environmental awareness that encompasses these values, individuals in the community should be educated (Dedeler, 2004). Although different ways are suggested for the solution of environmental problems, the most effective way is to prevent problems before they occur. It is accepted that the most powerful method to provide this is education (Şimşekli, 2004). Because the desired level of development related to the human-environment duo will only be ensured by the environmental awareness to be achieved due to a sound education.

Among the main reasons of today's problems are the inadequacies in the process of acquiring knowledge and consciousness. Societies cannot comprehend that the environment in which they exist and use it will be used by the latter after these shortcomings. However, the environment is not an inheritance, but a trustworthy transfer to future generations. For this reason, in today's societies, there is much more need for people who are compatible, friendly and trained in their environment (Atasoy, 2005).

It is possible to reach the origin of environmental problems, to produce remedies for these problems and to provide positive changes in the attitudes and behaviors of individuals towards the environment through environmental education. Because, it is an indisputable fact that individuals with adequate level of education and sensitivity play a more constructive, protective and active role in solving environmental problems. From this point of view, it is aimed that individuals become conscious with environmental issues and problems, develop solutions and abilities related to these problems and create a willingness to make effective decisions by means of environmental education (Cole, 2007).

It is possible to summarize the objectives of environmental education as follows: to perceive the environmental and natural phenomena experienced by individuals through sensory organs and to provide them with sensitivity, to know the concepts of artificial and natural environment comparatively, to comprehend the interaction between them with their results, to learn and apply the methods for conducting environmental studies.To comprehend the connections between other branches of science and to be a close follower of environmental issues. Together with this, environmental education should adopt the concepts of luxury and need with the differences and aim to bring fundamental benefits to social progress by this separation (Khodabandeh, 2010)

3. VIRTUAL REALITY AND ADVANTAGES IN EDUCATION

Countries should develop new educational models based on ecology and environment by the collaborative method, due to the global nature of environmental issues, regardless of their structure and viewpoints. What is happening on the planet makes this a necessity rather than a utopian expectation. Therefore, education policies need to be developed both in terms of content and method and to be dealt with in a long-term way. It should be emphasized that environmental education is not only a specific time and activity within the program, but also has an interdisciplinary field of education. However, transferring the problems through the environment in which they are experienced and their interactions is very important in terms of permanence. However, the societies that will be educated with this perspective will continue to find place in the world hosting them.

Education is one of the effective areas where today's technology is important. Students' ever-increasing computer literacy is the most important factor that nurtures this situation (Knight, 2006). The penetration of technology into every field and the increase in demand due to related innovations have suggested the use of virtual reality (VR) in the field of education. In addition to being a safe and fully controllable practice of VR technologies, it has provided the student with the opportunity to learn with realism and interaction experience. This new style has been promising for easier and more complex training (Kartiko and all, 2010).

An effective education should provide individuals with strong technical knowledge and the ability to develop feasible solutions. Providing innovative solutions and enabling sufficient skills to achieve employment in challenging business life. VR makes a significant contribution to individuals with the motivation and confidence that it will create. The technology, which is highly adopted due to all these returns, also satisfies the expectations of the current generation of students (Abulrub and all, 2011).

In 1963, Ivan Sutherland's thesis was the first step towards virtual reality. This study, which pioneered the computer-aided drafting studies, has been the source of a significant number of studies in the field of education (Bridges, 1986). Research on VR and similar technologies has inspired new models for learning and teaching (Chen and Tsai, 2012).

In 1980, the term VR proposed by Jaron Lanier in the United States (Fuchs and all., 2011) is briefly referred to as the computer-generated on world (Rheingold, 1991). From a technical point of view; the user can view that can be seen from a particular camera in three dimensions thanks to the software that manipulates a series of photographs . In more complex systems, it allows the user to interact with the environment by getting help from various instruments (Tuggy, 1998).

Virtual technologies have the potential to make students feel more determined and motivated (Kerawalla and all, 2006). VR, one of the leading applications of virtual technologies, is an innovative educational tool that enables students to solve real-life complex problems with on-the-spot approach (Kartiko and all, 2010).

VR provides a rich, interactive, engaging educational environment that supports experimental learning (Mantovani, 2003). Improving the learning process, student motivation and awareness raising are seen as other benefits (Horne and Thompson, 2008).

VR enables students to explore new areas, make predictions, design experiments and interpret results with real-life experience (Steinberg, 2000). Because this constructivist approach is based on student-centered experience, it makes that it easy for students to unleash knowledge (Winn, 2002). VR, which enables the student to be active, allows autonomous exploration with the interaction making complex concepts understandable and teaching by living. In this way, students can achieve learning outcomes and cognitive skills through more real-time interaction and reach more conclusive decisions (Kotrenza and all., 2009). In addition, the opportunity of accessibility and experience provided by VR brings great convenience to disadvantaged students in the society and increases the opportunities for participatory training (Lange and all., 2010).

4. VIRTUAL REALITY IN ENVIRONMENTAL EDUCATION

Environmental awareness is expressed as the realization of the importance of a human being's relation with his environment for his own existence (Erten, 2004). In recent years, serious efforts have been made to create this sensitivity of societies and new searches are being used. Environmental education is directly related to environmental problems. Environmental education is an education aiming each person to know the ecology and the natural balance, to realize their position and weight in this cycle, to be aware of the factors affecting the environment and to display the correct behaviors related to them (Uğurlu and Demirer, 2008).

Environmental education aims to develop a positive outlook on all environmental values, to raise the level of knowledge, to develop a holistic approach to environmental problems and to take responsibility (Thomson & Hoffman, 2003). By achieving these goals, the natural environment will be protected and will not be damaged. However, the training model in achieving such important goals should be comprehensive and effective, which could lead to strong change in social behavior (Yıldız et al., 2008).

Developing environmental awareness in humans and creating environmental behavior depend mainly on three factors. These are cognitive, affective and situational factors. Cognitive factors correspond to environmental problems and ecological knowledge of individuals. Emotional factors affect the environmental behavior and include the emotional dimension of the ecological phenomenon. Situational factors affecting environmental behavior include the status of individuals, their demographic structures and economic conditions.

The success of VR on these three factors suggests that it will create the desired effect on environmental education. If concrete examples are given in this sense; thanks to VR, it is possible to allow students to visit a place which is not practical in real life, and to visit places that are not suitable for transportation, health and safety opportunities with realistic feelings. It provides the opportunity to observe the processes that are important both in terms of close proximity and the importance of in-situ inspection. It will be appropriate to give this subject to composting, which has a great place in environmental engineering. The fact that composting processes are not present in many places, and they have drawbacks in their close observation, make it difficult to reach the practical information on this subject. VR, on the other hand, prevents the lack of education and provides a holistic approach.

Likewise, another study by Stanford and Oregon Universities supports the success of VR. In a study to draw attention to the climate change and its consequences, it was aimed to reveal the danger of extinction of marine ecosystems, one of the most insidious effects of increasing CO2 emissions. Having discovered that VR is a powerful tool for improving environmental learning gains and attitudes, researchers have proven that simulating the effects of ocean acidification is significantly encouraging people's environmental awareness (URL).

VR, which is a complementary material for the distance education method which is also used by environmental engineering, is considered as an attractive source for today's students. VR,which has proven effective in both face to face and distance education models; construction, space, underwater, military and nature. The effective success it has provided has inspired other areas of specialization and pushed them into new research that they can use (Burnley, 2007).

4. RESULTS

Along with the changing world, the structure and impact dimensions of environmental problems vary considerably. These environmental problems are the problems that affect the quality of life of societies deeply and even reach the life threatening dimension. It is known that the solutions of these problems will occur with the permanent environmental consciousness to be provided to the people (Gürcüoğlu, 2013). Environmental education is one of the topics that will be discussed in order to create environmental consciousness and to achieve healthy future. Therefore, the contribution of individuals to environmental education has to be prioritized by other contributions. Because all aspects of societies, states, and ultimately those who manage the environment in which they live, are people living in that environment. Individuals need to be educated according to their needs, owning the future, taking care of the ecological balances, sensitive and environmentally conscious. For this purpose, all kinds of social factors should be taken into consideration with a living process and they should be continuously questioned and reflected on the educational models depending on the results.

The training model for achieving such important goals should be comprehensive and effective, which could lead to strong changes in social behavior. These necessary conditions necessitate the model of environmental education to be applied within the scope of virtual reality. The real and experienced feelings that the virtual reality will bring to the people in the education process will create a high environmental impact. At the same time, virtual reality, which is one of the main problems experienced in education systems and a highly effective prescription for living knowledge, will make significant contributions to environmental education and hence our future with the experiences it will experience.

As a result, it is clear that the VR is a new learning model that better meets the needs of the 21st century student. Therefore, it is adopted with a rising trend among the newly discovered educational models (Elmqaddem, 2018). Because of all these gains, it will be of great benefit to benefit from VR technology which makes learning easy and efficient in order to ensure environmental awareness permanently at all levels of education from primary to higher education (Gutierrez, 2017).

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VIRTUAL REALITY FOR CITY PLANNING

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EXTENDED ABSTRACT

Introduction

City planning as all kind of planning is about something unreal, something about to happen in the future. There, how this future will look like is left to the imagination of those who are doing the planning and those who will be affected by this planning. Traditionally, the results of this planning have been laid down in the form of lengthy reports and 2D maps. For the preparation of these maps, the use of Geographic Information Systems (GIS) has become standard. The disadvantage of expressing planning in such a way is that most people are reluctant to read through hundred of report pages and have difficulties to read and understand 2D maps in the right way. This applies not only to the general public that thus is excluded from the planning process but also to most decision-makers who lack to interpret maps correctly.

Given this circumstances, it is no wonder that city planning at least in many cases, cannot be considered to be very efficient. The classical products of city planning just do not correspond to the needs of the general public and decision-makers. They are difficult to understand sometimes even for experts and resemble hieroglyphs for the layman. As KACAR et. al. (2015) put it “Prepared plans are not being implemented in the way they were intended to, which forms complex and ineffective differences between the plans and their implementation.”

The use of Virtual Reality (VR) tools brings urban planning and architectural design to a new level. It allows a reality like experience of the results of planning efforts in the presence. Moreover, interactive tools of VR offer even the opportunity to see the results of changes to this planning immediately. Ivan Sutherland, one of the pioneers of VR, stated already in 1965 “make that (virtual) world in the window look real, sound real, feel real, and respond realistically to the viewer’s actions” (Sutherland, 1965).

For communication of complex spatial information such as virtual 3D city models immersive 3D virtual environments have been created. Such an mmersion is related to user experience and can be described as a ‘psychological state characterized by perceiving and experiencing oneself to be enveloped by, included in, and interacting with an environment’(Witmer & Singer, 1998).

Mullins (2006) compared aspects of spatial perception in architecturlal application in a physical environment, CAVE and at Aalborg University’s ‘Panorama’ theatre, a facility of the Virtual Reality Media Lab. The results of his study showed that that depth perception in physical reality and its virtual representations in CAVE and Panorama are quantifiably different, that differences are attributable to prior contextual experience of the viewer, and that spatial ability is an important contributing factor. Results indicated significantly better overall accuracy of response in the CAVE than in the Panorama VR environment, which was attributed to the relatively higher degree of immersion and movement possible in the first VR environment..

Considerable research has focused on different visualization techniques including heat maps, glyph annotated maps and tradition 2D graphs, but studies on the effectiveness of VR in modeling the future of smart cities and on demonstrating the impacts of "what-if" scenarios to policy-makers and communities is lacking (Jamei et al. 2017).

Methodology

To use GeodesignHub, City Engine and Unity3D software, a high level of software knowledge and time is required. In order to overcome this drawback a custom-made solution based on the API provided by GeodesignHub was developed. By means of an user-friendly graphical user interace (GUI) an automatic workflow has been created from Geodesignhub to City Engine and Unity3D, which facilitates the selection of parameters.

The workflow consists of the three steps: 1) In GeodesignHub, the user has to select a system (like agriculture or low -density housing). Then, he selects an user name and the new development project in form of polygon. For this project, he has to define several parameters like the type of neighborhood and average amount of floors. 2) The selected polygon is automatically transferred to CityEngine where it is modeled according to the selected parameters. 3) In the last step, the user can easily transfer the modeled project ito the Unity3D game engine. It is automatically applied to the virtual reality environment in Unity3D. Bu using VR glasses or other VR means, the user can experience the planned development project as it was real.

Findings and discussion

Used a participatory GIS for entering and editing of spatially referenced data. These data consists of proposed project to be included in the plan for a respective area in the form of polygons. By means of a simple user interface for any selected polygon certain parameters can be defined.

In a second step, these definitions are forwarded to ERSI's CityEngine, a 3D modeling software based on parametric modeling. This software interprets these definitions according to predefined rules and creates automatically 3D objects like apartment or office buildings. Although in this research only a very limited number of parameters were defined this list could be extended as long as required by the purpose of the respective planning study. In this research, a system with only two parameters having 4 options offering a total of 8 different options has been developed.

So far, the system has been set-up only for the development of one city block that poses a severe limitation for the development of more comprehensive plans. Furthermore, such a city block can currently consist only of the same building type like apartment, office, shopping mall, etc. In order to be realistic a city block should contain different building types for example apartment and shopping mall.

In a third step, the 3D models created by CityEngine are forwarded to Unity3D, a game rendering machine that create the environment to be used in a Virtual Reality application.

Virtual Reality consists of two components: While it is relatively easy to create a virtual environment (any digital game that has been developed even 50 years ago was virtual) to present this environment in a way that a human being interprets it as real is something totally different. It requires that the 3D models used to be of high complexity showing so many details that it can be felt to be "real". As discussed before, a lot of input parameters should be available if such a high fidelity model should be produced, something that might not be possible during this kind of planning process. Certainly, there is a trade-off between

practicability of the planning process and high-fidelity of the virtual environment to be created. However, if all stakeholders involved in the planning process including those setting-up the system are aware of this situation a compromise that is reasonable for the special purpose of the respective study could be found.

Conclusion

Visualization in urbanp lanning and urban design provides three main benefits: (1)it assists in understanding the consequences of design schemes from multiple perspectives;(2)it helps understand the different layers of information about urban planning and urban design; and (3) it offers an effective platform for communicating with others.

Key benefits of using VR in designing smarter cities include the following: • Capability to assess design ideas in real time and within a 3D space during the design and planning phase; • Effective communication among different stakeholders, academics, planning professionals, and communities; • Saving of a significant amount of time by excluding guesswork in design; • Integration of all aspects in the design and, thus, achieving a resilient sustainable city design with the least amount of time/funds; and • Promotion of participatory planning. A key challenge in implementing VR in urban planning is cost. The use of VR has been limited to only private companies, high-end workstations, and educational institutions. The visualization and simulation of urban built environments require the extensive use of integrated software to include GIS, digital drawings (computer-aided designs), multimedia data, and World Wide Web-based VR techniques. Future works are necessary to determine how urban designers who work in small companies will benefit from VR systems in their urban design or planning practices.

Keywords: City planning, GIS, GeodesignHub, CityEngine, Unity3D

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ARTIFICIAL NEURAL NETWORKS CONTROLLED REACTIVE POWER COMPENSATION IN THE PERSPECTIVE OF INDUSTRY4.0

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Keywords: Reactive power compensation, artificial neural networks, learning algorithm, Industry 4.0

1. Introduction

Efficiency in electrical energy means that doing the same work using less energy without compromising the quality of service. Reactive Power Compensation is one of the most important ways to improve efficiency and energy saving in energy systems. There are many types of compensation techniques such as static and dynamic VAR. With the reliable and faster processors and the better control devices, now it is possible to design and implement more efficient Reactive Power Compensation systems. Moreover, advances in Information and Communication Technologies(ICT) have made it easier to balance the Demand and Supply of energy and have led the creation of the smart grid. The integration of machines and tools with ICT systems has resulted in the Fourth Industrial Revolution and Industry 4.0 applications. Industry 4.0 enables real time monitoring and controlling of the devices while collecting more data in order to make better and smarter decision. Artificial intelligence methods often find a place in designing of intelligent systems.

In this study, a reactive power compensation system will be designed by using artificial neural networks (ANN) according to the data obtained from the industrial 4.0 compliant devices.

2. Industry 4.0

The industrial revolution dates back to the invention of wheel. Simple mechanical systems were produced by using simpler hand-tools. This usage of labor and tools is considered as Industry 0.0. The First Industrial revolution (1.0) began with the invention of the steam engine in 1712[1]. While mechanical production systems based on the use of water and steam power had appeared, social classes also emerged in this era. In the second industrial revolution (2.0), mass production with electric power had been introduced. It is accepted that Henry Ford started mass production first time for car production[2]. The telegraph (1840) and the telephone (1880) were also invented. Moreover, the idea of Taylorism advocating Scientific Management System emerged in 1920. In the third industrial revolution (3.0), a digital revolution took place with the use of electronics and the development of Information Technology(IT). The first microcomputer Altair 8800 (1971) and Apple I (1976) were produced. Programmable Automated production system had been implemented in manufacturing. The fourth industrial revolution was started by the Germans in 2011. Industry 4.0 is a combination of Cyber Physical Systems which integrate complicated machines and tools with supporting IT technologies such as Internet of Things and make them autonomous and smart systems through collected data and intelligent controller,

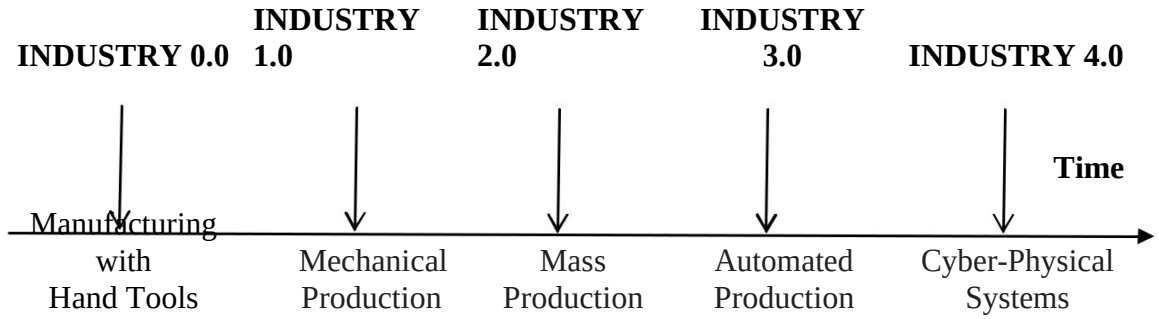

Figure 2.1. Development of Industry

3. Artificial Neural Networks

An Artificial Neural Network (ANN) consists of interconnected nodes similar to neurons in the human brain. As seen from Fig. 3.1, in a node, inputs from a data set are combined with the weights defining the significance of each input to desired outputs. The values of ANN weights are determined through learning algorithms using the previously collected data[3].

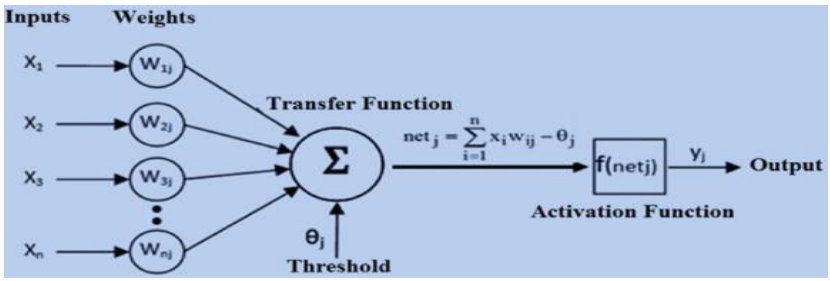

Figure 3.1. Artificial nerve cell [4]

Inputs: Data from outside to the artificial nerve cell. **Weights:** Inputs to the neuron are multiplied by these values as coefficients. These coefficients can be positive, negative and zero. The input with zero weight has no effect on the output. **Transfer Function:** It is the layer that calculates the net input to a cell. The best method of determining transfer function is to calculate by trial and error. **Activation Function:** Processes the net input to the cell and determines to output that corresponds to this input. Different formulas can be used to calculate output. Generally, the sigmoid function is prefered as activation function[3]. **Cell output:** The output value of the cell determined by the activation function. The output can be transmitted to the outside of cell or transmitted to another cell[5]. Artificial neural networks consist of input layer, hidden layer and output layer. **Input layer:** The input from the external environment is transmitted to the interlayers of ANN. **Hidden (Search) Layer:** In this section, data from the input layer is further processed. **Output Layer:** The cells in this layer produce the output data of the network by processing the data from the hidden layer. The number of the layer and function may be chosen according to the desired network structure.

4. Reactive Power Compensation

The electrical energy is generated as alternating current consists of two components, active and reactive. The active power, which is useful for consumers, consists of the active current. For

example, this power component is transformed into mechanical power in motor shafts, thermal power in heat centers[7]. Electrical machines such as generators, transformers, coils and motors operate according to the electrodynamics principle. The magnetizing current that provides the necessary magnetic field for the operation of these machines is called reactive current. Reactive power is not converted to useful power as active power is done[7].

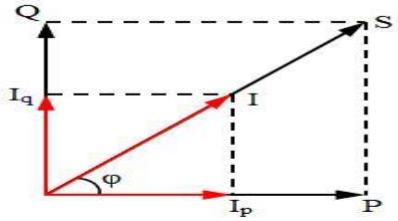

Figure 4.1. Phasor diagram representation of current, voltage and power.

When the phasor diagram shown in Fig. 4.1. is examined, Active Power(P) is equal to cosine product of the Apparent Power(S). The angle between Apparent and Active Powers is the phase angle of the fundamental voltage and the current. The cosine value of this angle(φ) is defined as the Power Factor(P.F.)[6]. Electrical loads can be catagorized in three classes: 1.Resistive: The current and the voltage are in phase and PF is 1, 2.Inductive: The current lags the voltage and PF is zero and 3. Capacitive: The current leads the voltage and PF is zero. For a resistive load, all power is consumed in a usefull way. Therefore, to make an electrical system more efficient, PF must be closer to 1.This process is called as reactive power compensation. Various methods are used for reactive power compensation. In these methods, the reactive powers that are needed by the loads are statically compensated by capacitors and/or reactors and dynamically synchronous motors [7,8].

In the compensation method using capacitor groups, the capacitor groups are gradually switched on. In this method, it may not be possible to fully compensate the reactive energy needed by the load. The time delay also occurs when the stages are activated. This can cause excessive or low compensation of the load over the energy transmission line[8,9]. In the compensation made by synchronous motors, the motors can be operated capacitively or inductively by changing the excitation current[10].

5. Reactive Power Compensation With Artificial Neural Networks

In this study, a reactive power compensation system is designed by using artificial neural networks (ANN) according to the data obtained from the Industrial 4.0 compliant devices. ANN learning algorithms is used on the data set to create a proper compensation system. In order to form the data set, the values of U, I, cos , P, Q, THDI and the reactive power of capacitor and the shunt reactor ratios belonging to the system are taken from the real system with the help of Industry 4.0 compatible devices.

5.1. Design of ANN

There can be many performance metrics such as modeling or training time for an ANN estimator. But the best and most important performance criterion is the accuracy of the estimation. The accuracy criterion is defined as the difference between the actual value and the estimated values. This difference is called the estimation error. The ANN model, which will be used for estimating the capacitor power, the shunt reactor currents and the steps required to be taken by the relay, is developed in MATLAB using ANN toolbox (Neural Network Toolbox-nntoll). Development of the ANN model is done in 9 stages.

8 Establishment of training and test data from input and output data in hand.

9 Entering the training and test set into the MATLAB program.

10 Creation of the network.
11 Selecting network parameters.
12 Training the network.
13 Establishing the test simulation of the network.
14 Comparison of estimated output values with actual values as a result of simulation.
15 Determination of the minimum error rate.
16 Termination of network training.

Of the 350 data received from the real system, 70% is used for network training, and 30% for testing the network. In the ANN model created with Matlab ANN toolbar; In the three stages of advanced feeding network and consulted network structure, back propagation learning algorithm, input, secret and output layer, 3 neurons and logarithmic sigmoid activation function in secret layer, 1 neuron and linear (purelin) activation function in the output layer were used.

5.2. Design of User Interface and Test System

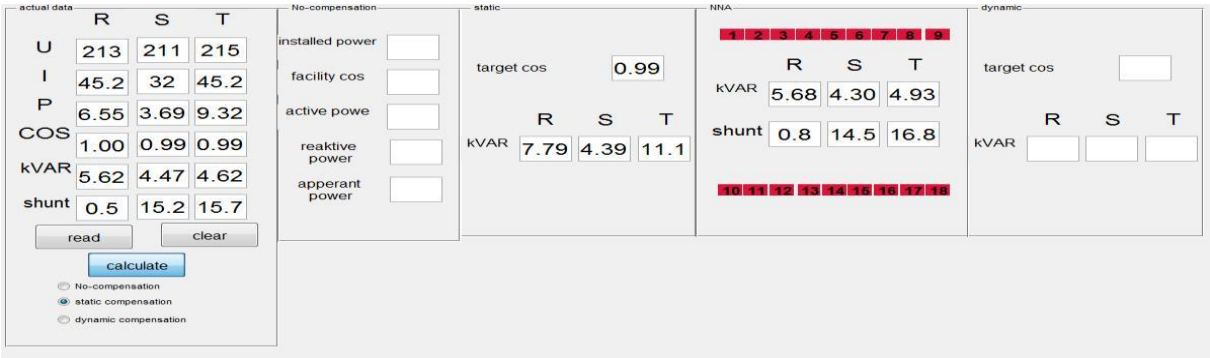

Figure 5.1. User Interface

The sample application system is designed in MATLAB Simulink. The User Interface consists of five sections. The first section contains the data collected from the real system and the calculation methods(No-compensation, Static or Dynamic). Before the compensation calculation, one of the options of no compensation, static or dynamic compensation should be selected.

Active, reactive and apparent powers of the system with no compensation will be calculated by selecting No-compensation option. When the static compensation option is selected, the required capacitive power and the shunt reactor currents will be calculated as in classical systems according to the targeted cos value. The status of the relay is also estimated. When the dynamic compensation stage is selected, the capacitor powers, the shunt reactor currents and the relay status will be estimated by the ANN based Controller. Moreover, a synchronous motor such as a ventilation motor can be used to correct Power Factor by controlling the excitation current. When the plant is in operation with a reactive power consumption, the motor will be run with the calculated necessary excitation current. In this case, both ventilation and compensation will be done at the same time. Since the capacitor groups will not be activated in this stage, energy saving will be ensured.

6. Results and Recommendations

In this study, ANN based power compensation system is designed and simulated. For different scenarios, the capacitor powers, the current of the shunt reactors and the relay status are estimated by the ANN controller. More sensitive reactive power control is performed. After traning the ANN controller, test results show that the ANN controller produces 98% correct outputs.

The capacitor power required by artificial intelligence was estimated at 23.2257 kVAR when using a 24.4 kVAR capacitor in real time. The margin of error is 1.1743%.

In the real system, while the shunt reactor current in R phase was 0.3948, the current was estimated as 0.3949 by artificial intelligence. 100% of the estimation rate here.

The comparison of the new system is done in terms of performance, initial investment and operation cost.

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VIRTUAL REALITY: VIRTUAL REALITY APPROACHES IN EDUCATION AND VIRTUAL REALITY IN ELECTRIC MOTORS

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EXTENDED ABSTRACT

The technology is called virtual reality, which enables a user to perceive being in a real environment using technological devices and interacting with this imitation environment by using a simulated environment created by computer-aided environments. In this research article, in the recent years, the use of virtual reality in education, widespread use of virtual reality approaches in education, and specifically technical education in mechatronics, electrical engineering, computer engineering, such as the use of electric motor usage, design, such as the way in which the virtual reality expression intended to give. In addition to research on the use of virtual reality in the field of education is examined. The paper also aims to present the framework of the literature studies on virtual reality and electric motors, and also to present new suggestions to the engineering faculties for the design and use of electric motors. The study also aims to provide new perspectives on education as well as sharing existing practices in the field of virtual reality.

The concept of virtual reality used by Jaron Lenier in the 1970s; It is used to transform non-existent objects into real-world objects by interacting with the three-dimensional world created by using computer software and hardware. Studies on virtual reality were firstly based on the 16th century in the historical process, and in parallel with the advances in computer technology, this technology continues to spread and develop rapidly [1]. Technology is used in all areas from entertainment, advertising, medicine to education areas. Some of the areas of application where virtual reality is used for educational purposes are: gaining a third dimension to two-dimensional books, teaching about cognitive maintenance and repair tasks, three-dimensional representation of concepts in areas such as physics, chemistry, biology, or performing experiments in virtual laboratories, tools and materials in engineering education. knowledge and skill acquisition are some of them [2]. In the study on augmented reality in electrical foundations; Recognizing that electrical fundamentals are of a very low level in secondary schools, different applications have been developed to test the interest of follow-up of other emerging instruments based on augmented reality technologies in this area. The study describes the competence of one of the applications tested with students aged 12 to 14 and the use of students in terms of student participation and achievement of specific goals. Along with the implementation of the test with secondary school students, there is also a technical brief description. It is presented to students in augmented reality test classes used in DC circuit applications. The results of this study show that the use of AR applications has the potential to be used as an experimental tool in the classroom, encourages students to participate in lesson activities, and enables students to be a good predictor of their learning activities in the use of AR [3]. In the study of electric propulsion using virtual reality software, the main results of the numerical analysis of the use of permanent magnet synchronous motor pushing an electric scooter are presented. Electric scooters were supposed to run in a virtual environment. Virtual reality (VR) interface is developed with Prescan, a special software. In this software, real driving conditions can be

simulated, even traffic lights and signs, pedestrians, other cars with special driving conditions. The impulse unit model and control technique is implemented with Matlab / Simulink. This co-simulation digital environment can be useful for a more accurate estimate of the actual operating conditions for electric cars. In addition, this digital and virtual platform can be easily adapted to real-time controllers, and an improved energy management in electric cars can be considered with this approach[4].

There are various software that can be used to develop applications related to virtual reality. Augmented reality software, which is superimposed on real images of virtual objects by using the object recognition feature of devices, has become a topic of interest today. Some of these software is installed on the operating system and the other part can work via internet browser. Virtual reality software can work according to the ID information of the black squares on the markers, or can be realized by painting and surface recognition. The most commonly used software development kits in these applications for augmented reality applications, ARToolKit, Mixare, Vuforia, Wikitude and virtual reality applications are included in Unity3D. Virtual reality tools and equipment system in general; head-mounted presentation systems, head-mounted image-transmitting crystal display, cabin simulators, customized rooms, desktop reality, boom, cave, spherical projection system and mechanical tracers. While developing applications in literature and commercial life, these software and tools are used..

In the study, which emphasizes the use of virtual reality concept in education, it is aimed to gain perspective from this field for the students who take electrical lessons and the students who take courses related to electricity. Detailed literature review is given. When the studies are examined, it has been seen that complex situations are simplified by simulating the design, operation and production of electric motors or machines with virtual reality. These complex, difficult mechanisms and operations are expressed in a virtual manner, allowing small details to be easily captured in details. This topic has been supported by bringing together the literature backbone supporting this study, which states that the application of virtual reality to the field of electric machines and motors should become widespread.

Keywords: Virtual reality, Education, Electric Motor, Electric Motor Design and Usage

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HOW BIG İS THE VIRTUAL REALITY MARKET?

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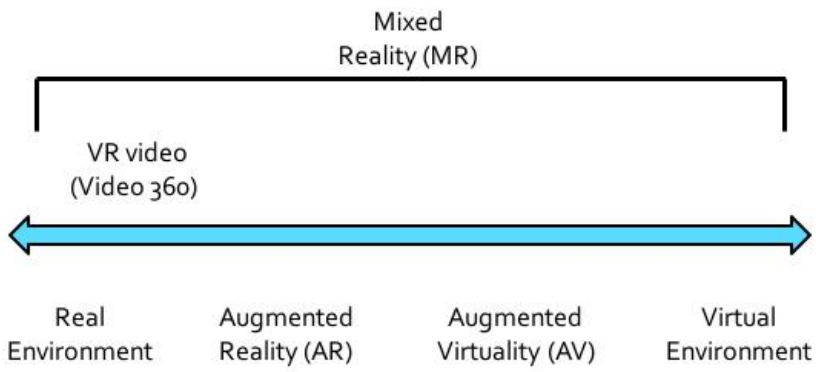
EXTENDED ABSTRACT

Virtual reality (VR) and augmented Reality (AR), as the new form of technologies are developing and evoking public interest. These are immersive technologies that provide new and powerful ways for people to generate,use and interact with digital information. These technologies take traditional media beyond conventional screens and use photographic images, video or computer generated graphics (sometimes provided as an 360-degree view within your field of vision) as a new communication and interaction medium that can be used across your company from marketing and sales to field services, training and data visualization. There are lots of examples of how VR and AR can reshape existing ways of doing things— from buying and selling a new home, interacting with a doctor, or watching a football game. As the technology advances, price points decline, and an entire new marketplace of applications (both business and consumer) hit the market. It is believed VR/AR has the potential to spawn a multibillion-dollar industry, and possibly be as game changing as the advent of the PC. This paper aims to show what VR/AR's potential market could be in the World today and in the future.

Virtual reality (VR) is a powerful technology that promises to change our lives unlike any other. Our senses are stimulating artificially, so that our bodies become tricked into accepting another version of reality(LaValle, 2019).

virtual reality can take many forms in generally and can be considered to range on a virtuality process from the real environment to fully virtual environment. The following diagram shows various forms along that process(http1):



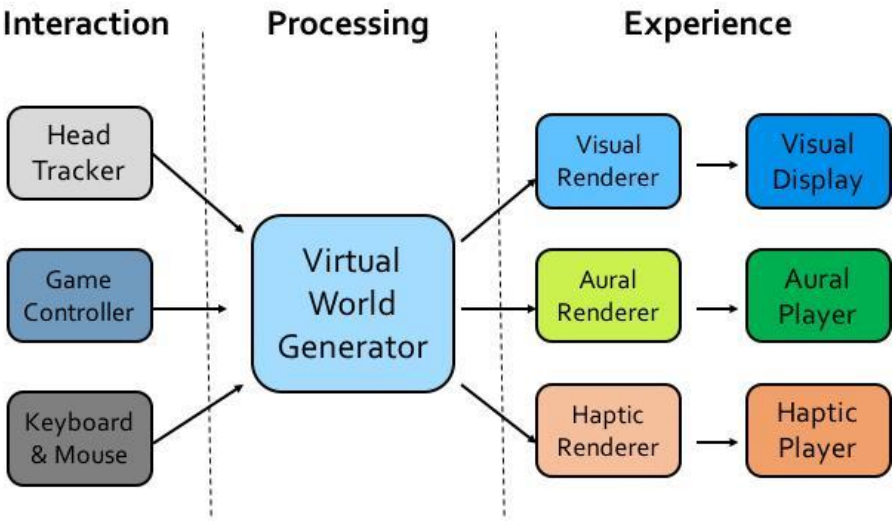
The real environment is the real world that we live in. Augmented virtuality (AV) is the result of capturing real-world subject and bringing that subject into VR. Augmented reality (AR) refers to systems in which most of the visual stimuli are propagated directly through glass or cameras to the eyes, and some additional structures appear to be superimposed onto the user's world.

True virtual environments are artificially created without capturing any content from the real world. Altough there are many differences between Augmented reality (AR) and virtual reality (VR), but also there are many similarities, however the experiences may still be very different. The consumer are transported to a different World by VR whereas virtual reality elements are added to the local real World by augmented reality. Nevertheles, the same hardware might be used for both while consuming or experiencing the content in practice.

An entire spectrum that encompasses VR, AR, and normal reality is used the term mixed reality (MR). MR refers to bringing 3D virtual objects such as holograms into the real world without the need to use any headset for watching in some cases. XR has also been lately used to refer to the all fore-mentioned forms.

VR video (video 360 degrees) contains experience that lets users to turn in any direction to view the content. On the other hand, the viewer lacks the ability to interact, move around, and can be considered a passenger, watching as the content plays out. Live events such as festivals have seen remarkable uptake for this type of VR because of the low technical overhead associated with delivering such experiences to smartphones.

Visual rendering specifies what the visual display should show through an interface to the virtual world generator (VWG). Similarly aural rendering involves aural processing and haptic rendering haptic representation related to virtual world generator as presented in the following picture:



Today, low-cost consumer VR technology is surpassing professional head mounted device (HMD) systems. The latest technological components, mainly arising from the smartphone industry,

have enabled high-resolution, low-cost, portable VR headsets to provide compelling VR experiences.

Overview of the VR/AR Market

VR/AR market will grow fast during the next few years according to the various predictions. The general trend pointed out in all predictions is that the growth gains first from consumer buying of VR gear and content. This is primarily based on games. Later on the growth comes mostly from the industrial buying of AR technology and services.

The VR/AR market will grow during the period of 2017-2021 by around 100% annually[3] according to International Data Corporation (IDC. Total spending on VR/AR products and services is expected to grow from USD 17.8 billion of 2018 to USD 215 billion by 2021(http2).

USA ($6.4 billion), Asia/Pacific excluding Japan ($5.1 billion) and Western Europe ($3.0 billion) are the biggest regions in 2018. USA will hold its major position by the end of the forecast period but Western Europe will pass Asia/Pacific excluding Japan area.

The biggest source of VR/AR revenues in 2017 is consumers according to IDC. However, other segments such as process manufacturing, government, retail, construction, transportation, and professional services will pass the consumer segment during the following years.

IDC indicates that the industry subjects that will allure the largest investments are expected to be retail showcasing ($442 million), on-site assembly and safety ($362 million), and process manufacturing training ($309 million). Industrial maintenance ($5.2 billion), public infrastructure maintenance ($3.6 billion), and retail showcasing ($3.2 billion) will be the largest industry use cases by the end of the forecast period

The consumer segment spending will largely consist of games with total spending growing to predicted $9.5 billion by 2021.

According to IDC forecast, spending on VR systems (including gear, software, consulting services, and systems integration services) will be greater than AR-related spending in 2017 and 2018, largely due to consumer buying of hardware, games, and paid content., AR spending will pass VR spending due to the industrial AR buying after 2018.

Digi-Capital's prediction is highly modest as its forecast for VR/AR revenue in 2021 is around USD 120 billion even if the VR/AR industry would outperform[4]. In case of underperforming the revenue in 2021 would be around USD 90 billion in the bad case.

Out of the other research companies that the value of all kinds of VR content (360, interactive and immersive video) will generate USD 6 billion by 2022 according to ABI Research predictions[5]. PwC's prediction[6] is that VR video revenue will exceed interactive application and gaming revenue by 2019. SuperData Research expection is[7] that VR revenue (excluding AR) will total USD 30 billion by 2020.

As a conclusion, the fore-mentioned forecasts predict the same trends: the VR/AR market will grow fast during the next few years, but the "hockey stick" growth will not be seen until the 2020's.

According to Goldman Sachs.com VR/AR predictions can be seen in Table 1.

Table 1: VR/AR predictions according to Goldman Sachs.com.

	Current Market Size	Data points on the population that could use VR/AR	2020 Base case Forecasts		2025 Base case Forecasts	
			Users	Software Revenue	Users	Software Revenue
Videogames	$106bn videogame market	230 mn installed base of video game consoles - 150mn PC	70 mn	$6.9bn	216mn	$11.6bn

		games in developed markets				
Live Events	$14bn in live sports ticketing revenue	-715 mn viewers of World Cup - 160mn viewers of Super Bowl 92mn ESPN subscribers	28 mn	$0.8bn	95 mn	$4.1bn
Video Entertaintments	$50bn online video TAM	450mn household online video addressable market	24 mn	$0.8bn	79 mn	$3.2bn
Real estate	$107bn total real estate commission market in US, Japan, UK and Germany	1.4mn real estate agents in US, Japan, UK and Germany	0.2 mn	$0.8bn	0.3 mn	$2.6bn
Retail	$3bn in ecommerce software market	1bn+ online shoppers In - store shoppers	9.5 mn	$0.5bn	31.5mn	$1.6bn
Education	Education software market $5bn for K-12, $7bn for higher education	200mn primary and secondary students in developed markets in US 50mn K-12 and 20mn College students	7mn	$0.3bn	15 mn	$0.7bn
Healthcare	$16bn patient	8mn physicians and EMTs in	0.8 mn	$1.2bn	3.4 mn	$5.1bn

	monitoring device market	developed markets in US, 800k physicians and 240k EMTs				
Engineering	$20bn engineering software market	8mn engineers in US, Europe and Japan 2.4mn enginners/technicians in the US	1.0 mn	$1.5bn	3.2 mn	$4.7bn
Military	$9 bn defence industry tra,ning and simulation market	6.9mn military personnel in high income countries (World Bank) 1.3mn US military personnel	Assuming proprietery HMDs	$0.5bn	Assuming proprietery HMDs	$1.4bn
Total			95 mn	$13.1bn	315mn	$35.0 bn

According to the **marketsandmarkets.com, VR market by region can be seen in Figure 1.**

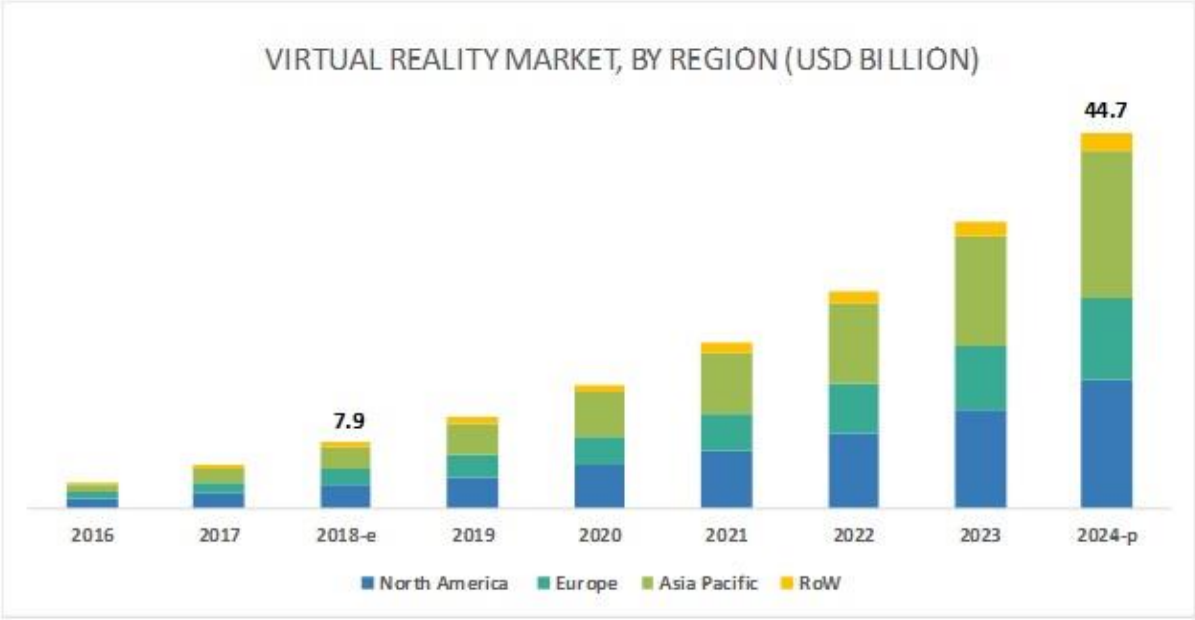


Figure 1: Virtual reality market, by region (USD Billion)

Keywords: Virtual reality, marketing, digital information

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AUGMENTED REALITY TECHNOLOGY IN NURSING EDUCATION

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EXTENDED ABSTRACT

Nursing education must be updated in concurrence with the changing conditions for students and patients in our century, technological improvements and globalisation of health services towards the professional development of nursing. Nursing education is a whole that is composed of the combination of theory and practice and includes cognitive, affective and psychomotor fields of learning (Eker, 2014). In recent years, it is seen that digital learning technologies become widespread with the use of different materials such as simulations and virtual learning environments in the psychomotor skill training of nursing education. It is considered that these technologic materials energise education and improve skills and knowledge that can activate problem solving actions (Silveira&Cogo, 2017).

New methods and technologies are required in education and training due to the reasons of the development of computer technologies in our century and undergraduate students being involved in the digital generation which is called as "Z generation". The digital technologies that are used for the training of nursing skills are simulation models, virtual environment simulators, videos, educational games and mobile applications (Silveira&Cogo, 2017; Cant&Cooper, 2010; Gündoğdu&Dikmen, 2017). As one of the new generation technologies, the augmented reality technology draws attention of researchers in education field and gains a place in educational environments rapidly in recent years by combining real and virtual worlds (Küçük, Kapakin&Göktaş, 2015).

The applications of "Augmented Reality (AR)" are practices which ensure the combination and interaction of "real" and "virtual" in real time (Özaslan, 2011). The augmented reality technology which proceeds rapidly day by day appears before us at many fields scuh as sport, entertainment, shopping and education. Educational practices can be enriched with the use of augmented reality in situations that are unable to be reached or objectified in real world due to inadequacies (Özaslan, 2011).

Augmented reality is a new research area in nursing education. According to related literature reviews, it can be seen that the number of studies which examine the effect of augmented reality technology on nursing education are rather insufficient. Any study can not be found as a result of a research in databases with combinations of "augmented reality" and "nursing education" key words in our country. It is seen that number of related studies are quite low abroad but the topic becomes popular gradually in recent years.

The results of studies towards the use of augmented reality in nursing education shows that this method has positive effects on learning process, promotes learning and improves skill performances in general. Students' ability to place a nasogastric tube was examined with an augmented virtual simulation training model which was designed according to iPad anatomy in the research of Aebersold and friends on the effect of augmented reality practice on nursing skills (Aebersold, Voepel-Lewis&Cherara, 2018). At the end of the study, participants stated that they consider the augmented reality practice as a realistic, easy to use, enjoyable and beneficial tool for skill learning. In another study related with this topic, Tilghman and friends developed a prototype where they used simulation and augmented reality towards intravenous drug administration and female bladder catheterisation skills of 1st year nursing

students(Tilghman, Doswell, Collington, Utili&Watties-Daniels, 2018). Vaughn and friends conducted a pilot study of an innovative hybrid simulation called "Augmented Reality Headset (ARH)" by combining a high accuracy simulation model and augmented reality technology at a nursing school in United States of America in 2015 (Vaughn, Lister,&Shaw, 2016).

It can be seen in the study of Pugoyl and friends that the studies towards augmented reality on the field of nursing education are not aimed only for clinical skills (Pugoyl&Ramos, 2016). A prototype in comic book style was designed in this study for improvment of proficiency in English for nurses. In another study from Denmark, lung anatomy was represented by visuals, videos and models on iPad with augmented reality technology in nursing schools.

In contrast with these studies, there are studies which show the negative effects of trainings with augmented reality technology on learning process. Materials in clinical skills laboratory of 1st year nursing students were marked with visual markers and QR codes in the pilot study of Garrett and friends on undergraduate nursing students (Garrett, Jackson,&Wilson, 2015). The study results showed that students had experienced technical issues such as slow response times, incompatible smartphones and problems with internet access where these issues caused a negative impact on their learning.

The results of studies show that augmented reality technology in nursing education enables a better performance and motivation in learning in comparison with traditional training methods. It is predicted that an increase in the number of studies based on augmented reality technology towards training of hard-to-learn skills that include abstract concepts in nursing education will make a positive contribution to the knowledge and clinical skills of nursing students.

Keywords: Augmented reality, nursing, nursing education

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IMPLEMENTING VIRTUAL and AUGMENTED REALITY TECHNOLOGIES IN TECHNICALDRAWING COURSE

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EXTENDED ABSTRACT

Using the scientific and mathematical principles of technology in the light of experience, decision and common ideas, creating useful products for humanity and providing solutions to the problems faced by people, it is very important to visualize the abstract objects and concepts in three dimensions in the minds of the engineering discipline. In all engineering branches, engineers are expected to have this characteristic, which is called the spatial visualization skill in the literature. Although it is stated that spatial visualization skills are genetic, it has been proved that this skill can be developed through appropriate training as a result of studies. In order to enable students to acquire this characteristic in engineering education, courses such as Technical Drawing and Geometry are taught as compulsory in the curriculum of the first grade students. Students who do not have technical education in high school or who have genetically low spatial visualization skills have difficulty in lessons learned in classical methods and lose their self-confidence and motivation. Many studies have been carried out on this subject affecting the academic and professional achievements of engineering students. studies; The effect of Augmented Reality Technology, which is used with web-based, CAD-supported and desktop computers, on the spatial visualization skills of students was investigated.

In this study, it was developed an interactive three-dimensional (i3D) course contents based on augmented reality (AR) and Virtual Reality (VR) in order to use in technical drawing courses in engineering faculty programs and the effects of the students on the spatial visualization skills and academic achievement were investigated.

The steps for developing Augmented reality course contents, the AR tool, are illustrated in Figure 1

Step1 : The part is defined and drafted in projected views
Step2: It is modelled in 3D through the CAD software Autodesk Inventor
Step3: The 3D part file is transferred to the graphics software Autodesk 3DSmax
Step4: Materials and light are assigned to the model and then converted to obj file format
Step5: The converted file is uploaded to Augment® AR SDK platform
Step6: A Picture file as a tracker is uploaded to Augment® AR SDK platform
Step7: The AR Tool is ready to use

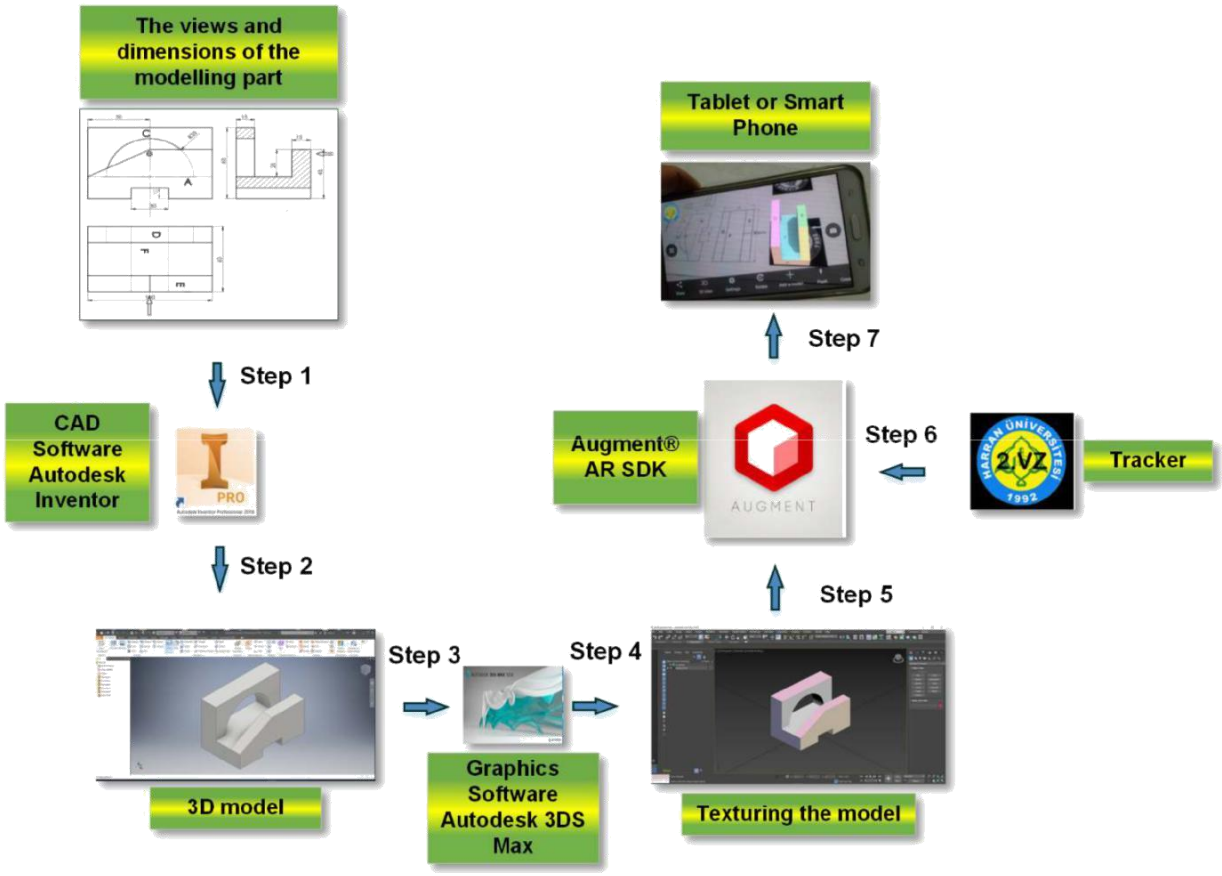

Figure 1. Development steps of the AR tool

The results of the tests, questionnaires and academic studies were evaluated statistically. To this end, an augmented reality application has been developed with the support of the Augment® software company and used with smartphones and tablets; A workbook was prepared using augmented reality technology and was used in the technical drawing course in the summer term of 2015-2016 school year. Likert type questionnaire was used to determine how effective augmented reality technology was used in teaching and learning technical drawing lesson subjects by the formative study technique. Students'academic achievement, spatial skills at the beginning and end of the semester and survey results were analyzed statistically.

In the second part of the study, two virtual classrooms were created by using virtual reality technology (Figure. 2). One of these classes is the digital models of the parts in the technical drawing book and the other one is the cross-sectional models. Sections of the virtual classroom walls and the sections of the projection are placed. The students, as shown in Figure 3., interact with the models with the help of virtual reality glasses and control arms and have taken into consideration the models. In this way they were able to fully perceive the depths and voids that the parts could not perceive in their planar views by means of virtual models they had grasped with their hands. These materials were used in the technical drawing course in the fall semester of 2017-2018. Because of the availability of the student in the fall semester, the experiment (f = 36) and the control group (f = 34) were formed. Only experimental group students participated in the study.

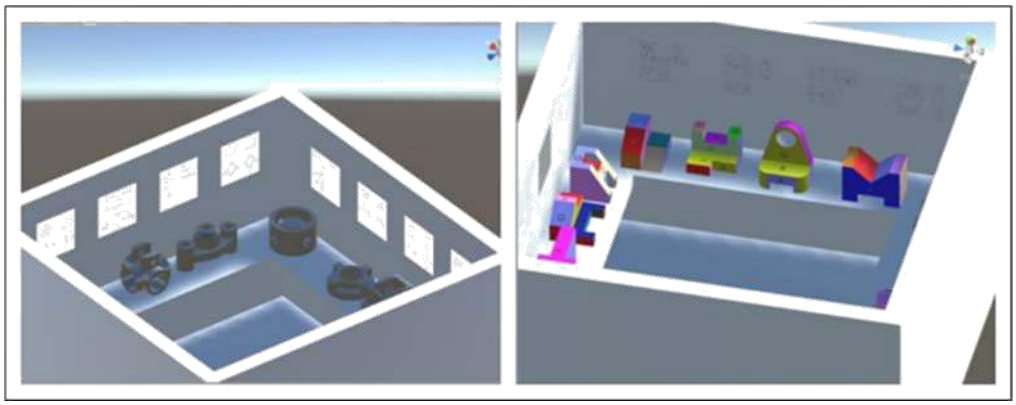

Figure 2. Two virtual classroom containg models and views on their walls

Figure 3. A student interacting with the models in virtual classroom with HTC Vive Controllers

In order to reveal the effect of virtual reality technology in technical drawing course, this attitude was developed and applied in Likert type TEÇİSGUD (Supporting Virtual Reality Applications in Technical Drawing Course). At the end of the period, data were collected to answer the scale and perform reliability analysis. Data indicate that the scale has a high level of validity and reliability; 6 showed that the items were related to each other and necessary for the scale.

As a result of analysis of scale items, it was determined that the participants of the study have positive attitudes towards the use of virtual reality applications in a technical drawing course.

Key Words: Virtual Reality Technology, Augmented Reality Technology, Spatial Visualization Ability, Interactive Teaching Methods, Technical Drawing

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EMPOWERMENT OF IMAGINATION THROUGH CYBER SPACE

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Keywords: Digital Education, VR as means of education, Change of the Education system, Computer Brain Interfaces, Mastering thoughts, Expansion of Imagination

EXTENDED ABSTRACT

We live in a time where science fiction is becoming science fact.

It's been only 20 years since the World Wide Web connected each one of us, and only 10 years since personal computers entered our pockets. As if these were not exciting achievements, right now we are creating realities that exist in cyber space, which we access through Augmented, Mixed and Virtual Reality technologies. The times we live in require not only the creation of more sophisticated tools, but also an awareness of how to use them. Our upcoming generations are growing up with these tools in their hands. Today they might be surfing on the web by looking at their tablet's screen, but tomorrow they will have the chance to fully immerse themselves and enter those worlds through a Virtual Reality headset.

In Virtual Spaces, the only limitation is our imagination. And imagination has no limitation.

In other words, stories that we can tell in these virtual spaces will have no limitations. Therefore, they hold the power to have a direct impact on the wellbeing of the individual and their perspective through which they experience life.

On one hand this is a great opportunity to provide an environment where kids imagination gets empowered through Cyber Space, create a whole new immersive decentralized education that goes beyond the limitation of 3-dimensional space, time and social borders created by countries. We could even have personalised AI systems that can study our behaviours in these spaces and study the stories we create, or we feel attracted towards. Then this knowledge can be used to help our personal growth and betterment of our society.

On the other hand, social media companies are already using these technologies to manipulate our decision-making process and keep us attach to the screens. The data that is being collected right now from mobile device screens is nothing compare to the data that can be collected from Virtual Reality headsets and spaces. In fact, not surprising that the social media companies that rule the market are already investing billions into these technologies. So, the danger is that an AI algorithm system that is already powerful enough to keep us attached to our mobile screens can study the interaction and behaviours of the individuals and use this knowledge to easily generate Virtual Worlds that the person would never want to leave.

No longer is any of this Science Fiction. In the recent years, our society has been shaken by the data scandals that showed how using the Internet and service provider's platforms have turned us

into “products”. As a global community, we need to learn from what happened to the Internet and social media spaces so as not to let the same happen to Virtual Environment that holds the potential to be a great part of our close future. Allowing the same to happen to Virtual Spaces can be very dangerous as levels of immersion with these technologies can be used to pacify masses, (Hulme, 2017). Specifically the upcoming generations, as they will be the ones spending most of the time in those places.

Kids’ imaginations are powerful. This potential both opens up and closes new doors of possibilities. Current education systems already pacify the creative potential of the individuals. As we grow up, we get conditioned to use the Divergent Thinking of our minds more compared to Creative Thinking (George, 2011). Virtual spaces offer us great platforms where we all can explore the creative side of our minds, with imagination being the only limitation and “thinking” soon becoming a form of direct interaction. With the advancement of Computer Brain Interfaces (CBI), interactions between both individuals and with the Cyber Spaces will soon be bringing us a new form of experiencing communication and creation.

CBI technologies are getting increasingly advanced in their accuracy of reading human thoughts and turning them into virtual experiences. In 2016, The Defence Advanced Research Projects Agency (DARPA) of the United States Department of Defence officially announced their research and technical advancement in rapidly improving these technologies, (Sanchez, 2017). They have officially announced they are about to achieve the reading of human thoughts through CBI and EEG caps enabling them to generate Virtual Worlds in Cyber Space based on these readings. DARPA has also announced that one of their aims is to use these technologies for military purposes; allowing soldiers to send thoughts to each other, see through each other’s eyes and from another’s perspective. In other words direct digital telepathy that goes beyond the limitation of language.

What if, rather than using these powerful technologies to claim more power over one another through means of war, they become the main tools of a whole new revolutionised education system?

Kids that are lucky to be living in today’s technologically advanced societies are already growing up in environments that allows them to interact with the early stages of these cyber worlds, through personal computers and over the internet. When Virtual Reality becomes the tool that is used to enter these spaces and Computer Brain Interfaces are widely available, thinking as a skill will be the most valuable thing one can master. From sharing and creating an idea to communicating without the need of using limiting language, mastery of imagination and creative thinking will become one of the main foci of mid 21st century.

This is precisely why the power of Virtual education needs to be recognized.

Letting profit motivated companies and organisations rule these technologies can have very dangerous consequences for our upcoming generations and for the future of our global community. Conversely, conscious use of these emerging technologies with good intentions to educate each other and elevate creative thinking offers great potential for expansion of imagination through Cyber Space. The next few years are very crucial for our current human civilization. The decisions that we make today form our reality, more than any time before. Therefore it is our duty to raise awareness about the responsible use of emerging science-fiction-

like technologies and claim our individual rights on these platforms, before we are already fully immersed in them.

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VIRTUAL REALITY APPLICATIONS IN OCCUPATIONAL WORK & SAFETY IN THE HIGH-RISK INDUSTRIES

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EXTENDED ABSTRACT

Virtual Reality is a fast growing technology that uses the ever increasing power of computers to simulate real and imaginary environments and situations with a high degree of realism and teaching.

The mutual issue of high-risk industries is that how to provide effective education regarding security. Virtual reality gives opportunity to the trainees and the others (interns and inexperienced workers) problem solving and making a decision abilities which requires sensory expertise, sensory engine crafts and cognitive skills with taking into account potential risks. Virtual Reality (VR) simulations are the outstanding tools to simulate abnormal and hazardous states of educational areas & workplaces and also to find out complex problems.

Safety in Turkish mining is an important issue. On mean, 4 workers die per working day and about 50 are work-related accidents. Inadequate or insufficient training is often shown as a cause of death in mines. However, education outside of the immediate working environment offers limited real opportunities and may not affect the stressful working environment itself. In contrast, virtual reality-based training tools can provide simulated real operating conditions without associated risks.

Training is a high priority in mining due to high injury rates and death rates. Although there is no substitute for real training, VR provides the tools needed to reduce training costs and improve safety. Using VR in the early stages of training can teach personnel how to use equipment in a controlled and safe environment (both for the personnel and the equipment). It also reduces equipment downtime due to training and the risk of damaging expensive equipment during training.

Modern simulation systems range from tactile systems that physically represent the real world to computer-generated visualizations. These computer-generated, three-dimensional artificial worlds are often referred to as Virtual Environments (VE). In most cases, users can interact with data and images provided by these computer-based visual systems.

In the mining context, the main objective of developing virtual environments is to enable the mine personnel to practice and experience the mine conditions, activities and operations that may occur in a mine site during the day's activities. Safe and efficient planning and production are required for a profitable mining enterprise. VR offers an intuitive way of discovering various and varied information about the mining process.

The study described in this thesis aims to advance the development of future VR education systems. The aim is to answer the questions about the main tasks and the context in which these

systems should support, the functionality of these systems and the levels of reality. Primary research questions:

- What are the contextual requirements and restrictions?
- VR training systems for the mining industry?
- How can realism be improved in simulation training?

This paper discusses context-sensitive requirements and limitations for developing virtual reality applications that apply to mine safety training. Responsive endeavors are spent due to eliminate hazards and decrease risks by the applying planning controls. As a result of those endeavors, to design virtual reality applications as working safety instruments have been subject of agenda. This research is intended to examine the benefits of virtual reality is applied for occupational safety and occupational training.

Keywords: Virtual Reality (VR), Occupational Work and Safety, High-Risk Industries, Safety Training Applications.

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AUGMENTED REALITY /VIRTUAL REALITY PRACTISES IN FINANCE: A PROPOSAL FOR FINANCIAL LITERACY EDUCATION

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EXTENDED ABSTRACT

World is in a continuous transition with information technologies that are developing even faster. Digital platforms are expected to mediate approximately 30% of global economic activity, while less than 10% of the companies' business models are compatible with digital transformation. (Torrance and Staeritz, 2019) Personal knowledge of many managers and leaders are no more than holodeck of Startrek, and they found it hard to distinguish similar- sounding IT concepts such as augmented reality (AR), virtual reality (VR), and mixed reality (MR), that are even used interchangibly. (Farshid et.al, 2018)

Finance is one of the pioneering fields in adopting AR/ VR applications for their services. Insurance industry uses this technology for launching new products and assess the catastrophic risks as well as technological risks like security and privacy abuse. Banking sector soon will make virtual branches available to their customers. People make their banking trascations on banking applications, deposit money to on-line accounts, do many financial transactions via internet or telephone banking without going to bank branches.

Meetings have been held with participation via video, would expand to holographic presence of participants. Financial advisory services are also possible with extensive coverage of massive and processed data.

Gaming consoles were the early AR applications, but AR moved to phones, mobile devices and smart glasses. Applications are developing much faster than expected in many digitalized businesses, millenials manage their lives and finances without visits to brick-and-mortar establishments. Fintech applications inevitablely replaces traditional financial services.

Financial literacy is one of the fields that require youngsters to learn, and benefit from the financial services that are transformed according to the needs of these people. Promoting financial awareness and training not only to young people, but housewives, retirees, is crucial for the better allocation of economic resources.

One of the biggest credit unions in Florida, GTE Financial decided to create a digital user-friendly platform to be used by existing and prospective customers. The platform is called GTE 3D, it uses music, vivid colors and a modern environment design to attract people. The users learn about financial products, lending, opening a credit line, etc. Teaching also allows them to virtually experiment the services and products.

New media allows us to enrich practises with interactivity, promote communication and feedback. It is also multifaceted and provides virtuality, globality, internationalization, distribution, diversification, mobility and collaboration. (Kysela and Storkova, 2015)

In essence, universities are the labaratories for new teaching techniques, and especially computer science and engineering programs are exploring and exploiting these new technologies of teaching. Students are even contributing as producers and providers. A recent study conducted at the University of Maryland demonstrated that students better recall when working with immersive environments rather than flat computer screens. The resaech showed that there is an 8.8 percent increase in recall. More than 40 percent of the participants experienced an increase in recall rate 10 percent or more while using VR. (Craig and Georgieva, 2018)

Our project would be creating financial literacy training packages on the platforms that are offered by Amazon as Sumerian or any other platform by those new-age companies. Amazon Sumerian is a user-friendly platform, makes it possible to create VR, AR or 3D applications for a variety of scenarios or use cases,. It doesn't require expert knowledge, provides flexibility for designing the environment, and for picking a host which can talk with users, narrate your scenes, respond to them.

We are in the process of preparing scenarios for different groups like highschool and university students, housewives, retirees, and low-salary employees in order to use financial services more deliberately. We then start out IT group for AR applications on these platforms and launch our training packages to users online or offline. We expect that these applications would have markets in East European, Asian and African countries.

Keywords: Augmented reality, virtual reality, financial literacy, learning

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MAKING VIRTUAL AND AUGMENTED REALITY REAL VIA NETWORK VIRTUALIZATION

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EXTENDED ABSTRACT

Both virtual reality (VR) and augmented reality (AR) have virtually limitless applications in education, manufacturing, telemedicine, entertainment and well beyond. However, only fifth generation (5G) wireless communication networks can take VR/AR experiences to the next level since both applications require large bandwidth and low latency. Specifically, the recently emerging VR/AR applications require the latency at around 1ms which is about 10 times lower than that of the present. 5G cellular networks are envisioned to provide high data rates, low latency, energy savings, high scalability, improved connectivity, reliability, and security.

It is now well-known that the current telecommunication networks (4G/4.5G) are insufficient to have a full VR and AR experience. On the other hand, the 5G communication networks will require a major paradigm shift: (i) current wireless systems are facing a bottleneck in spectrum resources and more spectrum resources are to be allocated for the next generation wireless communication networks, (ii) small cells and ultra-dense networks need to be used in order to make the network more flexible and to provide more users with network connectivity, and (iii) new wireless access technologies should be backward-compatible with the existing solutions to obtain the optimal network performance. In order to meet these demands, many campaigns and revolutionary ideas have been proposed around the world. Among those efforts, network virtualization is seen as one of the key enabling technologies for 5G.

With network virtualization, multiple logical isolated virtual networks can be created to run on the same physical infrastructure yielding more flexible, dynamic, and programmable networks. Virtualization technologies include network function virtualization (NFV), software defined networking (SDN), and cloud computing as shown in Figure 1.

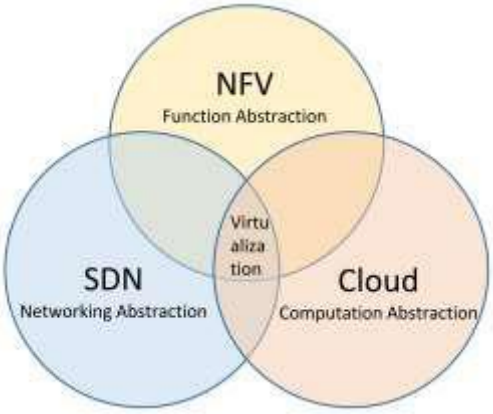

Figure 1. Network Virtualization Technologies

One can observe from Figure 1 that each of the fields is an abstraction of different resources: functions for NFV, networking for SDN, and computation for cloud computing. NFV and two closely related fields SDN and cloud computing are expected to help reconfigure and solve the open problems in the 5G networks. In this study, only the concept of NFV will be emphasized.

In the telecommunications industry, users constantly require more diverse and new services with high data rates as in the case of VR/AR applications. Accordingly, telecommunication service providers (TSPs) must continuously purchase, store, and operate new physical equipment (base stations, servers, etc.) leading to high capital expenses (CAPEX) and operating expenses (OPEX). Thus, TSPs have been compelled to develop more dynamic and service-aware networks. At that point, NFV has been proposed as a solution to address these challenges by leveraging virtualization technology. In 2012, The European Telecommunications Standards Institute (ETSI) is selected as the home of the Industry Specification group for NFV.

NFV decouples the network functions from physical network equipment, through the softwarization of network functions. Hereby, a given service can be decomposed into a set of VNFs, which could then be implemented in software. The VNFs may then be relocated and instantiated at different network locations without necessarily requiring and installation of new hardware, thus making core networks more intelligent, scalable and flexible. Furthermore, NFV greatly reduces CAPEX required to buy hardware devices and saves OPEX by aggregating resources for VNFs that run on a centralized server pool.

According to ETSI, the NFV architecture consists of four key elements: network function virtualization infrastructure (NFVI), VNFs, hypervisors, and NFV management and orchestration (NFV MANO). The *NFVI* includes both hardware and software resources in which VNFs are deployed. The virtual resources, that is, virtual computation, virtual storage, and virtual network resources, are created by *hypervisors* and the *NFV MANO* controls the provisioning of VNFs, and the infrastructure they run on.

To achieve full virtualization (see Figure 1), NFV, SDN, and cloud computing should be used together. Even though they are embraced by both industry and academia, the development of NFV especially is still at an early stage. In particular, we believe that artificial intelligence and machine learning will prove to be useful in the automation, management and orchestration of network virtualization.

Keywords: 5G, Network Virtualization, Network Function Virtualization, Software Defined Networking, Cloud Computing

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WITH VIRTUAL REALITY (VR) WE CAN EXPLAIN THINGS IN A DIFFERENT WAY

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EXTENDED ABSTRACT

Virtual training can be done from any location. This saves working time and travel expenses for employees, so calculate the companies. At locations, only the VR system is needed, which is available for a low four-digit amount. Once set up, the training can be repeated without restriction. At every new hiring, at all regular seminars.

However, the simulation technique is not just for practice but can also make it easier for technicians working outdoors. Augmented reality (AR) means that then. In contrast to the VR, no new worlds are created for this, but only individual virtual elements are projected into the real world. Also in this case, the fitter wears glasses, but one with transparent lenses, similar to a clearly too large bicycle glasses. The built-in computer makes the AR glasses easy to use on the go.

With their help, the employee sees what he is working on and at the same time receives helpful information. Many start-up companies are working on this technology and are developing training programs for car manufacturers, among others. DB is also one of the project partners.

A railway technician could thus now in the repair work a virtual twin of the points engine can be faded in, understand its operation and then dare to the real model. Once the technician is over-questioned, he switches over a camera in his glasses to an expert who can give him instructions.

In contrast to the real world, neither the machines, cars or trains nor the employees have to be in the same place. As in a multiplayer game on the console, trainees can train together - and sometimes make mistakes. This increases the learning effect. Even faults or emergencies can be easily simulated and employees prepared for emergencies.

As much as commercial companies praise the technology, the big breakthrough has not yet been achieved. "We are just beginning," say many VR researchers, "currently it's mainly about trying out the technology and participate in the development." The graphics of the virtual worlds are still too bad and the application possibilities are limited. It will take at least five to six years before virtual reality is applied in bulk, estimate VR researchers.

Businesses too are aware of the limits. The VR training sessions are not for hours of practice, experts say. That would be too exhausting and some people would be dizzy. Older employees in particular often have concerns that virtual service is more difficult for them than their young colleague. "Not all company employees will cheer about the program," experts say. Therefore, the VR training will be introduced only in addition to the practical training.

Although some companies already present their VR programs and advertise with them, it still takes up to the comprehensive training of employees. Probably until the end of 2019, experts estimate.

Virtual reality is a rapidly growing technology which utilizes the ever-increasing power of computers to simulate real-world and imaginary environments and situations with a high degree of realism and instructiveness.

Some Applications

- Learning Levels: Explain, Accompany, Examine
- Position knowledge: what is where?
- Structural knowledge: how is something related?
- Behavioral knowledge: how does the system behave?
- Behavioral knowledge: how do I behave?
- Procedure knowledge: which processes cause what?
- Introduction of documentation
- Introduction of simulators
- Visualization of the hidden
- Shortening downtime
- Training already during planning
- Training without occupancy of the object
- Training safely with scenario technique

Keywords: Virtual reality(VR), Augmented reality (AR), VR training

Virtual Geographic Environments for Water Ponds Bathymetry

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EXTENDED ABSTRACT

70 % of the world is comprised of waters, but only a small part of it has suitable properties for human use. In this context, it is necessary to ensure the sustainability of the current state and management of water resources. Knowledge of underwater topography is essential to the understanding of the current state of water resources and resource management in water bodies. It is estimated that 2.5 % of the total volume of water resources is fresh water and about 0.29 % of it is composed of lakes. For the scientific studies and ensuring sustainable usage of a lakes which is a source of drinking water is necessary to know the volume and depth for real usage.

In assessing the water quality of lakes, the amount and level of sedimentation which has a great effect on the change of volume and depth should be determined (Lachhab, Booterbaugh, & Beren, 2015; Wang et al., 2009). It is necessary to know the volumetric and morphological structure of the lake in the examination of the floods formed by the water feeding the lake (Romero & Imberger, 2003). In addition, the determination of the distribution of impurities in the sediments of lakes gives an important information for the characterization of lakes (Forsythe et al., 2016). In addition to this, it is necessary to determine the water level, volume and surface area of the lake in order to observe the temporal changes in human activities and lakes (Ławniczak, Choiński, & Kurzyca, 2011). In this context, the obtaining of bathymetry maps of the lakes are an important data for this studies. In recent years, such studies are based on mapping the data sets obtained by the use of ultrasonic sound waves using geographic information systems (Maina, Sang, Mutua, & Raude, 2018).

In recent years, the use of monitoring technologies (remote sensing, sensor, etc.) and geographic information systems (GIS) has been increasing in the use of water structures for the analysis of bathmetry (Dost & Mannaerts, 2008; Gao, 2009). The recent developments in multimedia and virtual reality technologies allow more information about water bodies bathymetry. A new generation of geographic analysis tool can be created by combining batymetry maps and various data sets obtained with the use of monitoring technologies and GIS systems with Virtual Geographic Environments (VGEs). The proposed virtual reality water ponds batymetry map relies upon the realistic representation of a watershed in three dimensions and the consideration of graphically based water models. Virtual water quality management approaches should be able to combine realistic representations of water basins, the capabilities of simulation models, and the options of manipulation and visualization can be provided by VR in just one system (Câmara et al., 1998). In recent years, VGEs have been frequently used to model water pollution in order to assess water quality and to ensure sustainable water management (Rink et al., 2018) and modeling the physical properties of water structures that play an active role in the distribution of these impurities (Liang, Gong, & Li, 2015).

The aim of this study is to obtain a bathymetric map in order to understand the current situation of Borabey pond and resource management in Emirce village which is a great resource for Eskişehir. In this study, Borabey Pond which is located in the north of the city of Eskişehir is determined as a study area as seen in Figure 1.

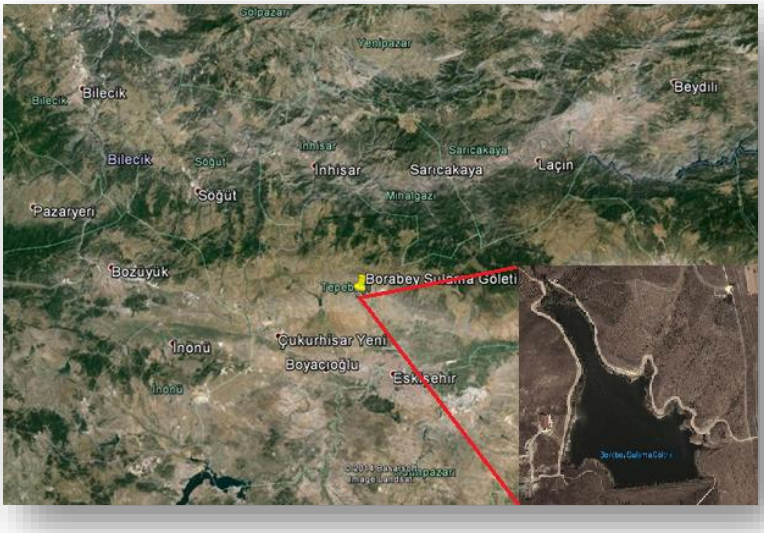
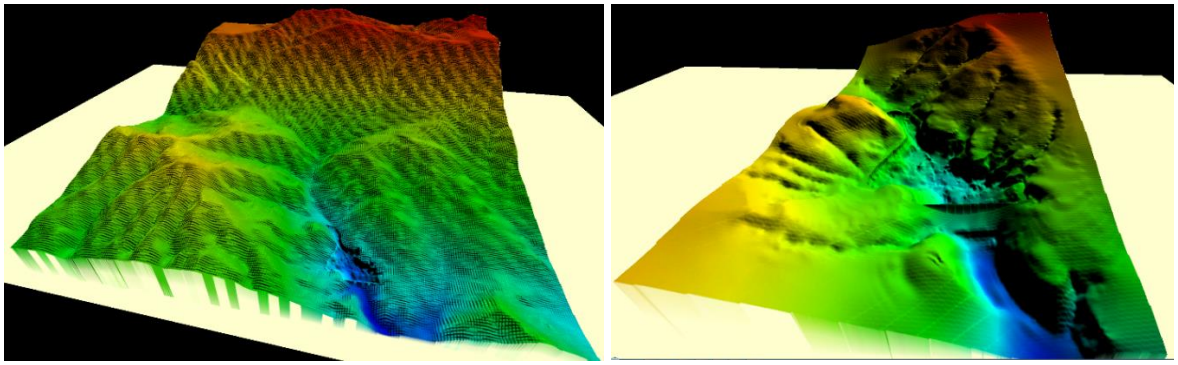


Figure 1. Study Area

Along the determined line of pond depth is measured by Acoustic Doppler Profiler device which produces ultrasonic sound waves. The lake bathymetry map was produced from measured depth points by using Geographical Information System methods. Digital Elevation Models (DEM) map of water base is created from bathymetry map which is combined with DEM and topography (Figure 2).



a) b)

Figure 2. Combination of DEM and Batimetry DEM maps obtained from 1/25000 scale map (b) Combination of precision and batimetry DEM.

As a result of the bathymetry map, the lowest elevation of the pond is 906 m and the highest elevation is 924 m. The area and the volume of the pond elevation were 814 m^2, 222 m^3 and 166559 m^2, 1422854 m^3, respectively.

With this study, it is seen that acoustic doppler measurement systems, which is a fast and accurate measurement technique, can be used as an alternative to the bathymetric measurement studies performed in lakes. It can be seen that acoustic doppler current measuring device which is used in this study and whose main function is current measurement in rivers can be used in such measurements without extra equipment cost.

Keywords: Acoustic Doppler Profiler, Bathymetry, Digital Elevation Model, VGEs, Water Pond

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