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***Odessa National Academy
of Food Technologies***



International Competition of Student Scientific Works

BLACK SEA SCIENCE 2020

Information Technology, Automation and Robotics

Proceedings

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TABLE OF CONTENTS

AUTOMATED EMERGENCY CALL SYSTEM BASED ON SOUND INCIDENT RECOGNITION Authors: Ruslan Kakatsiy, Valerii Stadnichuk, Kristina Tytarenko Supervisor: Sergiy Krivenko	9
AN APPLICATION FOR DEMONSTRATING AND COMPARING SORTING AND RETRIEVAL ALGORITHMS Author: Oleksandr Sokolskyi Supervisor: Oleksandr Melnykov	22
INFORMATION SYSTEM FOR WORKING WITH EDUCATION PROGRAMS AND HIGHER EDUCATION STANDARDS Author: Kateryna Didevych Supervisor: Oleksandr Melnykov	37
AUTOMATION OF PROCESS CONTROL FOR POSITIONING PISTON ACTUATORS Author: Dmytro Makletsky Supervisor: Volodymyr Honhalo	52
LATCH AUTOMATIC CONTROL SYSTEM FOR MONITORING THE DOSING OF BULK SUBSTANCES Author: Mykhailo Halitovskyi Supervisor: Volodymyr Honhalo	57
METHOD OF INCREASING THE HIDDEN CHANNEL BAND CAPACITY FOR INFORMATION PROCESSING TECHNOLOGIES AND TRANSMISSION OF VIDEO INFORMATION RESOURCES Author: Viktoriiia Dymchuk Supervisor: Volodymyr Barannyk	62
DYNAMIC SCHEDULING STRATEGY OF INTELLIGENT RGV Author: Kong Weikang	73
USING VR AND AR TECHNOLOGIES IN INCLUSIVE EDUCATION FOR CHILDREN WITH DISABILITIES Author: Mukhamedali Kusainov Supervisor: Ekaterina Kim	89
DEVELOPMENT OF MOBILE APPARATUS AND MEASURING COMPLEX FOR WASTEWATER COMPOSITION CONTROL Author: Ivan Bohatskyi Supervisor: Nonna Shapovalova	95
ASSESSMENT OF THE FUZZY STATE OF COMPLEX SYSTEMS Author: Artem Yakovenko Supervisor: Olexander Goloskokov	108
THE DEVELOPMENT OF THE TOOL FOR REAL-TIME NOTIFYING THE PEOPLE ABOUT LEVEL OF AIR POLUTION IN RECREATION ZONES Authors: Aleksandr Marchuk, Yaroslav Davydov Supervisors: Iryna Getman, Ihor Staskevych	120

algorithm to increase the percentages. It is 6.63%, 0.52%, and 2.16%, indicating that the algorithm is effective.

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USING VR AND AR TECHNOLOGIES IN INCLUSIVE EDUCATION FOR CHILDREN WITH DISABILITIES

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Abstract. *We are currently at a stage similar to the transition between theater and cinema. Initially, films were just another way of showing a theater. Some time passed before the filmmakers developed new technologies, ways of presenting a story unique to this environment. Thus, the same will be true for VR. Currently, a virtual reality computer game is simply a traditional computer game, but displayed on another medium. Over time, a paradigm shift will occur that we cannot know. In other words, VR is a revolution,*

although it took 50 years from the original idea in the laboratory to become a revolutionary product in the broad sense of the word.

Keywords: *virtual reality, augmented reality, integration, inclusive education, full immersion.*

Relevance. Along with the development of artificial intelligence and neural networks, virtual reality technology and its close fellow augmented reality have been popular for several years, which are likely to have a profound transformative impact on the way we live and work. In the next few years, virtual and augmented reality applications will become increasingly complex as devices become more productive and able to lay computer graphics on our understanding of our immediate environment and are increasingly being used in entertainment, education, healthcare and industry. Our understanding of how people can usefully move and interact in a virtual or augmented environment will also evolve, which will lead to the creation of more “natural” and innovative methods of interaction in inclusive education for children with disabilities.

I. Introduction

Virtual reality (VR) began its march about 50 years ago in the form that we would recognize it today - although the equipment was completely different. In the 1980s and 1990s, VR reappeared on the basis of a different generation of hardware (for example, CRT displays instead of vector updates, electromagnetic tracking instead of mechanical tracking). This attracted the attention of the public, and many engineers, scientists, celebrities, and business people hailed VR as the start of a new era when VR will soon make a difference. Then VR disappeared from the public eye and was rumored to be “dead”. Over the past 25 years, a huge amount of research has been carried out in a variety of fields - from medicine to business, from psychotherapy to industry, from sports to travel. Scientists, engineers and people working in the industry continued their research and applications, using and exploring various forms of VR, not knowing that this topic is actually dead.

Over the past 25 years, when VR was supposed to “die,” numerous studies are continuing, both in the development of this technology and in the field of its application in various fields. All these were applications that were being worked on at that time. In this article I will describe how VR was used in the field of education that has already shown results and can have significant benefits for people and society, and more specifically in inclusive education. With VR technology available on a massive scale, the potential for these benefits is significant. However, as Jaron Lanier [21] also said in 1990, “there is a really serious danger that expectations will be too high.” This remains true today, but we can be a little less cautious, because research over the past quarter century has shown results that stand on a fairly solid scientific basis and have every chance of further development.

II. Analytical review of the literature

The study of my chosen problem was carried out by such authors as Argelaguet Sanz, F., Multon, F., and Lécuyer [1], Aristidou, A., Stavarakis, E., and Chrysanthou [2], Aronov, D., and Tank, D. W. [3], Arora, A., Lau, L. Y., Awad, Z., Darzi, A., Singh, A., and Tolley, N. [4], Banakou, D., Hanumanth, P. D., and Slater, M. [5], Banakou, D., and Slater, M. [6], Bergström, I., Kiltani, K., and Slater, M. [7], Blanke, O., Slater, M., and Serino, A. [8], Blom, K. J., Arroyo-Palacios, J., and Slater, M. [9], Bolton, J., Lambert,

M., Lirette, D., and Unsworth, B. [10], Buckley, C. E., Kavanagh, D. O., Traynor, O., and Neary, P. C. [11], Buckley, C. E., Kavanagh, D. O., Traynor, O., and Neary, P. C. [12]. The writings of these authors describe the main points of the beginning of the study and the results that gave at least some result in the fields of medicine, sports, education and motion capture.

Authors such as Casu, A., Spano, L. D., Sorrentino, F., and Scateni, R. [13], Claessen, M. H., Van Der Ham, I. J., Jagersma, E., and Visser-Meily, J. M. [14], Cohen, O., Druon, S., Lengagne, S., Mendelsohn, A., Malach, R., Kheddar, A. [15], Cohen, O., Koppel, M., Malach, R., and Friedman, D. [16], Connolly, M., Seligman, J., Kastenmeier, A., Goldblatt, M., and Gould, J. C. [17], Ewert, D., Schuster, K., Johansson, D., Schilberg, D., and Jeschke, S. [18], Freina, L., and Ott, M. [19], Friedman, D., Pizarro, R., Or-Berkers, K., Neyret, S., Pan, X., and Slater, M. [20] they suggest that the implementation and integration of virtual reality technology into the life of every person provides extensive development opportunities, especially education and healthcare. The authors also share assumptions about the possibility of a complete immersion of consciousness in the virtual world, its advantages and disadvantages.

III. Object, subject and research methods

Mission – research of methods for integrating virtual and augmented reality technology into inclusive education.

Tasks:

- To identify methods for the further development of virtual and augmented reality technology for inclusive education;
- Identify a number of virtual reality applications where there is some evidence or at least debate about its usefulness in the global education system.

Subject of research – the results of the development of technological progress in the field of virtual and augmented reality around the world.

Object of research – virtual and augmented reality in the field of inclusive education.

Hypothesis

Over the next 30 years, each persons life will be directly or indirectly connected with VR and AR technologies, including in education.

IV. Work results

For starters, its worth stopping at the general meaning of VR and AR technology. The scope of virtual reality in education is very extensive. There are several reasons why VR is a great tool for education. Firstly, it can turn the abstract into tangible. This can be especially useful in science teaching. For example, suppose that using a collaborative virtual environment has the advantage of teaching students geometric concepts compared to traditional paper and pencil.

A second advantage in education is that it supports participation and action, not just observation. One example of this is surgical training, for example, it is worth emphasizing how VR is increasingly used in neurosurgery training and is ideally combined with a

tactile interface. Indeed, a European consensus program for teaching endoscopic surgery in artificial reality was developed and agreed.

The third advantage is that it can replace methods that are desirable, but practically impossible, even if it is possible in reality. For example, if a person must visit Niagara Falls in the first week, the Grand Canyon in the next and Stonehenge in a week, it is impossible for a person to visit all these places. However, virtual visits are possible, and such environments are under development.

A fourth advantage in education is that it violates the boundaries of reality as part of research. For example, changing the gravity of the earth to simulate the loss of the ozone layer or observing the appearance of a supernova from the first place as in a movie theater, which in the end is almost impossible to do in real reality.

In the field of VR for healthcare, surgical preparation has been thoroughly investigated. The use of simulations in surgical training planning is essential. To give a good example of why VR is necessary for surgery: interventional cardiology currently has no other satisfactory learning strategy than patient education. It seems that acquiring such training on a virtual human body would be the best option.

In the training of medical students and, in particular, surgeons, there is a corresponding potential role for augmented reality as a tool for studying anatomy using virtual 3D models. Although there are studies trying to gauge how useful augmented reality can be to improve the study of anatomy - including studies suggesting that VR can replace the use of corpses in Medicine.

Nevertheless, even the visualization of 3D models of the body for the study of anatomy gives good results for training, and therefore this area, which should expand in the future, integrating fully immersion systems and various forms of manipulation and interaction of students with body models.

But the most socially important and undoubtedly promising aspect of the use and integration of VR and AR technology in the education system is the possibility of its widespread use in inclusive education for children with disabilities. At the moment, there are no innovative high-tech teaching methods in this area, and virtual reality technologies can give us this opportunity.

Traditional inclusive education is directly related only to special communication approaches to learning, depending on the student's illness, for example, children with ASD (Autism Spectrum Disorder) need social support, preparation for lessons, and a child with cerebral palsy (Cerebral Palsy) mainly needs help in movement. But regardless of the disease, in most children with special needs, intelligence and / or mental motility is preserved. But due to their limitations, they cannot learn equally with other children.

One of the most acute social problems at the present time is the formation of negative social attitudes, especially the concepts of "strange", "other" and similar prejudices. Children from families and social groups with pronounced prejudices begin to assimilate the same negative attitudes in early school age; in the youthful period, these views are fixed.

As mentioned above, the use of virtual and augmented reality technology accelerates the learning process, including in children with disabilities. The use of interactive and engaging events with the effect of presence improves intellectual performance, and in cases with limited movements, I improve the motor skills of arms, legs, torso, depending on the scenario being performed.

It is important to note in this methodology the ability to contact and improve the communication abilities of children with disabilities is several times more effective than attempts to gradually return and adapt children to the social environment. The ability to create virtual playgrounds, classes and events, regardless of social inequality and prejudice in all aspects, is one of the main advantages of VR technology. This practice perfectly affects the child's communication abilities and motivates the further development of this area.

Separate mention requires a new concept which, unfortunately, is currently used only in novels and works of the science fiction genre "complete immersion." But it is worth noting that research is also being carried out in this direction, but comparing with other areas like entertainment, the industry development trend shows rather dubious indicators.

Full immersion is a state of consciousness, often artificial, in which the subject's awareness of his physical condition is reduced or completely lost. This mental state is often accompanied by a sense of the infinity of space, over concentration, a distorted sense of time, as well as ease of action. The term is widely used to describe immersion in virtual reality, the art of installation and video games, but it is not clear whether this word is used uniformly. This term also refers to commonly used fashion words, so its meaning is rather vague, but it carries a hint of something exciting.

The feeling of immersion in virtual reality can be described as the complete presence inside the suggestible space of virtual objects, where everything related to this space necessarily assumes its "reality", and the subject seems completely disconnected from the external physical world.

Immersion in virtual reality is a hypothetical technology of the future, which now exists for the most part as virtual reality in art projects. It consists in immersion in an artificial environment where the user feels exactly the same as in the usual reality of consensus.

The most thoughtful method is to create sensations in which virtual reality is "inserted" into the nervous system directly, this method can be called "Direct stimulation of the nervous system". In functional / ordinary biology, a person interacts with the reality of consensus through the nervous system. Through nerve impulses, he receives input from all sensory organs. They give neurons sensations of increased perception. If a person receives artificially created nerve impulses at the input, his nervous system will adequately respond and form real output nerve impulses that allow him to interact with virtual reality. In this case, real input impulses from the body to the central nervous system should be prevented.

In the future, this method will help to fully live a full life for people who have some limitations, and for some they will give the opportunity to start a new "virtual life".

V. Conclusions

In this article, we mainly examined the possibilities of VR in the field of education that have occurred since its inception. By focusing on applications and especially those whose results have some level of research support. This area is changing extremely fast, and the ingenuity of people is amazing, with new ideas and projects appearing daily. Here, I briefly list some of the latest ideas that have attracted attention along with the needs for improving inclusive education. Basically, these are ideas that are in the process of

implementation, without any results or, possibly, even without any level of implementation, but which have great prospects for further development. At some point, it may seem that we are talking about the distant future, but this future has already come and I hope this future will be bright for everyone.

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DEVELOPMENT OF MOBILE APPARATUS AND MEASURING COMPLEX FOR WASTEWATER COMPOSITION CONTROL

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Abstract. *The purpose of the work is to consider the main anthropogenic sources of pollution of the water environment, to familiarize with the criteria of pollution of water bodies, analysis of methods for determining the level of pollution according to the relevant criteria, development of a hardware complex monitoring the status of sewage. The object of designing is a hardware complex of sewage monitoring.*

The development of the hardware complex is based on the review of existing analogs of hardware and software complexes, the development of appropriate