Augmented Reality: Ukrainian Present Business and Future Education

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Abstract. *The aim of the study*: analysis of the current state and prospects for the development of augmented reality in Ukraine in business and education. *The objectives of the study*: to analyze the experience of using the augmented reality in advertising, marketing, education of Ukraine; to investigate the problems existing in this direction. *The object of the study*: the process of using augmented reality in advertising, marketing, education. *The subject of the study*: specific projects using the augmented reality in advertising, marketing, education. The used *method of study* was theoretical that included analysis of articles and materials of conferences on the research problem. *The results of the study*: nowadays, the augmented reality is used primarily in the field of advertising and marketing of Ukraine. As an example is the advertisement of Kyivstar (virtual tour around Ukraine, augmented reality quest), some of the Ukrainian companies have certain results in in this direction, for example, Augmented Pixels, Simo AR (in the development of a browser with augmented reality, the Kontramarka ticket service is implemented), Live Animations (such projects as Wonderland AR, My Yeti, Live Coloring, Gapchinska, Live Photo are already implemented). Among the problems that exist with the introduction of these technologies in education, first of all, we should note the shortage of specialists in the preparation of such educational projects and the uncoordinated actions of business and education in this direction. *Main conclusions and recommendations*: in order to disseminate research results it is necessary to hold thematic events of the all-Ukrainian level.

Keywords: augmented reality, AR, business, advertising, marketing, education, Ukrainian projects.

According to the chief of Apple – Tim Cook, the technology of augmented reality is also known as AR and such a "a big idea" capable of changing the world, as before it was done by a smartphone [21]. According to the definition of Ronald T. Azuma, the augmented reality has three characteristic features: combines virtual and real, interacts in real time, works in 3D [4]. Despite the fact that this term is quite new among the masses, scientists refer to the augmented reality by the end of the 1950 when Morton Leonard Heilig developed a simulator called Sensorama [6].

In Ukraine, an ordinary citizen can often deal with augmented reality in the field of advertising or marketing. Therefore, let's consider these areas in more detail.

In the sphere of advertising, the giant of Ukrainian mobile communication Kyivstar has more achievements in the direction of using the augmented reality. So, one of the first applications is the application Kyivstar Reality [11]. Thanks to this application, you can read the mark from the Kyivstar billboard, and from the static image the advertisement on the smartphone screen turns into a realistic video. The next step of this mobile operator was the holding of a three-week quest (starting from October 4, 2017) with elements of augmented reality using the application V.QUEST [10]. Participants had to find virtual tips. The quest took place in Kiev, Kharkov, Lviv, Dnipro, Odessa and other cities of Ukraine. Further Kyivstar within the framework of the advertising campaign "Qualitative 3G" arranged a virtual tour of Ukraine in 360 format [12]. Once in front of the billboard, all users of the Kyivstar Reality application can travel to Ukraine. It's enough just to activate the application and put the smartphone on a billboard with a special marker. Travel in 360 mode will begin with the depicted city. In the future, the user can select the navigation using the markers on the map. For a full immersion in the trip, you can visit the branded shops and use the Virbox with helmets VR cardboard (helmet for simulating virtual reality, assembled according to a special scheme of cardboard, optical lenses, magnet and velcro fastening). A smartphone with preinstalled software is embedded in the helmet in the smartphone, the magnetometer can react to changing the magnetic field. According to the data from the smartphone camera, magnetometer and accelerometer, the program simulates the effect of virtual reality [23].

Among the Ukrainian companies working in the direction of augmented reality, we can note the startup Simo AR [5], in the plans of which is the creation of a search browser with augmented reality, will provide the opportunity to purchase goods in one click with the help of a smartphone camera. Between the implemented projects of this startup can be called ticket service Kontramarka [20], recognizes posters and offers users to immediately purchase a ticket.

Another Ukrainian company that creates projects for augmented reality is Brainberry Global. On October 30, 2015, Augmented Reality MeetUp 2.0 was held in Kiev for representatives of business, digital agencies and technologists who are interested in trends and key aspects of the application of Augmented Reality technologies in various fields of business and science [22]. The organizer of the event is IT company Brainberry Global presented to the public the world's first video message service Minute of Life [15] with augmented reality, which users can create themselves and place on different physical objects. So, for starters it is suggested to download or record a video or photo, then add audio files, view the received video message and create a marker. Also, the company announced its start-up "ABC, Talk with me" – a mobile application that recognizes letters on cubes. Thus, the child can check the correctness of the word made up of cubes.

Live Animations is an international IT company of Ukrainian "origin", specializing in the development of innovative products with augmented reality for children [13]. The slogan of the company is "We make the world better by adding charms to it". Among her projects can be called:

- Wonderland AR: the book "Alice in Wonderland" with illustrations by Eugenia Gapchinskaya that come alive with the use of augmented reality;
- My Yeti: a wrapper for ice cream, when you move the smartphone camera to the image of the Yeti, a cartoon series about the adventures of the Yeti is loaded [17];
- Live Coloring: "reviving" coloring: you can download the coloring, paint it and revive in the colors in which they are painted;
- Gapchinska: "animated" images of angels on a box of chocolates, postcards or other, where there is an image logo. They can be photographed, also the application allows you to create a romantic postcard for a loved one and the angels will also be there alive;
- Live Photo: "animated" notebooks: if the wrapper of special notebooks, books, notebooks, puzzles, etc. has a "Live Photo" logo, then using a special application you can "revive" the characters of the wrapper.

At the end of 2017, the Venture Reality Fund [21] published the results of the AR/VR market research, according to which Augmented Pixels is named among the leaders in the machine vision category, an international startup with Ukrainian "roots" in the augmented reality area (the first name is AR23D, founded in 2010 in Odessa). Augmented Pixels entered the list of the largest suppliers of components for Computer Vision (a system of so-called computer vision, allowing machines to identify, track and classify objects).

It should be noted that in the countries of the near abroad, targeted activities are carried out in the direction of "Augmented Reality". Among them one can single out:

- the conference and the hackathon "AVRA MINSK DAYS" that was on April 14-16, 2017. The format of the event provided an opportunity not only to learn about successful projects, new technological achievements, get acquainted with industry representatives, but also to unite professionals to create their breakthrough product in the AR/VR area and present it to investors. The program of the event: VR Talks (reports of experts on the spectrum of application of AR / VR technologies, with facts and figures, case studies and demonstration of products), VR Show Stage (demonstration of new AR / VR projects – spheres from games and entertainment, to business, education, industry, art), Test Drive (the opportunity to test the latest AR/VR devices, attractions, incredible games, movies and animation, etc.), AVRA Job (job fair for AR/VR professionals, communication with potential employers) [1];
- business forum "AVRA DAYS SKOLKOVO" was on October 24, 2017 about effective AR/VR technology. The purpose of the forum was to unite the efforts, knowledge and experience of AR/VR-companies, business representatives and advertising agencies. The following industries were represented at the forum: industry, education, marketing, advertising, retail, real estate, medicine, cinema and animation, games and eSports [3].

Ukraine has not yet taken place in measures of such level dedicated to the issues of augmented reality – but the question of direction may be considered in thematic blocks, such as the annual conference InnoTech Ukraine (it was 23-24 March 2018) [8] that

dedicated to trends of technological innovations. At InnoTech Ukraine will be equipped exhibition area with the presentation of the latest domestic and foreign developments regarding the Internet of things, robotics, AR/VR/MR-technology and 3D-printing.

According to Alla Wolf (member of the Performance Augmentation Lab, which is engaged in theoretical and practical studies of augmented reality technology) "true potential of augmented reality lies not in entertainment and games, but in new features that augmented reality opens for education and production" [18].

By analyzing the speed of the development of complementary (or virtual) reality technologies and the possibilities of their use (first of all, it is the visualization of the material and, as a consequence, elimination of cognitive overload), it can be argued that it is expedient and necessary for their use in the educational process. For example, the project "Virtual Museum of Computer Technology" was implemented at the Poltava School # 9 and a manual was developed using the technology of complemented reality [14]. The fruitful work on the use of complementary reality technologies and teachers of the Kryvyi Rih National University Andrii M. Striuk, Viktoriia V. Tkachuk, Yuliia V. Yechkalo, and others [16; 19].

Undoubtedly, projects with the addition of reality have a huge future in the field of education, but their creation is restrained by such factors as: lack of specialists; the lack of measures at all-Ukrainian level to cover the achievements in this direction.

References

1. ARNext.ru: AR/VR konferentciia i khakaton AVRA MINSK DAYS (AR/VR conference and hackaton AVRA MINSK DAYS). http://arnext.ru/news/ar-vr-konferentsiya-i-hakaton-avra-minsk-days-22470 (2017). Accessed 31 Dec 2017
2. Augmented reality in higher education: five tips to get started. Times Higher. https://www.timeshighereducation.com/news/augmented-reality-in-higher-education-five-tips-to-get-started/2018933.article (2015). Accessed 25 Oct 2017
3. AVRA DAYS Skolkovo. http://avradays.com (2017). Accessed 23 Oct 2017
4. Azuma, R.T.: A Survey of Augmented Reality. Presence: Teleoperators and Virtual Environments. **6**(4), 355–385 (1997). doi:10.1162/pres.1997.6.4.355
5. Brauzer dopolnennoi realnosti: ukraintcy khotiat obognat Google (Augmented reality browser: Ukrainians want to overtake Google). Kyivstar Business HUB. https://hub.kyivstar.ua/brauzer-dopolnennoy-realnosti-ukraintsyi-hotyat-obognat-google (2017). Accessed 20 Nov 2017
6. Brockwell, H.: Forgotten genius: the man who made a working VR machine in 1957. TechRadar. https://www.techradar.com/news/wearables/forgotten-genius-the-man-who-made-a-working-vr-machine-in-1957-1318253 (2016). Accessed 12 Dec 2017
7. Chi-Yin Yuen, S., Yaoyuneyong, G., Johnson, E.: Augmented Reality: An Overview and Five Directions for AR in Education. Journal of Educational Technology Development and Exchange (JETDE). **4**(1), Article 11, 118–140 (2011). doi:10.18785/jetde.0401.10
8. Innotech Ukraine - IV International Forum of Innovation Technologies. https://innotech.ua/en (2018). Accessed 30 Jan 2018
9. Kafedra informatyky ta prykladnoi matematyky: Tretie zasidannia seminaru spilnoi naukovo-doslidnoi laboratorii z pytan vykorystannia khmarnykh tekhnolohii v osviti (Third meeting of the seminar of the joint research laboratory on the use of cloud technologies in

education). https://kdpu.edu.ua/informatyky-ta-prykladnoi-matematyky/naukova-robota/konferentsii-ta-seminary/3246-tretie-zasidannia-seminaru-spilnoi-naukovo-doslidnoi-laboratorii-z-pytan-vykorystannia-khmarnykh-tekhnolohii-v-osviti.html (2017). Accessed 29 Dec 2017
10. Kyivstar: Kvest u dopovnenii realnosti – vpershe v Ukraini (Quest in the augmented reality – the first time in Ukraine). https://kyivstar.ua/uk/mm/news-and-promotions/kvest-u-dopovneniy-realnosti-vpershe-v-ukrayini (2017). Accessed 16 Dec 2017
11. Kyivstar: Kyivstar Reality. https://kyivstar.ua/en/mm/entertainment/reality (2018). Accessed 26 Jan 2018
12. Kyivstar: Virtualni mandry Ukrainoiu 360 (Virtual tours of Ukraine 360). http://vr.kyivstar.ua (2017). Accessed 29 Dec 2017
13. Live Animations: Useful information about IT company "Live Animations". https://liveanimations.org/en/about (2017). Accessed 13 Jan 2018
14. Matviienko, Yu.S.: Zastosuvannia tekhnolohii dopovnenoi realnosti v osvitnii haluzi (Application of augmented reality technology in the educational field). In: Proceedings of the 3rd Ukrainian scientific and practical Internet conference of young scientists and students "The new information and communication technologies in education" (IISTE-2015), Poltava National Pedagogical University named after. V.G. Korolenko, Poltava, 18–19 November, 2015, pp. 163–165
15. Minute of Life - World`s 1st User Generated Augmented Reality Messenger. http://minuteoflife.com/en (2015). Accessed 14 Dec 2017
16. Modlo, E.O., Echkalo, Yu.V., Semerikov, S.O., Tkachuk, V.V.: Vykorystannia tekhnolohii dopovnenoi realnosti u mobilno oriientovanomu seredovyshchi navchannia VNZ (Using technology of augmented reality in a mobile-based learning environment of the higher educational institution). Naukovi zapysky, Seriia: Problemy metodyky fizyko-matematychnoi i tekhnolohichnoi osvity. **11**(1), 93–100 (2017)
17. Morozyvo z multykom | Morozyvo Yeti vid Lasunka (Ice cream with cartoon | Ice Cream Yeti from Lasunka). http://yeti.lasunka.com/yeti_eng.html (2017). Accessed 15 Dec 2017
18. Soroka, A.: Shcho take dopovnena realnist: istoriia ukrainskoi doslidnytsi (What is the augmented reality: the history of a Ukrainian researcher). BBC Ukraina. http://www.bbc.com/ukrainian/features-39057896 (2017). Accessed 13 Dec 2017
19. Striuk, A., Rassovytska, M., Shokaliuk, S.: Using Blippar Augmented Reality Browser in the Practical Training of Mechanical Engineers. In: Ermolayev, V., Suárez-Figueroa, M.C., Yakovyna, V., Kharchenko, V., Kobets, V., Kravtsov, H., Peschanenko, V., Prytula, Ya., Nikitchenko, M., Spivakovsky A. (eds.) Proceedings of the 14th International Conference on ICT in Education, Research and Industrial Applications. Integration, Harmonization and Knowledge Transfer (ICTERI, 2018), Kyiv, Ukraine, 14-17 May 2018, vol. II: Workshops. CEUR Workshop Proceedings (CEUR-WS.org), vol. 2104, pp. 412–419 (2018)
20. The poster of Kyiv 2017: buy tickets for concerts and performances in Kiev. Sale, order for Kontramarka.ua. https://kontramarka.ua/en (2017). Accessed 20 Nov 2017
21. The Venture Reality Fund. http://www.thevrfund.com (2017). Accessed 21 Jan 2018
22. V Proshedshuiu Piatnitcu Kiev Pogruzilsia V Dopolnennuiu Realnost Ili Kak Proshel Vtoroi Augmented Reality MeetUp 2.0 (In the Past Friday Kiev Plunged into the Augmented Reality Or How the Second Augmented Reality MeetUp 2.0 Passed). http://augmentedreality.com.ua/v-proshedshuyu-pyatnicu-kiev-pogruzilsya-v (2015). Accessed 15 Dec 2017
23. Wikipedia: Google Cardboard. https://en.wikipedia.org/wiki/Google_Cardboard (2018). Accessed 22 Jan 2018