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Using augmented reality as a medium for teaching history and tourism

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Abstract

This article discusses the use of new media in education and shows new opportunities but also risks of the use of these technologies, especially in the tourism and history. New media through a new user interface facilitates controlling of mobile applications thanks to motion and geolocation sensors and allows the data visualization in dependence on the surroundings of the user. The article will focus on the technology of augmented reality (AR) and describe how this technology can be used in education. Augmented reality is one of the newest technologies, which offers new ways how to educate effectively and attractively.

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1. Introduction to new media and augmented reality

New media play an important role in education today thanks to the mass spread of new information and communication technologies (ICT). New media enrich teaching practices with interactivity, promote communication and feedback. Typical characteristics of new media are multimediality, virtuality, communication, globality, internationalization, distribution, diversification, mobility and collaboration. This article discusses the use of new media in education and shows new opportunities but also risks of the use of these technologies, especially in the tourism and history. New media through a new user interface facilitates controlling of mobile applications thanks to motion and geolocation sensors and allows the data visualization in dependence on the surroundings of the user.

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New media, thanks to that, is changing the face of education and creating new opportunities for improvement the quality of teaching and learning and trying to reflect the user's information needs and at various types of restrictions. The article will focus on the technology of augmented reality (AR) and describe how this technology can be used in education.

1.1. What is augmented reality

Augmented reality (AR) is one of the newest technologies, which offers new ways how to educate effectively and attractively. Considering the growing popularity of mobile devices and new user interface worldwide, the use of AR on mobile devices becomes potentially very important form of education. Augmented reality is a way of displaying digital content in an image of the real world and its possible interaction with the environment and the user. As opposed to virtual reality, augmented reality does not buckle blinkers on user's eyes to isolate him – it retains full perception of the world, only enhanced with a distinguishable digital layer with information through advanced ICT. Augmented reality is not just a lab or room issue but a concept usable without restrictions both indoors and outdoors.

1.2. Required technologic base for augmented reality

The implementation of augmented reality provided by computer applications requires a specific hardware, currently widespread in the young generation (see chapter 2) and financially perfectly available – the cheapest device completely sufficient for augmented reality, (see chapter 1.2.2.) is on the current market in May 2014 offered at a price of EUR 60 – model Yarvik Novo Compact (Heureka, 2014) and software (see chapters 1.2.1. and 1.2.2.). As the user interface for augmented reality a few types of devices can be used. For example touch screen of a mobile device or head-mounted displays of Google Glass type (or Glass Up) displaying pictures right before user's eyes without the need to look away from his point of view (such way of displaying is called Head Up Display). These glasses are not available on the public market yet (April 2014), the sale is expected by the end of the year. The price should vary around USD 1.500 (USD 299 for Glass Up), therefore this article considers the mobile devices as the best solution to be used.

1.2.1. Multipurpose mobile devices for augmented reality

By multi-purpose mobile devices we mean mobile computers, which are nowadays frequently represented by notebooks/ultrabooks, smartphones or tablets. In education of history and tourism, the use of augmented reality is destined for outdoor use with a high degree of mobility of the user. For this purpose it is necessary that the application enabling displaying the augmented reality runs on computers with high degree of mobility. This means very low weight, small dimensions and due to the low power consumption and high capacity batteries also several hours of operation without the need of recharging. Internet data transfer is provided by wireless connection, preferably available everywhere via mobile data networks. Smartphone and tablet best suit these requirements, for they have very small dimensions and easier handling possibility (compared to notebooks) thanks to extremely low weight (usually no more than 0.5 kg, which is significantly lower than most notebooks and even ultrabooks, where the weight is at least double) and sufficient battery life.

The essence of augmented reality is to display digital content in real images. Everything happens within a touch screen of mobile device that captures the true picture by the front webcamera. The location of digital content must match the actual content as closely as possible – eg, the original historical entrance must be displayed on the screen exactly on the point where the entry to the current building is. Therefore the ability to accurately display augmented reality requires advanced technologies, which the mobile device must provide.

These technologies include:

- Front webcamera to capture the actual image in front of the user's eyes.
- GPS (Global Positioning System) satellites enabling very accurate location (accuracy within 5 to 20 meters) of the device anywhere on the Earth (called geolocation) and technologies such as gyroscope and accelerometer that

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