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AR TECHNOLOGIES IN ANDROID APP DEVELOPMENT

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Augmented reality have undergone considerable improvement in the past years. In spite of the numerous techniques and hardware devices, the crucial breakthrough have come with the spread of intelligent mobile phones. Mobile devices have limited hardware capabilities, which narrows down the scene analysis methods. An augmented reality application to create stickers for social media is considered in the paper.

Introduction. Augmented reality (AR) is a scientific field which has been well known for many decades. As early as in 1993 one issue of the Communications of the ACM was dedicated to the new emerging field of augmented reality and related ubiquitous computing. One of the significant contributors was Mark Weiser from Xerox Palo Alto laboratories. In [1] and few related articles, the key problems for this field were formulated. A significant number of them are still unsolved and augmented reality is still far from being a common tool.

Almost two decades later, in 2002, Billinghurst and Kato published a paper [2] that summarized state-of-the-art of the collaborative augmented reality and in a broader view the completely augmented reality. The gist of this paper is formulated in the conclusion: «Despite early promising results, a lot of research work needs to be done before collaborative AR interfaces are as well-understood as traditional telecommunication technology». This description could have been applied to most of the AR applications. One of the obvious reasons was lack of special hardware – helmets, binoculars, etc.

However, with the introduction of cell phones equipped with a camera, a completely new tool evolved. Now, a cheap common device is able to present a scene composed of real-word image and different artificial objects. Such presentation looks very natural. In a few years, it is obvious that the adoption of mobile augmented reality by common users is much faster than the adoption of previous applications (see [3], [4] and many others). This trend is clearly shown in Fig. 1 that presents normalized global search requests for «augmented reality» keywords. The exact reason for the 2009 boom will be explained later.

In spite of the significant amount of research in the field of AR, there is still a discussion about an optimal approach to the recognition of a real-world scene. In other words, an approach to identify where the user is and what is there in front of him. The following section briefly describes frequently used approaches to the problem. We will focus primarily on mobile AR applications.

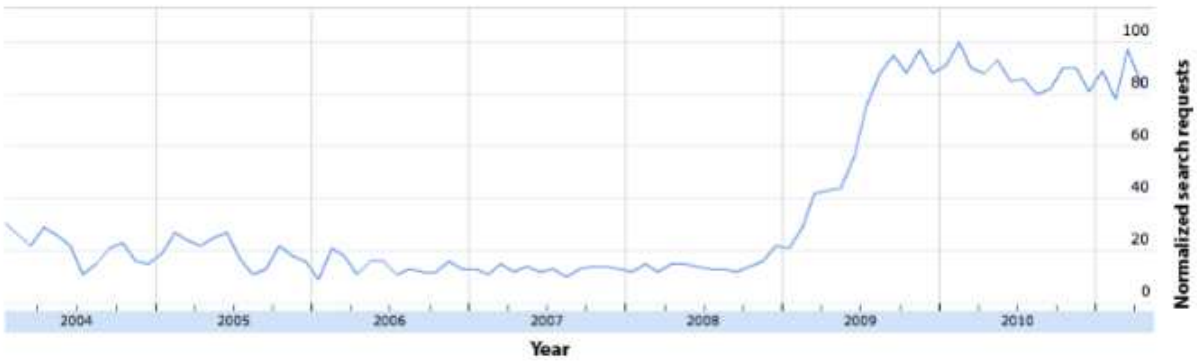

Figure 1. - Google search request for augmented reality between 2004 and 2011. The y-axis shows search requests normalized to range from 0 to 100. This number represents a fraction of highest search activity. The normalization method can be found on Google Search Insights web page.

Related research. In this section, the augmented reality technology and related technology required for the design and implementation of an augmented reality based application will be discussed.

As part of Virtual reality field, augmented reality is a system where virtual worlds are combined with virtual reality made by computer graphics. Augmented Reality is divided into two types: Marker-based Augmented Reality and Markerless Augmented Reality. The Marker-based Augmented Reality augments an object by using a special marker to easily calculate its coordinates. Its Resource libraries include the ARtag, ARToolkit, which pro-

vides the calculation of a fast and accurate coordinate while making a real-time augmented reality system. The Markeless Augmented Reality does not use a special marker. Instead it uses the information of the objects in the image to augment the object. This method detects the image's 3D object's corners and then uses the original form of the object as the object's augmented position.

Android is a mobile OS, made on Linux Canal technology. It has various APIs through which application can be made using Java and X.M.L. Through these, API's Android has interoperability in that the mobile device can be applied to other various devices and sensors. Compared to the conventional computers environment, mobile devices have higher mobility and portability which is an advantage, but there is the limitation of user input and the output of the result, which is a disadvantage. However, a mobile device has a camera, G.P.S, gyro sensor, etc. Therefore, it can use various information related to a user's location, that is, the user's current location, direction and degree of inclination, send this information to the server, get other various additional information through the APIs, and display it on the user's device.

When displaying information on an augmented reality screen, there are basic problems/limits faced including rendering, information congestion, human factor etc. Information congestion is an information-reading problem caused by the increase in information. Due to this, there is a need to maintain important data and the information filtering technic to reduce the amount of information. Information filtering's main elements include the following: user's goal, the relationship between that goal and each object, user's position, etc. Rendering deletes/removes the real objects and does real rendering too. To improve visibility, the Human Factor is used and it comprises delay, adaptation, tiredness and eye tiredness, etc.

Design and implement. Creating funny and cool stickers and making meme stickers for WhatsApp have never been so easy and quick. In implemented sticker maker app for Android, one can easily create and cut out their own stickers using their personal photos or any other photo they have in their library. The process to make a cool sticker is as simple as choosing a photo, making necessary crops, add any desired element or text to the sticker, and export the final result to any social network one wants. So, if one uses WhatsApp a lot and is already tired of default sticker packs and other available meme stickers each pack can be filled with up to 30 funny stickers and memes.

Sticker maker app for Android comes with a clean and neat design and the interface is so user-friendly that one will be able to create a funny meme sticker even if they are totally new to the concept of photo editing or creating stickers. The high-quality graphics, smooth animations, range of different customization tools, the option to create endless sticker packs, easy to use editing tools, and intuitive interface, make this sticker maker app the #1 choice when it comes to finding the best editing app to create stickers for WhatsApp and other social messaging applications.

While there are so many other photo editing apps to create one's own sticker packs, there are just a few reasons why we believe this photo editor app to create personal sticker packs, can easily become one's best tool to make unique memes and stickers:

One. It is super user-friendly and the intuitive interface designed to ensure one would get used to the whole process of making a sticker without having to worry about going through a complex procedure.

Two. The wide range of available funny elements to add to the stickers along with the unlimited customization options (such as changing the font, color and resizing photo) make sure one can easily create unique sticker packs with no limitations.

Three. Not only one can export their personal sticker packs and memes to WhatsApp, but they can also share the created stickers to any other apps and social messaging services.

And since the entire features of this sticker maker app are available for free, there is no harm giving it a try and explore the features for oneself.

Conclusion. In contrast with the current augmented reality technology, this paper has detailed analysis, research. The testing and exploration of augmented reality technology has been carried out. The augmented reality-based app considered in this paper is made up of the combination of virtual objects, the real world, and sensor data received from sensors.

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