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Object Based Augmented Reality Case Study

Literature Survey on Application based approach towards Augmented Reality.

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***Abstract*—** This paper is about Augmented Reality (AR) using object-based visualization and implementation on the smartphone devices. Augmented Reality (AR) employs computer vision, image processing and computer graphics techniques to merge digital content into the real world. It enables real-time interaction between the user, real objects and virtual objects. AR can, for example, be used to embed 2D graphics into a video in such a way as if the virtual elements were part of the real environment. In this work, we are designing AR based software in which we are solving the problem for ease of access of documents on check post. One of the challenges of AR is to align virtual data with the environment. A marker-based approach solves the problem using visual markers, e.g. 2D barcodes, detectable with computer vision methods.

Keywords- *augmented reality; arsystem; virtual reality application.*

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I. INTRODUCTION

The evolution of science and information technologies with the rapid growth of interest in human computer interaction (HCI), multimedia, computer and mobile technologies have become vital elements and worked wonders in many fields. The massive growth of adoption of these technologies which are widely implemented around the world led to an increased use of different techniques in all areas of life. Technologies have evolved as the buzzword of modern mobile information technology and are gaining increased attention in the media, through a variety of applications which uses information on the geographical position of the mobile device. Thus, demand for access to specific location points of interest (POI) through mobile devices is on the rise as user preferences increasingly spill over into a particular firm or industry. Portable technology allows users to create, present, and combine media elements (images, graphics, videos, music etc.) with text, links and other tools which enable navigation, interaction, creation, presentation, and dissemination of information through a conversational approach. Mobile devices are becoming multi-purpose information appliances, incorporating everyday services such as telephone, messaging, chat, games, internet browsing, location finding, tracking and navigation. Technology requirements for personal or professional purposes have now evolved into a need to combine portability with technology. Professional or personal applications are ported on to a mobile platform so they are not bound to any specific location and can remain productive wherever they are. Mobile platforms have thus evolved into powerful and compact devices capable of running innovative applications and technologies. Exploring and emphasizing importance, capabilities of mobile AR and to develop Android mobile application with an improved virtual experience for user. The objective is to develop and implement smartphone AR mobile prototype application by given information about the local objects which are near the current product. This mobile application is an object aware application, as this application incorporates product based services to show product updates. The application can help the users to learn about thein surrounding areas, locating and navigating through their respective environments and this is done by showcasing the possibility of using smartphone features and takes advantage of the different sensors available on most android based phones such as sensing capability of audio/video recording and text annotation.

II. LITERATURE SURVEY

The concept of augmented reality was introduced in 1960‟s, after the invention of first Head-Mounted Display (HMD) by Ivan Sutherland, which is used as viewing device for augmented reality. The term augmented reality was coined by Tom Caudell and David Mizell in 1990. KARMA was the

first research paper that completely focused on augmented reality system. Rekimoto developed a two dimensional matrix markers that allows camera tracking with six degree of freedom. Mann developed a first GPS-based outdoor system that provides navigational assistance to the visually impaired with spatial audio overlays. Mobile Augmented Reality System (MARS) was developed that registers 3D graphical information in tour guide for buildings and objects. Prince et al. (Prince, Cheok et al. 2002) introduced a 3D live augmented reality conferencing system. Through the use of multiple cameras and an algorithm determining shape from silhouette, they were able to superimpose a live 3D image of a remote collaborator onto a fiducial marker, creating the sense that the live remote collaborator was in the workspace of the local user. The shape from silhouette algorithm works by each of 15 cameras identifying a pixel as belonging to the foreground or background, isolation of the foreground information produces a 3D image that can be viewed from any angle by the local user.

Chi et al. (2013) discusses trends in AR applications for the AEC/FM with a specific focus on four AR technologies: localization, natural user interface, cloud computing, and mobile devices. The paper reviews 101 articles and outlines future trends and opportunities for applying AR in the AEC/FM industry in six directions: (a) field exploration based on hybrid localization, (b) in-field gesture or kinesthetic control of AR interface,(c) integration with location-specific information, (d) accessing field information using ubiquitous services, (e) portable AR devices in the field, (f) context-aware augmented reality in AEC/FM fields.

Wang et al. (2013) reviews 120 articles published between 2005 and 2011 in various journal and conferences databases with a focus on augmented reality technologies in the built environment. The paper classifies all available toolkits for augmented reality prototyping in five categories: 2D marker AR-PC and web-cam based, 2D marker AR-mobile, 3D object recognition-mobile, marker-less tools, GPS-compass based AR. In their research, AR literature is classified in three categories: (1) application area; (2) AR system layers: concept and theory (with four sub-layers including: algorithm and modeling, conceptual framework, evaluation framework, and technology adoption), implementation (with two sub-layers: software and hardware), evaluation (with two sub-layers: effectiveness and usability), and industry adoption; (3) other technical criteria. The paper explores state-of-the-art technologies in each category and proposes future research directions.

Shin et al. (2008) study various application areas for augmented reality technologies in industrial construction based on technology suitability. The research assesses different work tasks from the human factors perspective and presents a comprehensive map, which identifies eight work tasks including layout, excavation, positioning, inspection, and coordination, supervision, commenting, and strategizing out of seventeen classified work tasks which could potentially benefit from AR systems.

Al (2004) introduced a 3D markers based tracking system using a mobile phone. A hybrid tracking system for outdoor augmented reality in urban environments was developed that enabled accurate, real-time overlays on a handheld device. A parallel real-time tracking and mapping was introduced in 2007. Wagner et al (2008) developed the first real-time six degree of freedom implementation of natural feature tracking on mobile phones. Morrison et al. (2009) developed MapLens which use magic lens on a paper map to give a mobile augmented reality map. Recently, the field of augmented reality has gained more attention among the researchers.

Rasker et al (1998) introduced a spatial augmented reality, in which virtual objects are rendered directly within or on the user's physical space. ARQuake was developed in 2000 which is the first outdoor mobile augmented reality game. AR-PDA is a small wireless augmented reality system. In 2003, a mobile augmented reality system was developed, that guides a user through an unfamiliar building to a certain destination. An indoor augmented reality guidance system was developed in 2003. Möhring et. Fong et al. (Fong, Thorpe et al. 2002a; Fong, Thorpe et al. 2002b; Fong, Thorpe et al. 2003) the human and robots engage in dialogue, exchange information, ask questions and resolve differences. Thus, the robot has more freedom in execution and is more likely to find good solutions when it encounters problems. More succinctly, the human is a partner whom the robot can ask questions, obtain assistance from and collaborate with. In more recent work, Fong et al (Fong, Kunz et al. 2006) note that for humans and robots to work together as peers, the system must provide mechanisms for the humans and robots to communicate effectively. The Human Robot Interaction Operating System (HRI/OS) introduced enables a team of humans and robots to work together on tasks that are well defined and narrow in scope. The human agents can use spatial dialog to communicate and the autonomous agents use spatial reasoning to interpret 'left of' type elements from the spatial dialog. The ambiguities arising from such dialog are resolved using modeling the situation in a simulator.

Another approach involves augmenting physical objects directly. In the early 1970's, Papert created a "floor turtle", a small robot, that could be controlled by a child with a computer language called Logo. LEGO/Logo is a direct descendant, allowing children to use Logo to control constructions made with LEGO bricks, motors, and gears. Electronic bricks contain simple electronic devices such as sensors (light, sound, touch, proximity), logic devices (and-gates, flip-flops, timers) and action bricks (motors, lights). A child can add a sound sensor to the motor drive of a toy car and use a flip-flop brick to make the car alternately start or stop at any loud noise. Children (and

their teachers) have created a variety of whimsical and useful constructions, ranging from an "alarm clock bed" that detects the light in the morning and rattles a toy bed to a "smart" cage that tracks the behavior of the hamster inside.

III. CONCLUSION

The collaboration of immersive technologies in mobile platform lead to new interactive techniques by using new evolution of virtual reality technology known as Augmented Reality. It is the integration of digital information with physical real-world environments in a real-time session. Augmented by overlaying the real world with virtually generated renders such as, videos, graphics, sounds and text provide enriching and complementing reality with immersive ability to view content information, navigate, communicate, and changes the way user interact with their environment. Therefore, AR simply adds to reality in a way that enhances or improves upon what is displayed in a mobile application.

Acknowledgment

We declare that this written submission represents our ideas in our own words and where others' ideas or words have been included, we have adequately cited and referenced the original sources. We also declare that we have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in our submission. We understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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