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A Review paper on Augmented Reality

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***Abstract*—** This paper explores the technology of Augmented Reality by indulging in the first ever introduction to it, as well as how augmented reality has effected every individual's day to day life now and how it will affect every individual's day to day life in the future. It ranges from the first occurrence of augmented reality as a French author's idea to its establishment as a technology which is not only taking over the world like a storm but will gradually make it impossible to imagine functioning without the technology of augmented reality which will be deeply rooted in our lifestyles . It is discussed how augmented reality is becoming an irreplaceable part of industries as well as people. The three approaches to augmented reality are mentioned with the concept of their working. The future of augmented reality is discussed focussing on various sectors like marketing, designing, safety and security, shopping, social media, etc.

***Keywords*—**Augmented Reality, First Occurrence, Irreplaceable Part, Approaches to Technology, Future.

I. INTRODUCTION

Augmented Reality, as a technology, and especially as an idea, has existed in the world for a very long time. In the past few years, it has received a lot of attention as developers began to combine augmented reality with mobile applications. Along with mobile applications, release of products like Google Glass has brought Augmented Reality further into limelight. Augmented Reality as a term is used to represent a collection of technologies which amalgamate information generated by the computer with the natural senses of the viewers. Augmented Reality ensures establishment of direct, automatic and actionable links between the physical world and electronic information. Both spatially and cognitively, augmented reality bridges the gap between virtual world and real world by going beyond mobile computing. At least in the user's perception, digital information appears to become a part of the real world with Augmented Reality.

This paper focuses on how augmented reality has engulfed us since decades and tries to explain its omnipresence. It talks about the time when it was first perceived as an idea only with no name and explains the working of the technology as of today.

Figure 1:Augmented Reality

II. EARLY OCCURANCE

Augmented Reality is a fairly new coined term. The earliest record of occurrence of the idea dates back to as early as 1901, in a novel called 'The Master Key' written by an American author names L. Frank Baum. In his novel a fifteen year old encounters a demon who gives him many gifts, one of which was a "Character Marker". It was a pair of spectacles, when you wear them everybody you meet will be marked on the forehead with a letter indicating his or her character. For example, 'G' stands for good, 'E' for evil, 'W' for wise, 'F' for foolish, 'C' for cruel.

This device, named 'Character marker' has been seen in retrospect has an early foreshadowing of features analogous to those obtained in augmented reality devices. The official term was later coined in 1990 by Tom Caudell.

III. REAL LIFE APPLICATIONS

Augmented Reality is a technology which is gradually becoming an essential part of everyday life. Some of the very important sectors in which Augmented Reality will establish its ground are:

Construction

In construction, Augmented Reality involves placing a proposed design's 3D model on the space where the construction is to be done, using mobile devices and 3D models. Utilization of Augmented Reality in the Architecture, Engineering and Construction industries has matured in the recent past when companies like the Bentley Systems starting incorporating it into their projects.

Figure2: CONSTRUCTION WITH AUGMENTED REALITY

DIY Car Repair

For people willing to use applications in beta and for certain car brands, AR-assisted car repair is already a reality. For example, for Hyundai model car owners; there is a Hyundai Virtual Guide application that can be downloaded on their Apple or Android devices to help them with simple maintenance of their car, as well as general guidance and information.

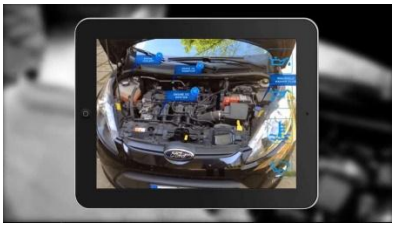

Figure 3: AR ASSISTED CAR REPAIR

Learning to Cook

Augmented Reality Kitchens help people learn how to cook. It guides people through recipes and tells them what to do with the food. It detects the weight and requirement of the raw material placed and instructs accordingly. Tokyo Institute of Technology is working on a system that could be integrated into stoves.

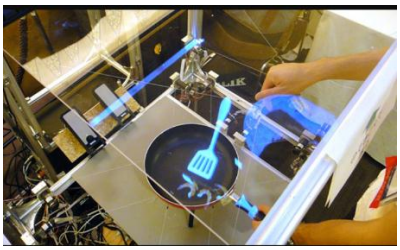

Figure 4: AR ASSISTED COOKING

GPS Turn-by-turn Navigation

The major concern in following GPS navigation has always been taking the eyes off the road to look at where to go next. Augmented Reality has overcome this problem as well by introducing GPS Turn-by-turn Navigation. The driver no longer has to worry about missing a crucial turn or risk a collision as the real time camera preview enables them to check conditions on screen without impacting driving safety.

Figure 5: AR ASSISTED GPS NAVIGATION

IV. FUNCTIONING OF AUGMENTED REALITY

There can be three approaches for the working of Augmented Reality:

SLAM

SLAM stands for Simultaneous Localization and Mapping. This is considered the most effective method of rendering virtual images over real-world objects. SLAM functions by localizing sensors with respect to their surroundings simultaneously, while mapping the structure of the environment at the same time. It is not particular software or algorithm but an approach to solve complex Augmented Reality simulation problems.

RECOGNITION BASED

Recognition based, also known as Marker based augmented reality makes use of a camera to identify markers or objects like QR/2D code or natural feature tracking (NFT) markers, to showcase an overlay only when the device senses a marker. In order to distinguish a marker from real world objects, Marker-based AR technology depends upon device camera. The position and orientation can also be calculated along with the marker image. The virtual replication will be rotated as the marker is rotated.

LOCATION BASED

Unlike recognition based, the location based AR depends on a GPS, digital compass, velocity meter, or accelerometer to provide data related to the location and the visualizations of augmented reality technology are activated based on these inputs. This type of Augmented Reality technology has been made quite popular since location detection features in smartphones makes it easy. Mapping directions and other location centric applications are some common uses of location based AR.

V. CONCLUSION

In the future Augmented Reality is expected to be at a much greater boom than now. It will allow designers to experience their products and not simply imagine them. Opportunities to make factories, mines, plants and assembly lines safer will also be offered by Augmented Reality. The experience of shopping at a brick-and-mortar store will be merged with the convenience of shopping online by letting consumers try on, visualize and experiment items considered for purchase in an entirely new manner. Technologies like ARKit and ARCore mark a significant push towards democratization of AR experiences. Advertising companies in order to improve their communication with its customers are expected to tap into Augmented Reality.

Augmented Reality holds and explores innumerable possibilities which will completely transform our lifestyles in the days to come.

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