Chapter 86
Mixed Augmented Reality Systems for Real World Integration

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ABSTRACT

Augmented Reality (AR) plays a vital role in the field of visual computing. AR is actually different but often confused to be the same is Virtual Reality (VR). While VR creates a whole new world, AR aims at designing an environment in real time with virtual components that are overlaid on the real components. Due to this reason, AR comes under the category of 'mixed reality'. AR could be viewed on any smart electronic gadgets like mobile, laptop, projector, tablet etc., AR could be broadly classified as Marker-based and Markerless. If it is marker-based, a pattern is used whereas in markerless system there is no need of it. In case of marker, if we show the pattern to a webcam it will get details about it and impose the object on the marker. We are incorporating a new efficient solution for integrating a virtual object on to a real world which can be very much handful for tourism and advertisement for showcasing objects or things. The ultimate goal is to augmenting the 3D video onto a real world on which it will increase the person's conceptual understanding of the subject.

INTRODUCTION

Many systems today are too difficult to use because of complex user interfaces. This is partially due to a lack of competence in designing user interfaces many engineers suffer from. A more important reason is that with the growing computational power of modern systems, devices and applications become more complex and integrate more features. Soft- and hardware that was only available to a small amount of specialists a few decades ago, is now a well-integrated part of everyone's daily life. Go o d user interface design is therefore no longer an option but a hard requirement for developing highly usable applications.

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Augmented Reality (AR) research aims at developing new human computer interfaces. Instead of showing information on isolated displays, it puts data right where it belongs: into the real world. AR thereby blurs the distinction between the real world and the user interface and combines them in a natural way allowing the creation of simple and intuitive user interfaces even for complex applications.

MOTIVATIONAL OVERVIEW

Since the birth of computing technology, humans have used computers as a tool to further their progress. Numerical computation has always been the backbone of computing technology, but as this technology advances, a wider range of high-level tools are realized. AR is ultimately the addition of computer-generated information related to the user's current perception of reality. The more information we have ab out our surroundings, the better equipped we are to function in that environment. This concept of information as a useful tool has been seen in all aspects of life. Equipped with a map and compass, someone can more easily navigate through an unfamiliar environment. The map informs the user of environmental information while the compass provides a sense of direction relative to that environment. These tools are useful aids, but they still leave room for human expertise for their effective use. Imagine the same user equipped with a wearable computer continuously providing directional information to keep this user on course. This technology could guide a user with limited knowledge through completely foreign environments. AR has many known uses and will continue to advance the human toolset as its technology advances. The medical field has been significantly impacted by the introduction of AR. The ability of a surgeon to visualize the inside of a patient can greatly improve the precision of operation. Other fields have also been positively impacted. From the augmentation of live NFL broadcasts, where the "first down line" is added to the assisted maintenance of aircraft through heads-up information, AR is proven to be a useful and powerful tool in our society. These forms of human-computer interaction involve one-way communication. The computer system acquires knowledge pertaining to the user, position and orientation for example and uses this knowledge to communicate to the user in context. The user's view of the environment is then augmented with pertinent information. It is understood that the power of AR would be taken a step further with the introduction of user interaction with the augmented

Figure 1. Milgram's reality-virtuality continuum