International Journal of Emerging Engineering Research and Technology
Volume 3, Issue 1, January 2015, PP 105-108
ISSN 2349-4395 (Print) & ISSN 2349-4409 (Online)

Augmented Reality Using Hand Gestures

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Abstract: *A human-computer interaction interface (HCI) based on Hand gesture recognition. It is a challenging problem in its general form. We consider a set of manual commands and a reasonably structured environment, and develop a simple, yet effective, procedure for gesture recognition. Our approach contains steps for segmenting the hand region, locating the fingers, and finally classifying the gesture. The algorithm is invariant to translation, rotation, and scale of the hand. We demonstrate the effectiveness of the technique on real imagery.*

However, technology is progressing. In particular, Augmented Reality (AR), an emerging Human-Computer Interaction technology, which aims to mix or overlap computer generated 2D or 3D virtual objects and other feedback with real world scenes, shows great potential for enhancing e-commerce systems. Unlike VR, which replaces the physical world, AR enhances physical reality by integrating virtual objects into the physical world. The virtual object becomes, in a sense, an equal part of the natural environment. This chapter presents a new type of e-commerce system, AR e-commerce, which visually brings virtual products into real physical environments for user interaction. The new approach gives customers a chance to "try" a product at home or in another use environment. The chapter presents development of a prototype AR e-commerce system and a user study of the developed prototype. Experiment results and data both validate the new Human-Computer Interaction .AR e-commerce system and provide suggestions for improvement. Overall results of the study show that the AR ecommerce system can help customers make better purchasing decisions.

1. INTRODUCTION

Although prior studies show that VR can enhance e-commerce, by providing more product information through enhanced human-computer interaction, current VR methods for ecommerce still only provide scaled virtual product models displayed on traditional computer screens. New, more advanced, methods are needed to provide consumers with more realistic product models, with respect to size, customer experience, and user interaction. AR is a technology which can mix or overlap computer-generated virtual objects with real world scenes or objects. Unlike VR, which experientially replaces the physical world, AR enhances physical reality by integrating virtual objects into a physical scene. Generated virtual objects become, in a sense, an equal part of the natural environment. In recent years, much research has focused on developing AR applications, which could be generally classified into two types, based upon the different devices used: optical see through AR and video see-through AR. Optical see though AR uses a semi-transparent screen onto which computer generated objects can be projected; users, can simultaneously view the computer generated images and see through the screen to view the natural background environment and, thus, see an integrated AR scene. Video see-through AR uses cameras to capture the live scene as a video stream. For each viewed image frame, a captured video image frame is processed and computer generated virtual objects are added. One advantage of video see-through AR is that the mixed scene can then be displayed on different devices. With video see-through AR, markers and computer vision methods are often used for tracking. Between the two prominent AR methods, video-based AR has attracted the most attention from researchers.

Although AR methods and applications have progressed significantly over recent years, there has been little research conducted related to using AR to enhance e-commerce.

In this study, a new AR e-commerce system was developed using, video see-through AR technology, since the devices needed for this type of AR system is more available to online consumers. Video see-through AR technology is also more flexible because the mixed AR scene can be displayed on different devices, rather than with a special optical see-through device only. The system integrates a full-sized virtual product model into an online shopper's physical environment and provides the

customer methods for "realistically" interacting with the virtual product. With this system, online shoppers can directly and freely interact with the product model in their environment and in a more nature way.

For example, they can physically move around in their environment to see how the product fits in their space from different viewpoints, and they can also move markers around in their environment to move the virtual products to different locations in their environment.

2. APPLICATIONS OF AUGMENTED REALITY

AR represents the cutting edge of modern society's social-technological development. AR applications are being created by independent groups and organizations all over the world for use within many disparate fields. With this being the case, despite the definitions mentioned earlier in this paper, there remains no consensus as to what constitutes true AR applications and technologies, or how the possible applications of AR should be conceptually organized. According to Azuma et al. (2001), the goal of AR is to use 3D virtual objects as tools to enhance users' perception of, and interaction with, the real world, by causing 3D virtual objects to appear seamlessly within the 3D environment of the real world. However, AR technologies can be designed to interact through many sensory channels (e.g. auditory, visual, olfactory, and haptic) which renders definitions focused only on visual data insufficient to deal with future developments in AR (Hughes, Stapleton, Hughes, & Smith, 2005). Ludwig and Riemann (2005) offer an organizational scheme which argues that potential AR applications fall into three main categories: - (a) Presentation and visualization, (b) industry, and (c) edutainment. Additionally, Hamilton (2011) offers an extensive breakdown and analysis of AR applications within education, as well as within the media and entertainment industry, the gaming industry, the travel and tourism industry, the field of marketing, the expanding field of online social networks, and in everyday life.

While Hamilton (2011) and others point out that many cur-rent AR applications may seem gimmicky and transient, the fact remains that many of the AR applications discussed by Azuma (1997) have been refined and continue to play important parts in our modern world. It cannot be denied that AR applications have tremendous potential for all fields where rapid information transfer is critical. This is especially true for education. However, around the world, the cutting edge of AR research and development is being driven more by business related interests than by groups focused on augmenting education. A majority of AR technologies are being developed with no actual educational agenda. However, teachers, as always will be able to examine what is available and put it to use effectively.

3. GESTURE RECOGNITION

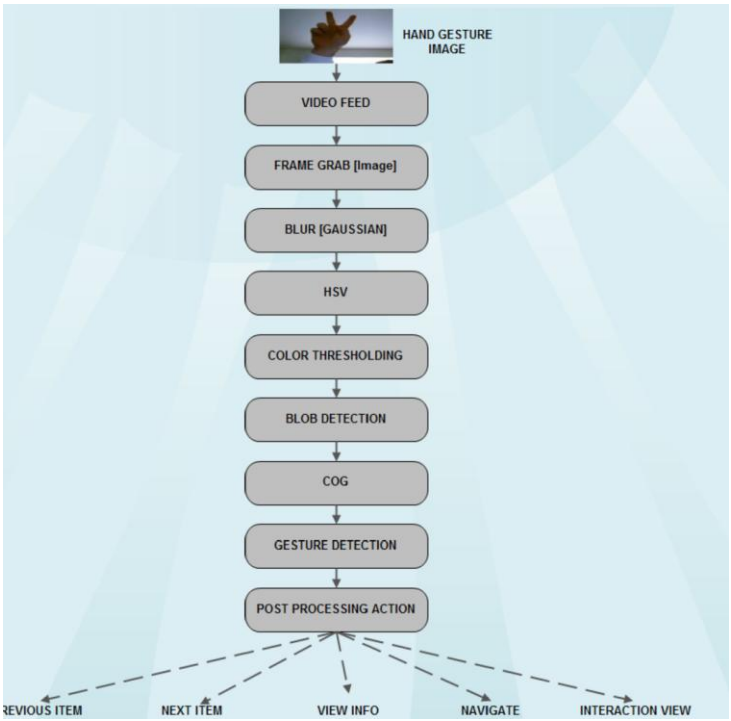

Fig1.*Work Flow*

Nowadays, gestures still are naturally used by many people and especially are the most major and nature interaction way for deaf people. In recent years, the gesture control technique has become a new developmental trend for many human-based electronics products, such as computers, televisions, and games. This technique let people can control these products more naturally, intuitively and conveniently. This technique also can be a well substitutive human machine interaction way for some special people, such as deaf, dumb or physically disabled people, drivers, workers, even game players.

Many researches indicate that the gesture control will become the new trend of HMI. Human entered innovation and design are the major consideration for design intelligent life space and are also the core concept of many technical researches and developments. In daily life, besides home life and work environment, vehicle driving is a common activity for a lot of people every day.

How to improve driving safety and to fully enjoy the advanced vehicle electronic products play the important role for providing human-centered user interfaces. Most vehicles have been equipped some multimedia player devices, such as radio, CD and DVD players and other devices. Besides, more and more additional information systems are installed in vehicles, such as satellite navigation, electronic maps, and mobile communications systems.

Hence, more and more devices and systems are control by drivers even during the driving time. However, drivers needed to keep their mind on driving, especially when the speed of vehicles are faster.

4. ADVANTAGES

- Real time customization of accessories such as clothes, furniture, etc.
- Empowerment of customer with additional facility.
- More user interaction due to inbuilt gesture recognition.

5. FUTURE SCOPE

As future work, increasing the hand gesture recognition accuracy rate and improves the total speed of process is primary target, so that we can have less process time and do other algorithm calculation. We will add more hand gestures or add mechanism of operation by two hands. It will make control diversity. We will add user define hand gesture by himself that can set user's intuition hand gesture. We will add more service of information retrieval and it makes more choose and let users feel convenient. In malls, colleges, hospital to get a better idea of those places by taking a view of them without going inside those places.

6. CONCLUSION

In recent years, the gesture control technique has become a new developmental trend for many human-based electronics products. This technique let people can control these products more naturally, intuitively and conveniently. This project proposes a gesture recognition scheme with well accuracy and efficiency. This scheme can be applied to be the human-machine interface for users to control some service system just by their hands. We can easily navigate a 3D model with hand gestures by providing different symbols of navigations on screen. User has to take their hand in front of the symbol. Our hand gesture recognition can integrate with other application such as interactive game, smart home, auxiliary equipment and industrial control.

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