

Augmented Reality 6th Sense

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ABSTRACT

Augmented Reality is considered an extension of Virtual Reality. Augmented reality is a technology in which we combine the real world entities with virtually created objects. Augmented reality is huge technique and we are adopting a part of this technique. In our paper, we are controlling the windows media player using augmented reality. Here, we are going to perform the operations of windows media player (viz pause/play, forward and backward) using a virtual touch surface which will be monitored using a web camera. The paper suggests two stages: Integration of digital and real world in which we create a virtual touch surface and Integration of touch surface with application like Windows Media Player.

General Terms

Augmented Reality, Web Camera, Windows Media Player.

Keywords

Augmented Reality, Windows Media Player, Web Camera, Virtual Keys, Global Positioning System.

1. INTRODUCTION

Augmented Reality (AR) is a live, direct or indirect, view of a physical; real-world environment whose elements are augmented by computer generated sensory input such as sound, video, graphics or the latest Global Positioning System (GPS) data. As a result, the technology functions by enhancing one's current perception of reality. It is a variation of virtual environments. Ideally, it would appear to the user that the virtual and real objects coexisted in the same space. Here we're extending the reality by combining it with a virtual world.

In day-to-day application, we control the windows media player with the help of two input devices viz mouse or key board. We intend to run the windows media player in an innovative way. We use the technology of augmented reality for this purpose. The aim is to minimize the number of input devices for windows media player to one. The input device that we are going to use is a "webcam". The specific research goals of this dissertation are as follows:

- Hand free operation of the WMP
- Easy setup
- Working of the application should be independent of the resolution of the Webcam

The main purpose to develop this application is "user friendliness" (by saying user friendly we mean low cost, less time for set up, easy installation of the developed application).



REALITY AUGMENTED REALITY VIRTUALITY

Fig 1: Reality-Virtuality Continuum

2. LITERATURE SURVEY

In 1998, Bruce Thomas et al. present "Map-in-the-hat", a backpack-based wearable computer that includes GPS, electronic compass and a head-mounted display. At this stage the system was utilized for navigation guidance, but it later evolved into Tinmith, an AR platform used for several other AR projects.[1]

In 2000, Bruce Thomas et al. present AR-Quake, an extension to the popular desktop game Quake. ARQuake is a first-person perspective application which is based on Six degrees of freedom [6DOF] tracking system using GPS, a digital compass and vision-based tracking of fiducial markers. Users are equipped with a wearable computer system in a backpack, an HMD and a simple two-button input device. The game can be played indoor or outdoors where the usual keyboard and mouse commands for movement and actions are performed by movements of the user in the real environment and using the simple input interface. Simon Julier et al. present BARS, the Battlefield Augmented Reality System. The system consists of a wearable computer, a wireless network system and a see-through HMD. [1]

In 2002, Michael Kalkusch et al. present a mobile augmented reality system to guide a user through an unfamiliar building to a destination room. The system presents a world-registered wire frame model of the building labeled with directional information in a see-through heads-up display, and a three-dimensional world-in-miniature (WIM) map on a wrist-worn pad that also acts as an input device. Tracking is done using a combination of wall-mounted ARToolkit markers observed by a head-mounted camera, and an inertial tracker. [1]

In 2003, GeoVector along with partners Vodafone, HP, Microsoft, Virtual Spectator and Animation Research Ltd showcase Spectator Augmented at America's Cup Sailing Races in Auckland, New Zealand. Dan Cutting et al. present, AR phone: Accessible Augmented Reality in the Intelligent Environment at OzCHI 2003. [1]

In 2004, Mathias Möhring et al. present a system for tracking 3D markers on a mobile phone. This work showed a first video see-through augmented reality system on a consumer cell-phone. It supports the detection and differentiation of

different 3D markers, and correct integration of rendered 3D graphics into the live video stream. [1]

Michael Rohs and Beat Gfeller present Visual Codes, a 2D marker system for mobile phones. These codes can be attached to physical objects in order to retrieve object-related information and functionality. They are also suitable for display on electronic screens. [1]

In 2005, Anders Henrysson ports ARToolKit to Symbian. Based on this technology he presents the famous AR-Tennis game, the first collaborative AR application running on a mobile phone. ARTennis was awarded the Independent Mobile Gaming best game award for 2005, and the technical achievement award. [1]

Furthermore an authoring environment is developed to create the AR scenes for the maintenance tasks.

In 2007, HIT Lab NZ and Saatchi and Saatchi deliver the world's first mobile phone based AR advertising application for the Wellington Zoo. [1]

Further augmented reality developed many applications.

3. PROPOSED SYSTEM

Augmented reality involves two aspects: Interaction with the computer device and Control of either a software device or a hardware device.

In this case, we will be interacting with the computer device using imagery and controlling the software i.e. Windows Media Player[WMP]. In our System a webcam will be connected to the computer device. It would be then monitored on a plane surface(the plane surface can either be a glass plate or a wooden sheet) .Regions involving the main function of controlling the Windows Media Player called the hotspots are marked on the webcam window using C sharp programming language. There will be 3 hotspots, they are Play/Pause, Next and Previous. Any motion within the region of the hotspots on the plane will trigger their respective program which we are coded using c# programming language. We thus create a virtual keys, where a plane glass will be used as a keyboard. As the regions are difficult to point out on the given real world field, we mark the regions on the plane glass with marker. A technique called video overlay is used to ensure faster capture and display of the video.

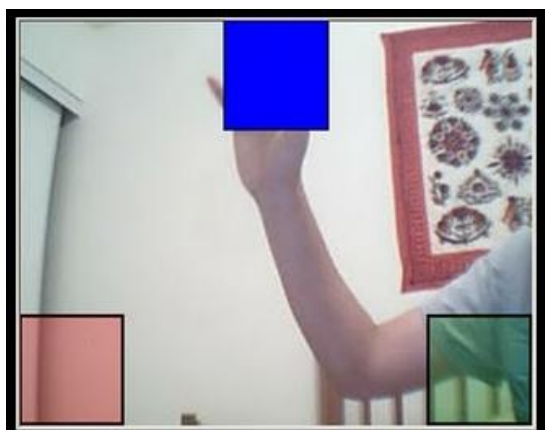


Fig 2: Three hotspots marked as Buttons

3.1 We Intend To Achieve Following:

3.1.1 Integration Of Digital And Real World; Creation Of Virtual Touch Surface

This involves scanning of real world objects like a plane surface using web-camera and superimposition of virtual touch keys. This will be attempted using C#. Basically few rectangular areas will be scanned for any change in pixel values.

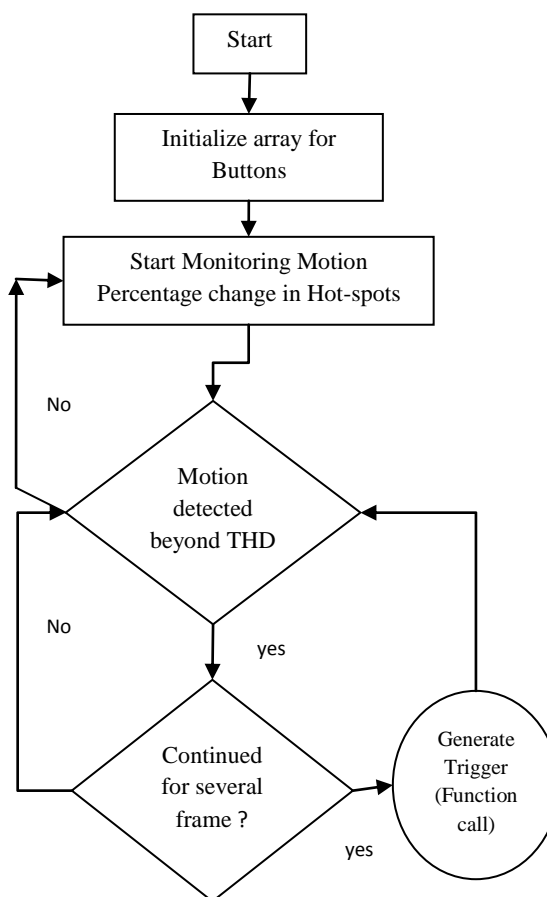


Fig 3: Flowchart for creation of virtual touch surface

3.1.2 Integration Of Touch Surface With Application Like Windows Media Player

Second phase involves integration of Windows Media Player into the newly created virtual touch surface. Windows Messaging Interface and Core API call handlers will be used to accomplish this. Windows Messaging Interface allows data transmission between two applications; API services are used to interface with OS Core and Kernel for controlling audio services.

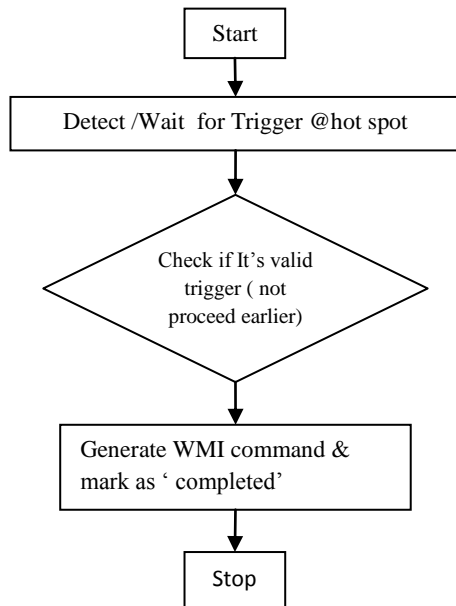


Fig 4: Flowchart for creation of integration of touch surface with WMP

3.2 Algorithm Used:

3.2.1 Algorithm For Windows Media Player[WMP]

- 1) Define all the directives
- 2) Create a class to control window media player
- 3) Invoke a beep to generate a trigger.
- 4) Activate application windows.
- 5) Verify if WMP is a running process.
- 6) Generate code for WMP commands to control applications like play, pause, next song, previous song etc.

3.2.2 Algorithm For Camera

- 1) Define all directives.
- 2) Define areas for 3 hot spots.
- 3) Assign 3 different colors for 3 hotspots.
- 4) Add motion event to each hot spot.
- 5) Start the camera.
- 6) Repaint the hotspot whenever the motion is detected.
- 7) Stop the camera.

3.2.3 Algorithm For Motion Detection

- 1) Declare 1st motion data=false
- 2) Declare on_motion_event which triggers the program(play/pause frwdbackwd) to run
- 3) Set threshold for rate of change of frame =5
- 4) Check if rate of change of frame has normalized beforetriggerring the event
- 5) Set reference bit map data to null initially
- 6) Set threshold sensity for change in value of each pixel to 10
- 7) If motion is detected for the 1st time then set it as reference bit map data and assign new frame reading to current data.
- 8) Calculate total pixels of the box(height *width)
- 9) For each pixel //function for motion event
if(current data-refrence data>each pixel threshold)
Then increment pixel_motion

- 10) Calculate percentage motion from pixel motion and total pixel
- 11) Call motion event
 - (11.1) set loop=0,
 - (11.2) max bound=15 //this is for the number of frames the pixels will be monitored.
 - (11.3) Calculate total(motion_percentage) for about 15 frames(max bound)
 - (11.3.1)increment loop
 - (11.4)When loop>15(max bound) then calculate average_motion percentage from total(percentage motion) and max bound.
 - (11.5) if rate of change of frames not normalized then
 - (11.5.1) then check if average percentage motion > threshold
 - (11.5.2) Call motion event function
- 12) if motion percentage<9
 - (12.1) Set normalized to false
 - (12.2) return value of motion percentage

4. ADVANTAGES

- Hand free operation of the Windows Media Player: We control the windows media player with the help of 2 input devices viz mouse or key board. The aim is to minimize the number of input devices for windows media player to1. The input device that we are going to use is a “webcam”
- Our application will be easy to setup.
- Working of the application will be independent of the resolution of the Web cam.
- Application will be User friendly i.e. low cost, less time for set up, easy installation of the developed .

5. CONCLUSION

- Our application is an practical implementation of AR concept . In day to day life we control the windows media player with the help of 2 input devices viz mouse or key board. In our project, we intend to run the windows media player in an innovative way.
- The aim is to minimize the number of input devices for windows media player to one. The input device that we are going to use is a “webcam”
- The ultimate goal will be to generate virtual objects that are so realistic that they are virtually indistinguishable from the real environment.

6. FUTURE SCOPE

Our ultimate goal is to minimize the input devices, required to control the Windows Media Player using augmented reality [AR]. Using this concept, we can implement virtual electric switches for industries to prevent the short circuit accidents.

The availability of laboratory, equipped with augmented reality is necessary for working of this software. The web camera must sense the area properly for working of this software. for example, Imagine that a group of designers are working on the model of a complex device for their clients. The designers and clients want to do a joint design review even though they are physically separated. If each of them had a conference room that was equipped with an augmented reality display then this could be accomplished. The physical prototype that the designers have mocked up is imaged and displayed in the client's conference room in 3D. The clients can walk around the display looking at different aspects.

Only recently have the capabilities of real-time video image processing, computer graphic systems and new display technologies converged to make possible the display of a virtual graphical image correctly registered with registered with a view of the 3D environment surrounding the user. Researchers working with augmented reality systems have proposed them as solutions in many domains. Many of the domains, such as medical are also proposed for augmented reality systems.

7. REFERENCES

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