

# Virtual Reality Implementation in Real XD Based Environment

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**Abstract-** It is a virtual reality based concept. It is used in a virtual reality environment for virtual tours which has been increasingly recognized as an alternative to traditional real life tours for various campuses. The proposed concept holds three steps of processes. The photographic images will be created using image acquisition followed by area selection which can be operated using Bluetooth with joystick and then quality of virtual reality will be analyzed using fuzzy logic. The outcome of virtual reality can be recognized with the field experiments. The field experiments used here were fan and odour equipment. According to the sensor value recognized, the respective field experiment gets ON. The respective sensor values can be changed frequently according to our wish. The virtual reality of a campus can be viewed by the user with the help of a VR headset and smartphone. This virtual reality for campuses can be used for both indoor and outdoor navigation.

**Index Terms-** VR head phone, fuzzy logic.

## 1. VIRTUAL REALITY

Virtual reality (VR) is a computer interface that maximizes our natural perception abilities. Static two-dimensional images are often deceiving; it may be hard to reconstruct scales and distances between objects. Thus, it is important to implement the third dimension and to bring depth to objects.

There are two major components of three-dimensional virtual reality: movement and stereoscopy. Our eye can easily reconstruct the third dimension if the object moves (movement). VR use separate images for the right and left eyes. Pre-determined movement is implemented using a movie or animated image. Arbitrary user-defined movement is implemented using the Virtual Reality Modelling Language (VRML) which is a standard language for

describing interactive 3-D objects and worlds delivered across the Internet. VRML-images can be rotated and magnified interactively.

Best virtual reality implements both movement and stereoscopy. However, at this point you can view it only using special graphical computers (SGI).

## II. TYPES OF VIRTUAL REALITY

There will remain a number of different types of Virtual Reality systems. One way to distinguish one from another will be the mode with which it interfaces with its users. The following are just some of those modes.

### a. Window on World

This particular Virtual Reality system is perfect for the field of medicine. Typically using a desktop monitor rather than an HMD, it allows its user to visualize complex medical procedures such as surgeries or colonoscopies.

### b. Immersive System

The next step beyond the Window on World view is the immersion using a virtual headset. By removing its users from the physical world, and placing them in a virtual world, the sharp visuals and crisp audio delivered via the HMD can help them escape everyday life and explore a far-off land.

### c. Telepresence

Telepresence is exactly what it sounds like: tele, —at a distance!, and presence, —being present!. The sensors are therefore controlled and operated remotely by the user. Consider bomb disposal robots,

undersea exploration, and drones as being operated via telepresence VR.

d. Mixed Reality

The final kind of Virtual Reality that we will be looking at is Mixed Reality. This is where computer generated inputs are brought together with the previously mentioned telepresence inputs or the user's view of the real world to create a valuable output. This could be a fighter pilot's view of maps or key data points displayed inside his helmet, or a surgeon being able to view real-time patient information during a complex surgery while wearing an HMD.

III. SYSTEM DESCRIPTION

It is a virtual reality based concept. It is used in a virtual reality environment for virtual tours which has been increasingly recognized as an alternative to traditional real life tours for various campuses. The proposed concept hold three steps of processes and they are, i) Image Acquisition, ii) Area Selection, iii) Quality of Virtual Reality.

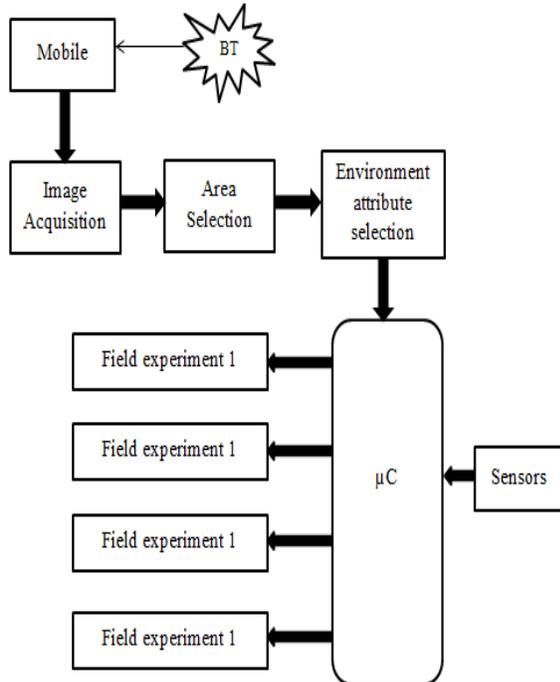


Figure 1.1 Block of the proposed system

The photographic images will be created using image acquisition followed by area selection which can be operated using blue tooth with joystick and then quality of virtual reality will be analyzed using fuzzy logic.

According to the sensor value recognized, the respective field experiment gets ON. The field experiments used here were fan and odour equipment. The respective sensor values can be changed frequently according to our wish. The virtual reality of a campus can be viewed by the user with the help of a VR Headset and smartphone.

The system is represented by three major blocks (i.e. Image Acquisition, Area Selection and Environment Attribute Selection) and carried by verification of XD based environment, if it is matched the field experiment gets ON otherwise it will be in OFF condition.

a. Image Acquisition

Digital imaging or digital image acquisition is the creation of photographic images, such as of a physical scene or of the interior structure of an object. The term is often assumed to imply or include the processing, compression, storage, printing, and display of such images.

The first stage of any vision system is the image acquisition stage. After the image has been obtained, various methods of processing can be applied to the image to perform the many different vision tasks required today.

An improved panoramic image based virtual reality/telepresence audio-visual system and method includes panoramic three-dimensional input devices, a computer processor, and a panoramic audio-visual output device. In one embodiment of the system the input devices comprise a sensor assembly including a plurality of positional radar, camera, and acoustical sensors for recording signatures of all sides of three-dimensional subjects simultaneously.

The computer processor integrates the sensor signals, processes signals as a virtual model, updates the model based on participant interaction, and selects and distributes portions of the processed virtual model for presentation on display units and audio speakers. The panoramic audio-visual output device includes a head-mounted display or a closed structure having contiguous individual display units mounted in all viewable directions surrounding the participant. Conventional, stereoscopic, auto stereoscopic, and holographic display systems are provided to view the panoramic three-dimensional image based model.

Computer graphics, artificial intelligence, telecommunications, and vehicle control embodiments of the system are provided.

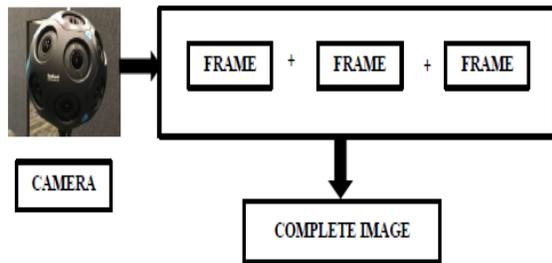


Figure 1.2 Process of image acquisition

b. Area Selection

A Bluetooth stick is a pointing device used mainly but not exclusively for computer games. A Bluetooth stick has a base, on which control buttons can be mounted, and a vertical stem, which the user can move in any direction to control the movement of an object on the screen; the stem may also have control buttons. The buttons activate various software features, generally producing on-screen events. A Bluetooth stick is usually used as a relative pointing device, moving an object on the screen when the stem is moved and stopping the movement when the stem is released.

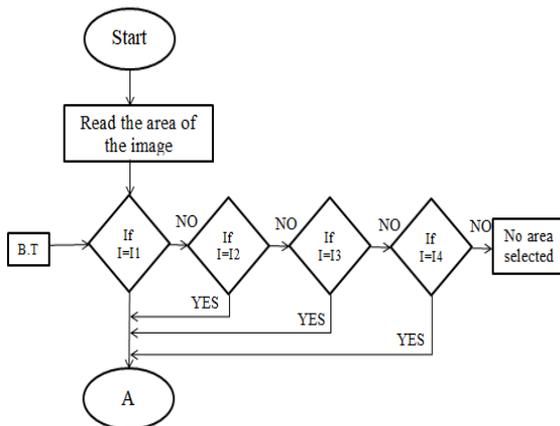


Figure 1.3 Flow diagram of area selection

c. Environment Attribute Selection

The image for a particular position will have particular sensor values. If the sensor values of image matches with the sensor values of microcontroller the field experiment gets ON else it will be in OFF condition. The sensor values will be stored in the EEPROM. The EEPROM stands for Electrically

Erasable Programmable Read Only Memory. In an EEPROM the data can be written with the help of electrically programming the chip. EEPROM memory is widely used in microcontroller systems where some particular data need to be retained each time the system is turned on and to save particular data before the system is powered off.

The EEPROM memory chips can be interfaced in a microcontroller chip usually with the help of serial communication protocols. In case of small applications where only a few bytes needs to be stored the extra EEPROM chips are not preferred since it add extra complexity in the hardware, coding and increase the cost of the system. Hence most of the microcontrollers are provided with small sized built-in EEPROM chip which can be used to store data in small applications.

The Arduino board has an AVR microcontroller in it which also has a built-in EEPROM memory. The memory size varies with the Arduino boards and the microcontroller used in them. A microcontroller might need to store its data like sensor value, or a particular count or image data for a long period of time uses the EEPROM memory. The EEPROM memory is also used to save the data before the systemswitches itself off so that the same data can be retained next time when the system is turned on. This particular project demonstrates how to save the last read value from a sensor into the built-in EEPROM of Arduino before it is powered off, so that the next time it is powered on the same data can be read. The environment attribute selection is established with the help of Fuzzy Logic.

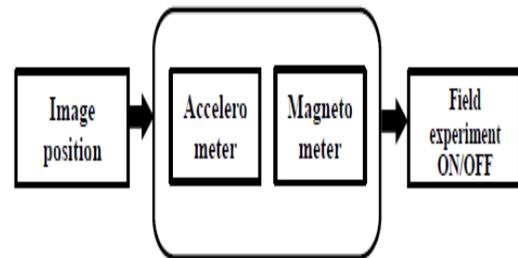


Figure 1.4 Quality of virtual reality

IV. HARDWARE DESCRIPTION

PIC MICROCONTROLLER

PIC is a family of Harvard architecture microcontrollers made by Microchip Technology, derived from the PIC1650 originally developed by

General Instrument's Microelectronics Division. The name PIC initially referred to "Peripheral Interface Controller".

#### HIGH PERFORMANCE RISC CPU

- Only 35-75 single-word instructions to learn
- All single-cycle instructions except for program branches, which are two-cycle
- Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle
- Up to 8K x 14 words of Flash Program Memory, Up to 368 x 8 bytes of Data Memory (RAM),
- Up to 256 x 8 bytes of EEPROM Data Memory Pin out compatible to other 28-pin or 40/44-pin PIC16CXXX and PIC16FXXX microcontrollers

#### MEMORY ORGANIZATION

There are three memory blocks in each of the PIC16F87XA devices. The program memory and data memory have separate buses so that concurrent access can occur and is detailed in this section. The EEPROM data memory block is detailed in —Data EEPROM and Flash Program Memory. Additional information on device memory may be found in the PIC microcontroller Mid-Range MCU Family Reference Manual (DS33023).

#### DATA EEPROM AND FLASH PROGRAM MEMORY

The data EEPROM and Flash program memory is readable and writable during normal operation (over the full VDD range). This memory is not directly mapped in the register file space. Instead, it is indirectly addressed through the Special Function Registers. There are six SFRs used to read and write this memory:

- EECON1
- EECON2
- EEDATA
- EEDATH
- EEADR
- EEADRH

#### ACCELEROMETER SENSOR

Accelerometer sensor can measure static (earth gravity) or dynamic acceleration in all three axis.

Application of the sensor is in various fields and many applications can be developed using this sensor. Accelerometer sensor measures level of acceleration where it is mounted this enable us to measure acceleration/deceleration of object like car or robot, or tilt of a platform with respected to earth axis, or vibration produced by machines.

#### HEAD MOUNTED DISPLAY

The head-mounted display (HMD) was the first device providing its wearer with an immersive experience. Evans and Sutherland demonstrated a head-mounted stereo display already in 1965. It took more than 20 years before VPL Research introduced a commercially available HMD, the famous "Eye Phone" system (1989).



Figure 1.5 Head Mounted Display

#### V. RESULTS AND DISCUSSION

In this project, we evaluate the virtual reality in a prototype model.

The mobile will be inserted in the VR headset. First, the required image will be selected and then the area gets selected. These steps can be performed with the help of Bluetooth. If pictures particular area's sensor value matched with the microcontroller's programmed sensor values it will ON the particular field experiment else it will be in OFF condition. It can be experienced with the help of hardware setup.

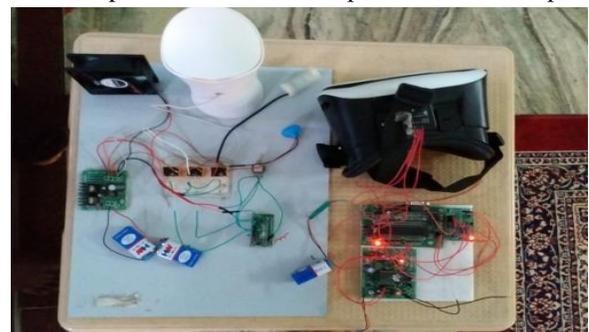


Figure 1.6 Setting sensor value in first position.

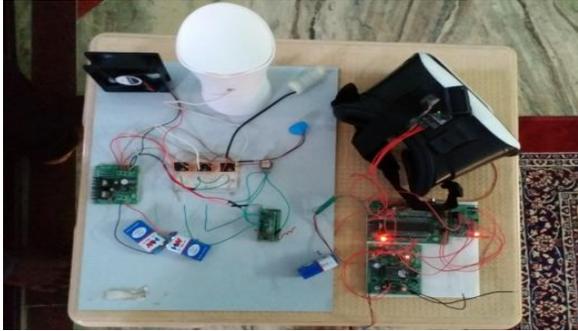


Figure 1.7 Setting sensor value in second position.

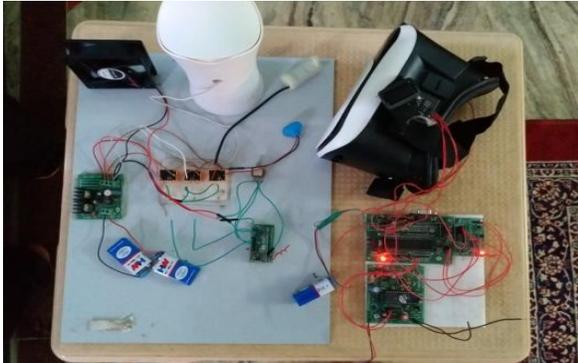


Figure 1.8 Setting sensor value in third position.



Figure 1.9 Output of particular position.

## VI. CONCLUSION AND FUTURE WORK

### A.CONCLUSION

The above implementation was an effort to understand how an environment can be viewed in Virtual Reality.

As the concept holds three steps of processes, the photographic images has been created using image acquisition followed by area selection which can be operated using Bluetooth with joystick and then quality of virtual reality has been analyzed using fuzzy logic. According to the sensor value recognized, the respective field experiment gets ON. The respective field experiments were fan and odour equipment. The respective sensor values can be

changed frequently according to our wish. The virtual reality has been experienced by the user with the help of a VR Headset and smartphone.

The expected outcome was the prototype model of virtual reality.

### B.FUTURE WORK

There is a scope of further improvement to execute virtual reality in various applications in regular basis and to use a point locator as area selector instead of Bluetooth.

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