VIRTUAL REALITY BASED INDUSTRIAL AUTOMATION

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ABSTRACT: A computer can generate a virtual reality, which brings an immersive environment that can be interacted with. This paper introduces virtual reality based industrial- automation for interactive interface where there is a n number of input. It is to reduce the implementation cost. The proposed solution where based on the accessibility features which is already in use by another platform. Home appliances can be controlled by switch, but we are using virtual reality to control the home appliances. Virtual Reality module is one which can be used to give the input and can be used as a switch. It requires ZigBee transmitter to control the device. It helps the people with disabilities to use the features more effectively. This technology can have an impact on visually impaired people.

*Index Terms–Virtual Reality, PIC Microcontroller, ZigBee.*

I. INTRODUCTION

The foundation device is subjected to control the industrial automation. Even though usage of device in home is increasing day by day, the power consumption increases tremendously. The introducing new devices to the market virtual reality plays an important role. Virtual Reality is user friendly and can be used by everyone. Virtual Reality (VR) is an environment focused on visual immersive experiences. It refers to the use of interactive simulation to provide users with opportunities to engage in environments that may appear and feel like real-world objects and events and that may provide the user with a subjective feeling of presence. Virtual Reality module consist of convex lens and OHP sheet which is used to project the input. The camera captures the input and send to the receiver module through ZigBee transmitter where the corresponding device can be on or off. Output can be displayed in LCD which corresponds to device. We include a PIC microcontroller which can be used as a brain of our project. We connect PIC microcontroller with LCD where the output can be displayed. We can also control the device by using automated touch panel. The final output will be a virtual reality module where any device can be connected to it. In case of any abnormal activities of device we can controlled it by using hardware touch panel. Merely it is not restricted to limited range we can increase the range by using ZigBee repeaters and ZigBee antenna. We can control the device using virtual reality.

II. EXISTING SYSTEM

In this modern era, there is a huge increase in population. So, there is enormous amount of electronic device. Invention of electronic items is rapidly increasing and they have been constantly used by everyone. For connecting electronic device, we are using switch. Instead of switch we can use many techniques to control the device. We can control the device by using remote technique and by using sensors. This system is to control the devices using mobile phone that it is nothing but capacitive touch. By using capacitive touch, we can control the device. There are two modules present in this they are transmitter module and receiver module. They can be used to control the device. The touch used here is very costly and simple. They have been using simplest method. There are only few devices can be controlled and cannot be much efficient.

In this existing system, they are using capacitive which is costlier and cannot be used everywhere. The system uses very simpler components. Camera is not used in this method, but we are using camera in the proposed method to capture the input. This system has many disadvantages. To overcome this, we are introducing wall into a virtual touch to control the device in proposed method.
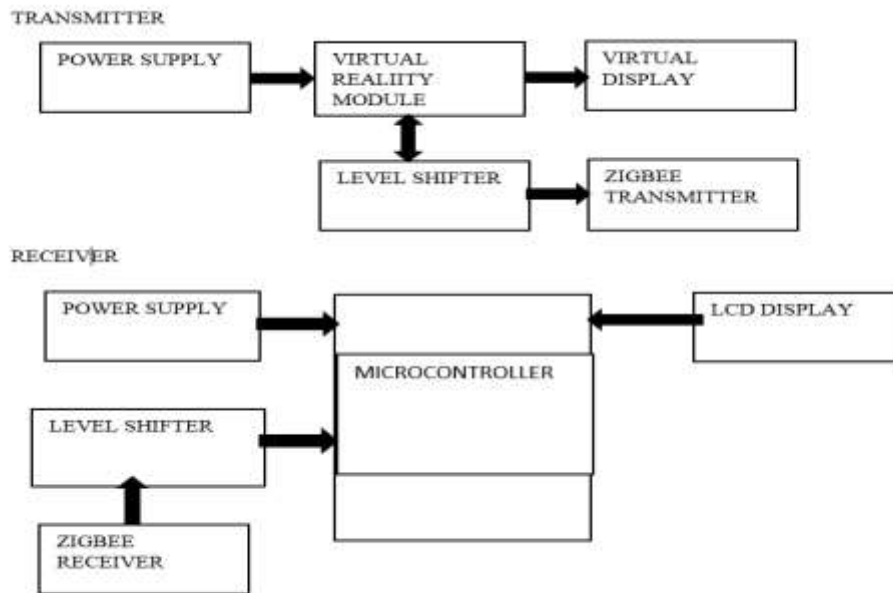
III. PROPOSED SYSTEM

The system can be used in both home and industrial purposes. In our system, we can control the device using virtual reality. We have a prepared a wall touch instead of capacitive touch. Capacitive touch is very high cost. But in our project, we are turning the whole wall into touch so it can be cost effective and, we are adding automated touch which is used to control the device manually. We are using the camera which is used to captures the input and can be send to receiver module and where the corresponding devices can be ON/OFF. There will be a two module one is a transmitter module and a receiver module. We can control the device using virtual reality module. Transmitter module is to transmit the data and receiver module is to receive the data. This system can be used to do

Transmitter Module

In transmitter side virtual reality sensing system, virtual touch screen, camera, monitor, CPU, wireless transmitter. ZigBee transmitter used in transmitter side. When we project our input on the wall it shows the image like switch, when we touch the switches we can control the devices through the wall as an input it transmit the data through the ZigBee. When we touch the input from the wall the camera captures that touching finger skin and it works. This operation shows on the monitor and computer decodes the image touched by the user and it detects by a camera of the virtual sensing system. Finally, data were send to the wireless transmitter block. There are three channels in transmitter block.
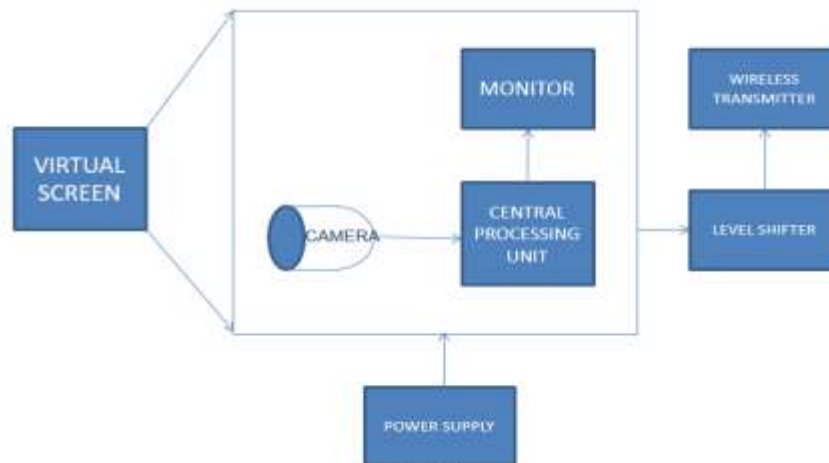
Receiver Module

In receiver side pic micro controller, LCD, Power supply, Relay and any three types of device can be used. Each channel consists of two characters one for input and another one for output. For channel 1 A is input and B is output. For channel 2 C is input and D is output. For channel 3 E is input and F is output. Each device can be connected to one channel.
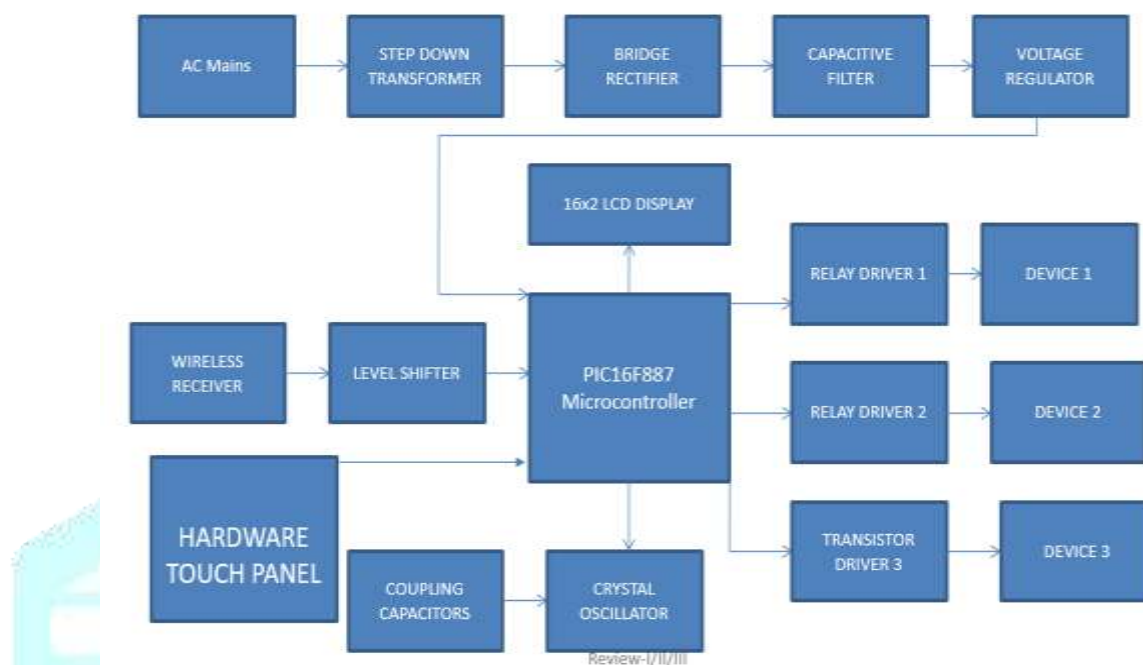
IV. HARDWARE

VIRTUAL SCREEN

Virtual screen is one of the screen where we can touch the input, it is nothing but wall that we are using in our project. Virtual screen is one of the technique that can be used for search purposes. Virtual screen is same as that of projector screen. In projector screen, we can see the image and videos, that can also have been seen in virtual screen. Light is one of the important factor for the virtual screen. Where there is a bright light we can see clear display of image, but when the light is dark we cannot see the clear display of the image. Virtual screen can project the input of the project.

VIRTUAL SENSING SYSTEM

It is one of the sensing system used in our project. The input that are given through virtual display unit in screen is captured by camera and by touching the wall it can virtually sense it. Virtually sensing means we are not touching the wall but when we place our hand near the wall it will sense it and sends the input. The virtual sensing system means it can sense the system virtually and it is also referred to as soft sensing.

VIRTUAL DISPLAY UNIT

Virtual display unit is one of the important part of our project. This module consists of OHP sheet, convex lens and camera. It is used to project the input. We are using three channels for three devices, so input for three devices can be projected in virtual screen. This module can relate to the system. By using the track-v software we can see the input in the system. The camera used in this module is to capture the input and the input that captured can be seen in the system. The camera used here is web camera. The camera is to capture the input. OHP sheet which is called projector sheet is used to project the input. OHP sheet is called Over Head Projector sheet. It is mainly used in schools for painting and for some other purpose. Convex lens is used in this module. Convex lens can be used along with the OHP sheet and it can be used to project the input.

Fig A

Wireless Transmitter

The transmitter which is used to transmit the data without the use of wire is called wireless transmitter. There is a data communication between wireless transmitter and receiver. Here we are using ZigBee transmitter for wireless communication. Data communication between two devices is possible when it can receive the data from that transmitter. In transmitter side, the image is transmitted to receiver inside by using ZigBee. The camera captures the input and sends the data to the system. Camera, monitor, central processing unit, power supply and level shifters are present in the transmitter side, each has its own configuration.

ZigBee

ZigBee transmitter of 100m is used in this project. It has an operating frequency range of 4GHz. ZigBee transmitter can transmit the data within the limited range but by using the mesh network we can increase the range of ZigBee. The mesh network is nothing but connecting more ZigBee transmitter and it can be used to transmit the data over high range. ZigBee repeaters is one which can also be used to increase the range. ZigBee repeaters is nothing but GSM technology GSM technology is widely used in mobile phone communication. ZigBee repeaters is used to communicate between longer distance. ZigBee antenna can also be used to increase the range. Max 232 level shifter can also be used along with zigbee transmitter.

Wireless Receiver

Wireless receiver is used to receive the data from transmitter. It also associated with max 232 level shifter. Transistor Transistor Logic of 12v is present in wireless receiver and it can be send to the PIC microcontroller. ZigBee receiver is the one which used to receive the data. ZigBee transmitter and receiver is a wireless network that can be used for remote control and sensors application. ZigBee technology is widely used and it can be used in agriculture, automation and industry. ZigBee technology is based on IEEE standard 802.15.4 which defines the physical and MAC layer.

LCD Display

The combination of both liquid and crystals is called liquid crystal display. LCD display is used to display the output. LCD display we are using is 16*2 LCD display. There are 16 pins in LCD and each pin has its own configuration. LCDs are light weight with only a few millimetre thickness. Basically, LCD does not generate light and so light is needed to read the display. Reading is possible in the dark only by using back lighting. A display size of layout as size can be changed which makes the LCDs better. LCDs have a wide operating temperature. LCDs can be used bin watches, calculator and measuring instrument. LCDs can also be used in telecommunication and entertainment electronics. LCDs can be replaced by cathode ray tube and can be used for display of text and graphics, and in small TV application. The port EN, D4, D5, D6, D7 of LCD can be connected to microcontroller in our project.

Fig B

PIC Microcontroller

PIC microcontroller is used as a brain of our project. It consists of 40 pins. PIC microcontroller 16F887 is used. The pin of microcontroller can be connected to LED and it can be connected to device. It is one of the latest product from microchip. IT is same as that of modern microcontroller. RISC architecture, operating frequency 0-20mhz are same features of the microcontroller.

The PIC microcontroller is programmed by embedded c language by using proteus software. The PIC microcontroller can transmit and receive the data in accordance with the clock pulse. Crystal oscillator and capacitive filter can be connected within the PIC microcontroller. Two capacitive of range 20pf to 40pf which is used to stabilize the clock signal. The circuit is designed with the help of proteus software.

A coupling capacitor is one which is internally connected to microcontroller. It is used to connect to two circuit, only the ac signal from the first circuit can pass through while other can be blocked. Crystal oscillator is one which can be used to oscillates the frequency. Crystal oscillator can be operated at 4mhz frequency.

Step Down Transformer

Step down transformer is one which is used to step down the voltage that is given either it can be a AC or DC supply. Microcontroller accepts only 5v DC supply. 12v DC supply is generated from power supply, but step-down transformer is used to step down 12v DC supply to 5V DC supply.

Bridge Rectifier

It is one of the circuit which is used to transfer DC to AC or AC to DC. PIC microcontroller accepts only AC supply and bridge rectifier can be used to convert DC to AC supply. Bridge rectifier can also relate to capacitive filter.

Voltage Regulator

Voltage regulator is to regulates the voltage and to give the correct voltage that the microcontroller can accept. It is used to remove the unwanted voltage and give the correct form of voltage.

Relay Driver

A relay is an electrically operated switch. A relay can relate to device 1 and device 2 in our project. It can also be connected with PIC microcontroller. A relay is an electrical switch that opens and closes under the control of another electrical circuit. It is one which can be used to give the correct ac supply to the device.

Fig C

Transistor Driver

Transistor driver is a circuit which is connected with both microcontroller and device 3. It can be used to give the correct form of AC supply to the devices.

V. SOFTWARE REQUIRMENT

Micro C

Micro C is a software that can be used to compile program for PIC. Micro C is a program compiler which is used to compile the program to microcontroller through the system. Microcontroller can accept only the machine level language. Microcontroller is a device which can be programmable. Embedded C program can be given to PIC microcontroller. Microcontroller can relate to system which can be used for program. It is also called programming burning tool. Embedded C program is one of the important features for microcontroller and if there is no program microcontroller will not be work.

ISIS-Proteus

Proteus is a windows tool for schematic capture, simulation and PCB designing. Proteus is a simulation tool which is used for simulation. Proteus is a tool which used to convert high level language into machine level language. Proteus is a tool for designing the components and the simulation can be given to it. The program which can be compiled in micro c can be copied in the proteus file menu through hex files. Proteus is a simulator and it can simulate any kind of components.
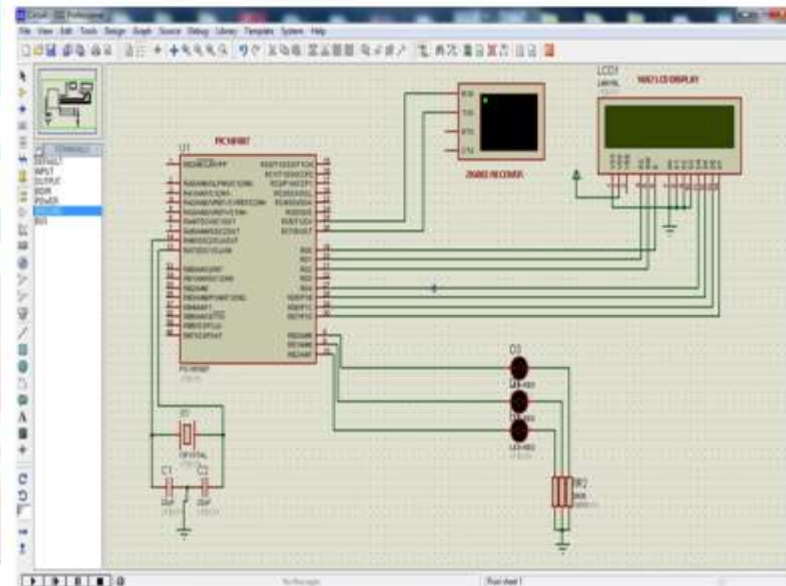

Fig D

Trackkv 12

Trackkv 12 is a software which is used to display the input, which is captured by the camera. It has four co-ordinates, one can be input side, other is faded image. Also, it can have X or Y corresponding value.
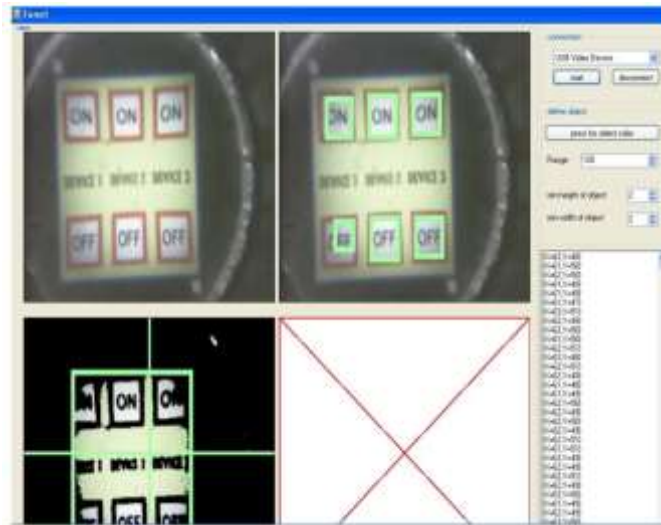
Output

Fig E

WHEN DEVICE 1 IS ON

Fig F

WHEN DEVICE 2 IS ON
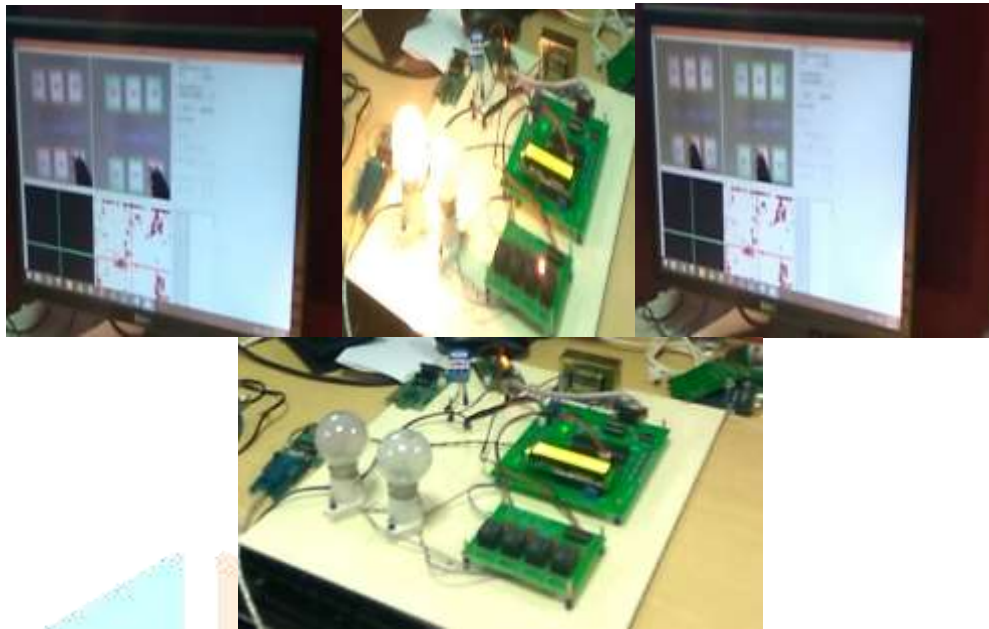

Fig G

WHEN DEVICE 1 AND 2 IS OFF

Fig H

VI. CONCLUSION

We have a developed a virtual reality module by which the devices can be controlled. Virtual reality module can project the input in virtual screen and the camera captures the input and the input can be transmitted to receiver side through ZigBee transmitter where decoding process take place and the corresponding device can be ON/OFF. Additionally, we can control the device also by using automated touch.

VII. FUTURE WORKS

The future works includes the controlling of robotics using the virtual reality and it can also be used to record the data. ZigBee repeaters can be used to increase the range of operating frequency. By implementing this project with the help of ZigBee antennas allows the longer range of communication. Virtual reality can also be used in retail shop and industry.

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