Design and Implementation of Robot employed with Sense Aware

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Abstract: - Presently everywhere in the world are exporting coal from coal mines. Working in such dangerous areas is harmful. In areas like forests or on mountains it is difficult to trace the location and temperature. This paper explains how to design and implement wireless robot which will enable us to control the robot with the help of internet and it will be able to detect the temperature, light, location, humidity, harmful gas in areas like coal mines, forests and hilly areas. It will help in rescue operation and user can access the video transmitted from the remote area such as sensitive area which are beyond our reach. The total system consists of mobile robot controlled using internet. It has a camera mounted on it and a sense aware is for detection of harmful gases such as marsh gas in coal mines.Senseaware is the device in which all the sensors are inbuilt in a single device. Thus, the user can access the robot with the help of internet and simultaneously can access the video transmission from the robot. The camera movement is controlled by using a webpage at the user interface providing the view of surroundings.

Keywords: - *APDS-9960 Gesture Sensor, IOT, Internet, Raspberry Pi, Robot and Sense Aware.*

I.   INTRODUCTION

The Robots are being used in variety of industrial applications for various activities like pick and place, painting and in hazardous places for material handling,etc.Robots are becoming more intelligent as technology advances in areas of cpu speed, sensors, memories etc. There are ever demanding applications in rescue. Internet robotics has captured the huge interest of many researchers worldwide. By using Internet of things i.e., machine to machine interconnection without involving human-human interconnection, the robots can be used in rescue operations.
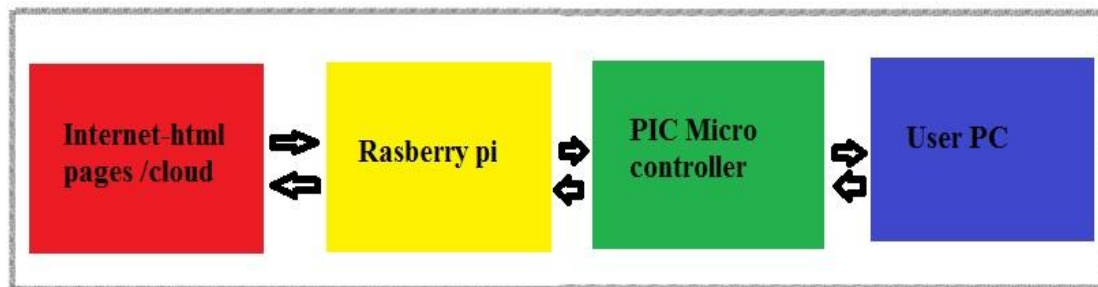

Fig 1: functional diagram

In this implementation of robotic system, when a person enters a monitored area, gesture sensor detects the movement and the gas sensors (MQ02) will detect the marsh gas or any harmful gases and the (LM35) temperature sensor will detect the heat and immediately send the indication to the control room section through wireless communication and is indicated through alarm. The concerned people can understand that there is danger .The camera connected to the microcontroller keeps on capturing what is going on in that dangerous area and saves it into a computer.
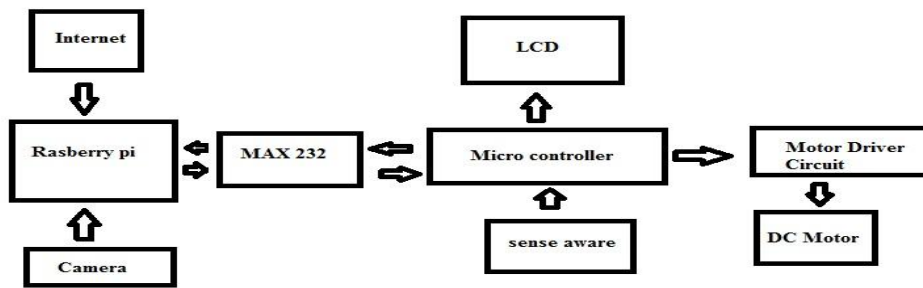
II. BLOCK DIAGRAM

Fig 2: Block diagram

Robotic unit consists of the following:

2.1 PIC Micro controller

The PIC micro controller used is PIC16F877 as shown in "Fig 2.1".It is used for controlling camera movement and DC motors which are used for robotic wheels for movement. It collects data from sense aware and the accelerator sensor.
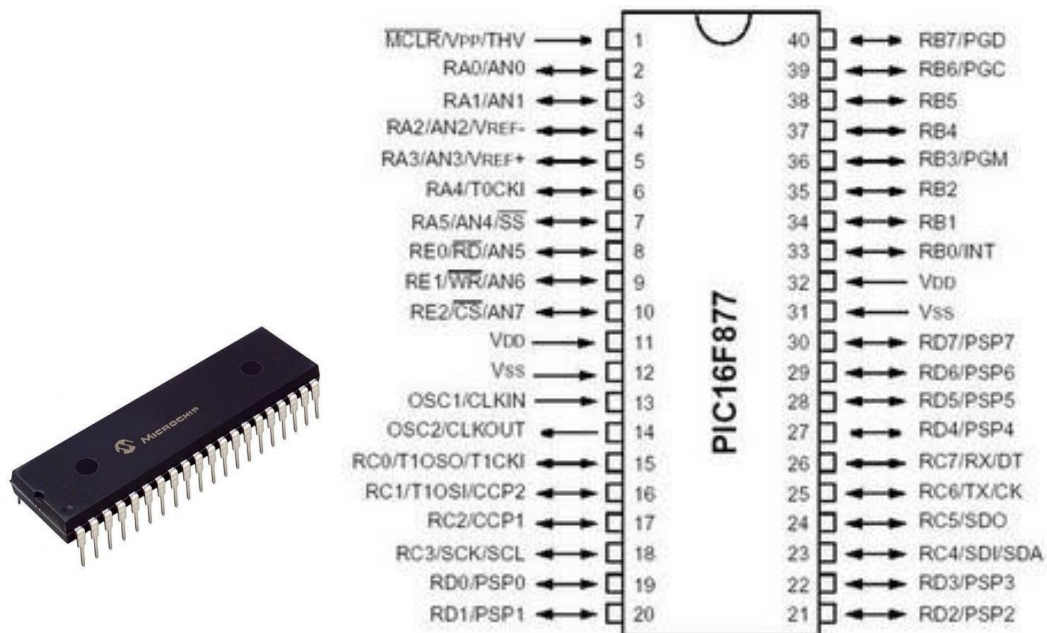

Fig 2.1: PIC16F877

2.2 Raspberry pi

It is used for video processing and sending video to user by connecting it to the internet. Processor used is ARM processor which has high performance and low cost and low power consumption.

fig2.2: Rasberry Pi

2.3   Gesture Sensor And Sense Aware

Gesture sensor used is APDS-9960.It is used to detect the gestures of the human and Sense aware is the device consisting of five inbuilt sensor depending on internet of sensors. It does the operation of the inbuilt sensors-location, humidity, temperature, gas and the light sensors. Sense aware will consume low power and gives high performance. It consumes voltage of 3.3-5v.
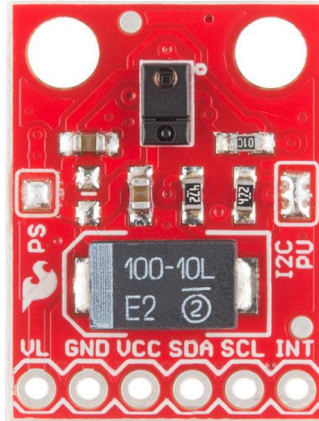

Fig 2.3: Gesture Sensor ASDP-9660

2.4   MAX 232

It is used for communication between micro controller and raspberry pi. RS232 can also be used.
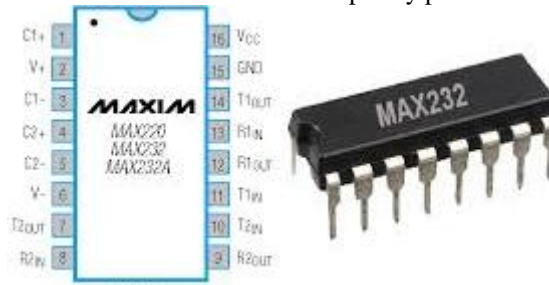

Fig 2.4:MAX232

2.5   LCD

Used to display output and for testing purpose

2.6   User PC

User's PC is connected to the internet and both the Stepper, DC motors are controlled using the internet. Thus, provides live video streaming by using html pages or cloud.

III.   IMPLEMENTATION

In this project, control of the robotic unit is from remote end with the use of internet and also we are able to get the videos from the robot end .At the user PC, we will have videos on the web browser and we will be able to control the camera movement and the robot movement. DC motors are used for the movement of robotic wheels and the stepper motor is used for the camera movement. Motors and the sense aware and gesture

sensors are interfaced to PIC micro controller.Rasberry pi is used for transmitting video and for video processing to user's PC with the help of internet.

The images captured by the camera should be processed very fast to provide real time visualization of surrounding to the user. We use ARM processor because it is of low cost and can be operated by using low power.Rasberry pi is a credit card sized computer that plugs into your TV and a keyboard. It is a capable little computer which can be used in electronic projects and for many things that our PC does. It plays high definition video and has a strong processing capacity because of using the ARM 11 architecture.ARM 11 has 8 GPIO, 1 UART ,1I2C AND 1 SPI and there are simple and easy used open source peripheral driver libraries.
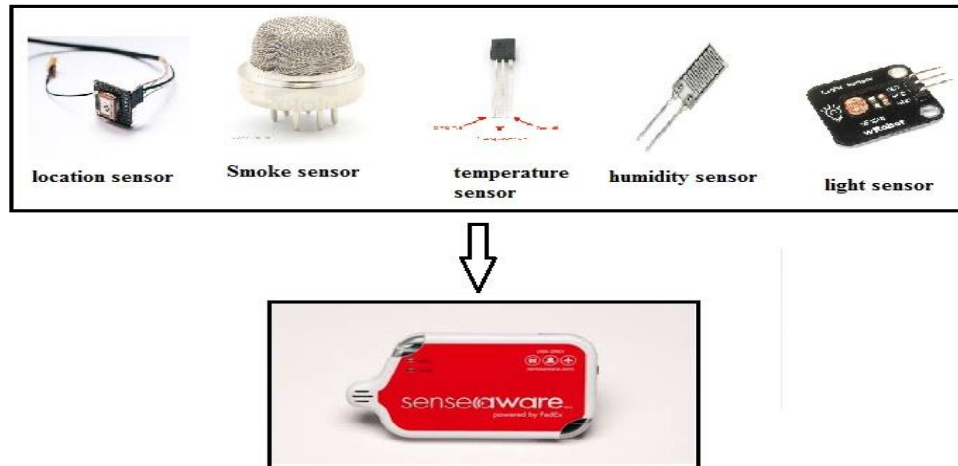
Fig 3: Sense Aware

Internet of things (IOT) main element is the Wireless sensor network. IOT technologies are implemented mainly based on machine to machine communications and embedded systems as a part of industrial solutions that are available today and rely on various co-existing interfaces, protocols and platforms. Sense aware uses small smart devices that comprise five different inbuilt sensors with computational and communication capabilities. It reports the status of packages in real time to the cloud .These smart devices comes in different sizes in order to support different packages depending up on the sensors we use as shown in "Fig 3".It collects and processes the information such as location, temperature, light, humidity, gas in order to enhance the visibility and transparency of the supply chain. It uses the principle of context switching in internet of things.

IV.   CONCLUSION

Using this technology, robotic system can be used in dangerous areas where it is difficult for humans to survive and it can be used as a spy robot prevent sudden accidents caused in coal mines where the death rate is increasing.

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