

Wi-Fi based Home & Industry Surveillance Bot using Pi camera

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Abstract - There are various surveillance systems such as camera, CCTV etc. available in the market. In these systems, the person located in that particular area can only view what is happening in that place. We proposed a system to build a real-time live streaming and monitoring system using Raspberry pi with installed Wi-Fi connectivity. Whereas we can monitor the movements in 360 degrees which is accomplished with the help of motors. Also we are going to detect gas leakage. By using video cameras, information returned by ROBOT analyzed the real time images so that the computation effort, cost and resource requirements needed are significantly decreased.

Keywords: Raspberry pi, DC motor, pi camera, MQ2 sensor.

1. Introduction

Raspberry pi is a credit card size small computer. There are various surveillance system such as camera, CCTV etc. In these systems, the person who is located in that particular area can only view what is happening in that place. The main advantage of our proposed system is to used it for security purpose. The other advantage is that it is very simple circuit. The operating system used here is Raspbian Operating System. Gas leakage is one of the most frequently observed parameter, and it is extremely harmful. So, proposed system capable to monitoring this value indefinitely without any delay and without putting any harm's way. Our proposed system is implemented on Raspberry Pi and interfaced with gas sensor and with controlling the device also live video streaming is implemented for quick actions. Mobile video surveillance system has been envisioned in the literature as either classical video streaming with an extension over wire or wireless network system to control the human operator. Remote monitor has become an important maintenance method that is based on the network. There are two unit that is raspberry pi and processor unit with wireless link between them. Sensor unit will send sensor reading to Raspberry Pi Unit which will be uploaded to the server. The Pi camera will be connected to Raspberry Pi CSI camera port.

The smart supervisor system is developed in this study of next generation smart supervisor using ARM cortex A53. They are observing device operation such as gas leakage detection, temperature & video capture. The smart supervisor system architecture, When Raspberry Pi B+ model, ARM cortex A53 Processor are used to control this system.

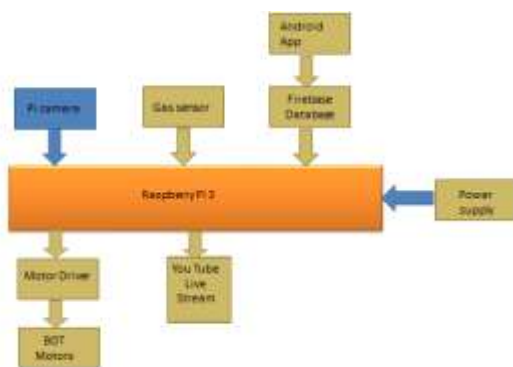
The Raspberry pi and all the devices are mounted on the robot. The camera is mounted to the front side of the robot to capture the video. We are using here android app to change the direction of robot from anywhere as well as to monitor the live stream. For that we will require the internet connection to both the Raspberry pi and mobile. Through the app we will change the firebase database, which is continuously monitoring by the Raspberry pi. According to the database the robot will change it's direction. The pi camera is used to capture the live video. For access the video we are using the You Tube live stream. The You-tube live stream is accessing through the app to monitor the video.

2. Literature Survey

The Smart Security Camera using Raspberry pi and Open CV is a module constructed for surveillance and it design to be used inside the warehouse facility. This system is devised using a low-cost security camera with night vision capability using a raspberry pi. This system is having the ability of gas leakage detection that can be used to avoid potential crimes and potential fire. Light-footed surveillance camera evolved by the researchers that has the potential of identifying the condition of the scene that is being monitored and also gives alarm as the event occurs. This system also provides security during night time as it is having the potential to provide night vision. Night vision capability is attained by simply taking off infra-red (IR) filter from an ordinary webcam and thus can be used for night vision sensing with the help of IR Light Emitting Diode illuminator. Multi-environment Bot for surveillance and live streaming is developed to assemble real-time surveillance system. The live streaming is achieved using mjpg streamer and the server-client model is made using java. IP-based installation provides access from anywhere and hence are preferred over the analog system. IP-based systems offers good picture quality and they are also favorable when it comes to flexibility. But IP-based system needs some how knowledge about the networking and these systems are too expensive than the analog systems. This raspberry pi controlled Bot is incorporated by a client-server model. This model is constructed on java and thus can work on any systems such as windows, Linux. This entire model is connected to a local network and everyone available in that particular local network can control it from anywhere. The live streaming is obtained by MJPG streamer.

We proposed a system to build a real-time live streaming and monitoring system using Raspberry pi with installed Wi-Fi connectivity. In monitoring phase, the pi camera will record the video of the location in real-time. Capturing of video is done through commands given from the computer to the raspberry pi. This command communication is done using WiFi. The pi camera is being used which will provide a very good quality of the video. The connection of Raspberry pi with the motor driver is achieved using the GPIO pins of Raspberry Pi. Input pins of motor shield are connected to GPIO pins and output pins of the motor shield are connected to the motors. A portable charger of 2 Amp current is connected to the motor shield and it also connected to raspberry pi. After the proper connections the raspberry pi is ready to boot up. A Python program is written for controlling the motors wherein the GPIO pins will give out the output from the raspberry pi to the motor shield. The robot movement is controlled through the directions mentioned on the web page created using Hypertext Markup Language (HTML) code and webpage Universal Resource Locator (URL) address. This process communication done through Wi-Fi to the Raspberry Pi model B. The camera module is installed into WiFi port and it is enabled in raspberry pi settings. For the Live Streaming of videos, MJPEG streamer is installed and configured. After the configuration is done just view the live streaming in the application as well as the website. The website has been developed to allow a large number of people to experience the live streaming irrespective of their location. Here admin rights are given to authenticate the visibility of critical information by only authentic users.

3. Block diagram



Raspberry pi- Raspberry Pi is a series of small single-board computers. It is mostly used in general purpose systems. It not include peripherals. Some accessories have been included in several official bundles.

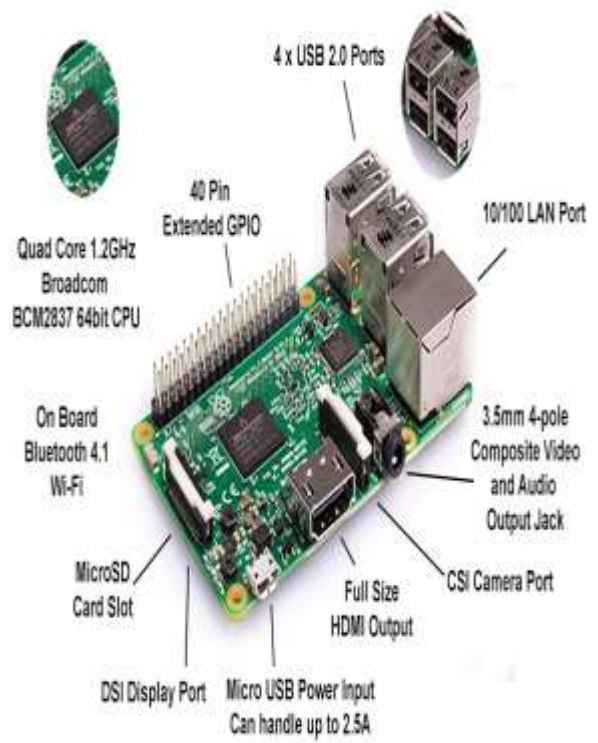


fig-1:Raspberry Pi

Pi camera- Raspberry Pi board has defined port for camera module which can be directly inserted into that port.



Fig-2:Camera module

Gas sensor: gas sensor has higher sensitivity to Propane and Hydrogen, also used to combustible steam, it is with inexpensive cost and suitable for many application.

Characteristics:

- a) Better sensitivity to Combustible gas in large range
- b) High sensitivity to LPG, Propane and Hydrogen
- c) Long life and low cost

d) Simple drive circuit.



Fig -2: MQ2 Gas Sensor.

Fire base:

Firebase is web app development platform that provides developers with a plethora of tools and services to help to develop high-quality apps, grow their users, and earn more profit.

Fire Based service can be divided into two groups:

1. Devlope & test your app.
2. Grow & engage your audience.

Motor driver:

A motor driver is a low current amplifier, the function of motor driver is to take a little-current control signal and then convert it into a large-current signal that drive a motor.

Motor drivers are found in a wide applications including:

- Relay and solenoid switching
- Stepping motor
- LED and incandescent displays
- Automotive applications



Fig-4: Motor Driver

Live video streaming-

The Live Video streaming is an integral part of this project as it serves as the means by which the user can monitor the robotic from a remote end, otherwise the user has no other way to determine whether the arm is moving or not, otherwise he is present at the local site where the arm is present. The video is out the port 81 and can be viewed from any browser by providing the IP address in the address bar of the client browser.

4. CONCLUSION

The smart supervisor system we have built surveillance and real time video streaming system in which authentication is required to access the smart supervisor system. The smart supervisor system displaying the gas sensor value. This message is depend on the response coming from the supervisor system server & mobile. Whenever the gas leakage is detected, a mail is going to be sent to the registered mobile number. If correct IP address is provided, the app will proceed to display the various device operations & video streaming operations. According to the instructions provided by the app on our android mobile we can operate the movement of the robot. The robot can move in forward, backward, left and right direction.

5. FUTURE SCOPE

1. Major improvements on the system processor speed are much needed in order to process large files e.g. video for effective motion detection and tracking.
2. The designed security system can be used in homes to monitor the facility at any given time.
3. The system requires to be remotely controlled. Hence, future explorations should focus much more on the same.

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