

IOT BASED COMMERCIAL FLOW CONTROL SYSTEM WITH PROXILITY AND TRESPASS DETECTION FOR CYBER DEFENCE USING RESBERY PI

By Anjeeshnu Banerjee.

1/ NEED

These days with the increase of technology advancement as well as need of technology and gadget in industries and commercial factories has not only solved the problems of effective productivity and cost efficient productivity by substituting manpower, it has also brought a dark side to it, which is security to be specific cyber security.

Nowadays Hackers have become smart and evolved they not only attack over the wire from some remote location, they also intrude the industry by trespassing it and trying to gain access, and in case when they fail to gain access they try to cause havoc / damage, to the factory. Havok may range from trespassing, causing fire or Arson, cause toxic gas leakage as well as Activating false fire alarm in order to stop the production of the factory.

- In the world from year 2020 – 2022 there are more than 198350 + trespass and intrusion by hackers and havokers detected and reported. Actual numbers are way more.
- This have resulted in more than 350+million dollars damage to the industries across the world

As far my research these sector of cyber crime is not given much attention, and some sot of action need to be taken on it with a appropriate solution.

So I Anjeeshnu Banerjee came up with an solution which might help which is basically a IOT BASED FLOW CONTROL SYSTEM WITH PROXILITY AND TRESPASS DETECTION BY USING RESBERY PI AND SEVERAL OTHER IOT DEVICES.

So, far this has not been tested by industries but this might solve the problem.

ABSTRACT

In this paper, I have propounded a system which is capable to detect any trespass and intrusion as well as fire and can eliminate fire in control manner provide the exact location of the affected region. IT is also capable of detecting false alarm and stop it, it is also capable of detecting any toxic gas leakage and take action to it.

Raspberry Pi 3 has been used for flow control which are integrated with a couple of sensors and camera including flame sensor, gas sensor, PIR sensor, MCP3008-ADC convertor, relay, electricity operated motors, ESP32 802.11 camera, GSM module I have provided a confirmation of the fire suspecting system to avoid any false alarm. The system will immediately send an email along with the image of the affected spot and device location. Also an emergency message is sent. In case of any fire or gas leak or trespass. It may also able to capture the face of the trespasser.

KEYWORDS

- flame sensor
- gas sensor
- PIR sensor
- MCP3008-ADC convertor
- Relay
- electricity operated motors
- ESP32 802.11 camera
- GSM module
- Buzzer

INTRODUCTION

IoT plays a major role in industrial safety and control. Technologies based on IoT make the industries smarter, safer and more environmentally sustainable. Fire accidents are a major threat to industries. It results in severe losses. IoT can help in intelligent fire monitoring and detection by integrating information from sensors to detect fires and take immediate response action. It helps in speeding up the response times and provides information for evacuation, rescue and fire suppression. It can also help to identify the cause for the fire. The notification devices such as alarm, horn, buzzer can be activated to provide alerts in case of fire. Several advanced features in mass notification systems including the capability to communicate alerts via email to targeted recipients, can thus help in creating quick and effective awareness. The sensor information is transmitted over the internet and can be viewed using laptops, mobile phones. This data can also be used for investigation purposes after the accident has occurred.

FUNCTIONAL REQUIREMENTS

- Research based on raspberry pi and implementation development platform to build a complete application system.
- Research and implementation of remote transmission of monitoring data in the existing environment.

The important computer room are monitored by sensors and the collected data are send to the raspberry pi development platform for processing. By installing Ethernet shield network adapter on the development board the collected data is sent to the sensor network for data processing and display Remote user can any micro computer for accessing IP network and run the network for real time monitoring.

HARDWARE REQUIREMENTS

The basic hardware components used:

A. Raspberry Pi Development Board

The Raspberry Pi-3 Model B is a credit card sized computer with inbuilt Wi-Fi and Bluetooth connectivity.

SoC: Broadcom BCM2837

CPU: 4× ARM Cortex-A53, 1.4GHz

GPU: Broadcom VideoCore IV

RAM: 1GB LPDDR2 (900 MHz)

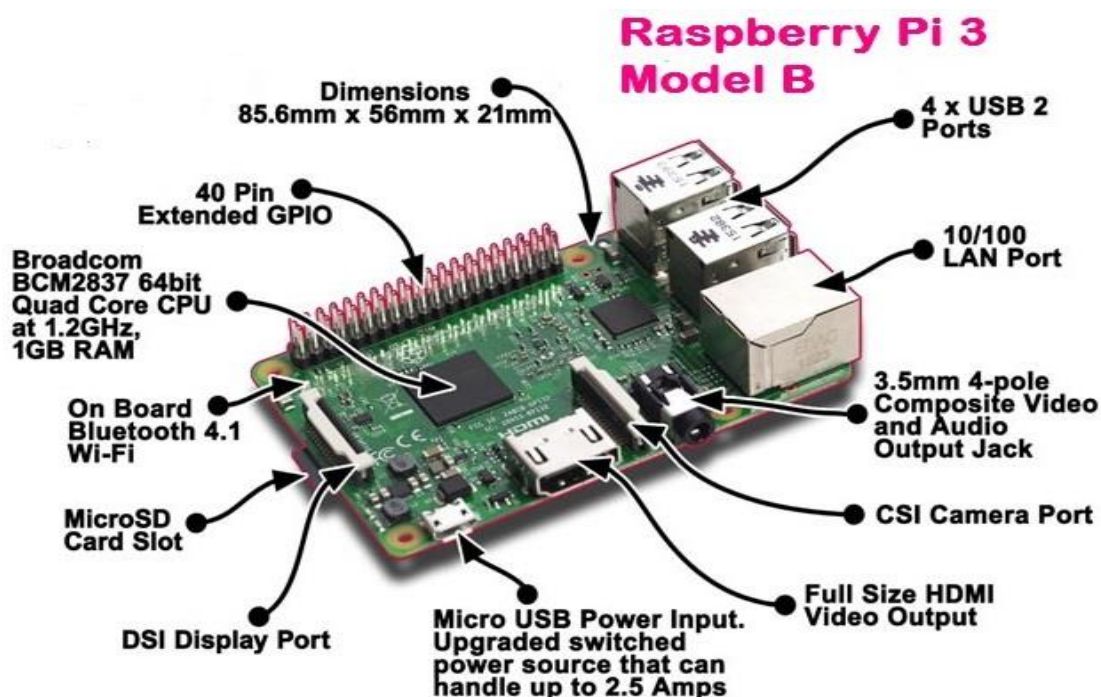
Networking: 10/100 Ethernet, 2.4GHz 802.11n wireless

Bluetooth: Bluetooth 4.1 Classic, Bluetooth Low Energy

Storage: microSD

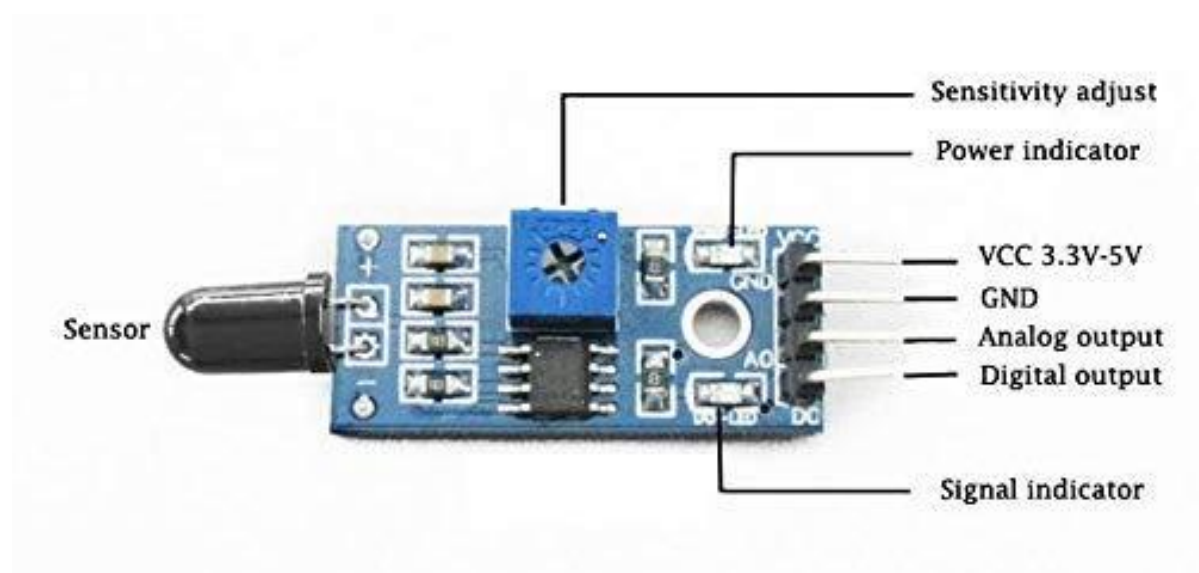
GPIO: 40-pin header, populated

Ports: HDMI, 3.5mm analogue audio-video jack, 4× USB 2.0, Ethernet, Camera Serial Interface (CSI), Display Serial Interface (DSI)



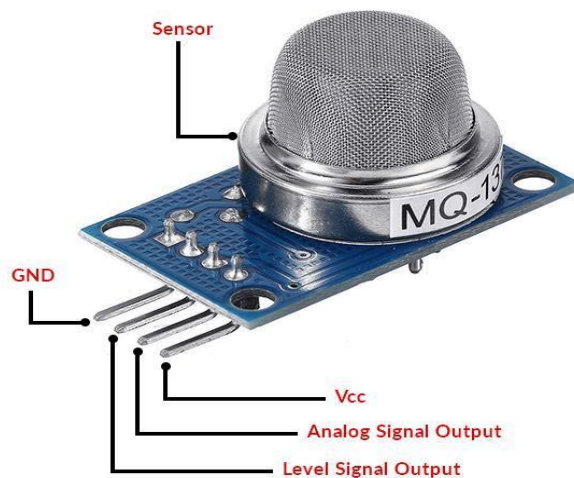
B. Flame Sensor

A flame detector is a sensor designed to detect and respond to the presence of a flame or fire. It also can detect ordinary light source in the range of a wavelength 760nm-1100 nm. The detection distance is up to 100 cm.



C. Gas Sensor

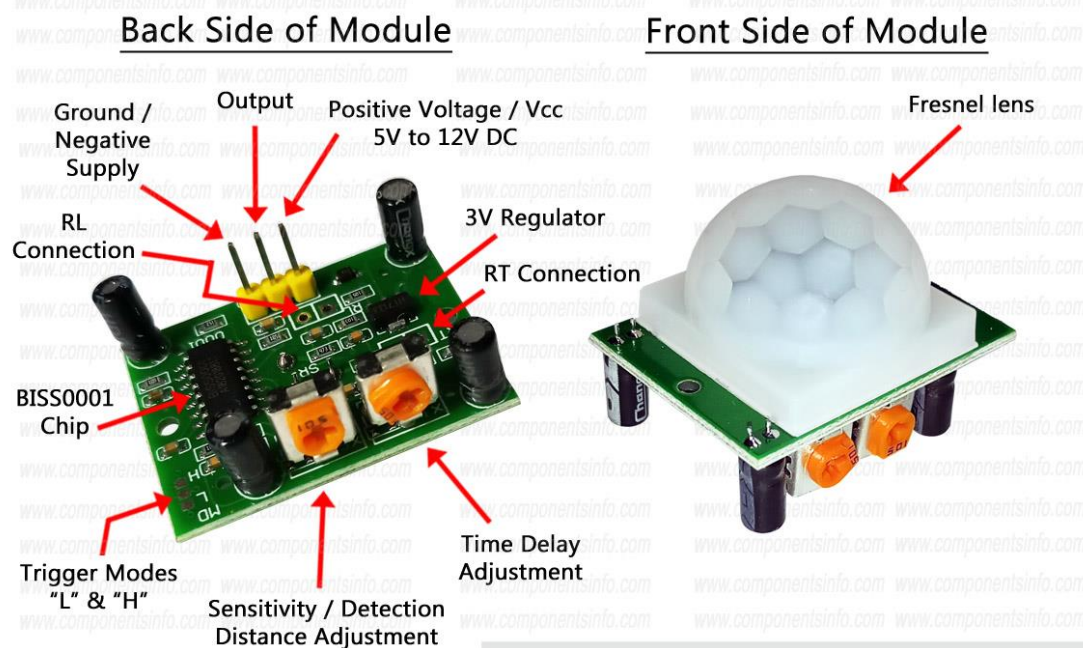
The MQ2 gas sensor is useful for gas leakage detection. It can detect H₂, LPG, CH₄, CO, Alcohol, Smoke or Propane. Due to its high sensitivity and fast response time, measurement can be taken as soon as possible.



D. PIR sensor

A passive infrared sensor (PIR sensor) is an electronic sensor that measures infrared (IR) radiation being emitted from objects in its field of view.

HC SR501 Pir Motion Sensor Module Pinout & Details



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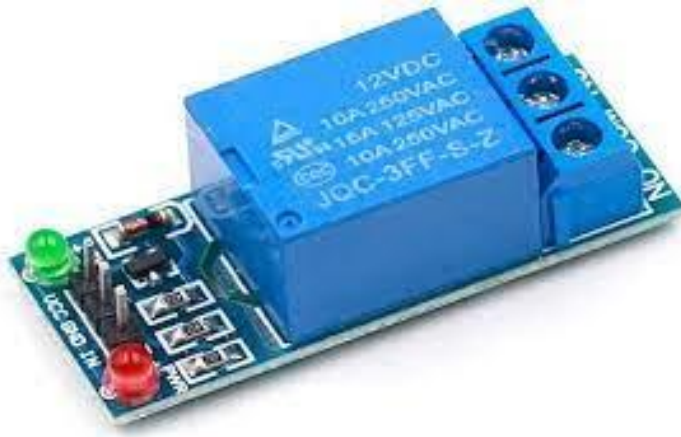
E. MCP3008- ADC Converter

The MCP3008 is a low cost 8-channel 10-bit analog to digital converter. It can read the analog input from the sensors and convert it into digital signals.



F. Relay

A relay is an electrically operated switch. It takes some amount of power and distributes it to allow other devices to be powered in certain circumstances.



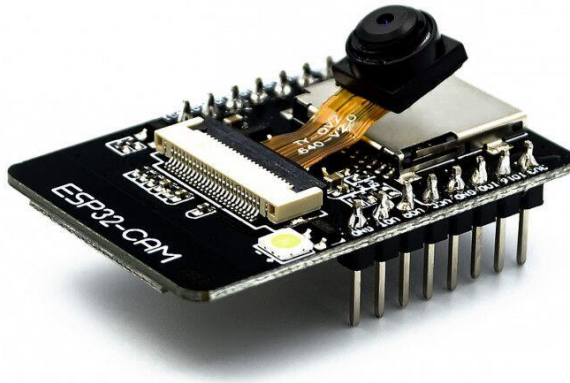
G. Motor

A water sprinkler mechanism can be connected to the shaft of the dc motor, which will sprinkle the water when the fire is detected by the sensor.



H. Camera

A rotatable web camera is used which captures the image of the intruder when motion is detected.



I. GSM Module

GSM module is used for the sending and receiving of the message through SMS it can be controlled at home and can access various appliances at one place and it act as a security alert subsystem gives automatic security monitoring.

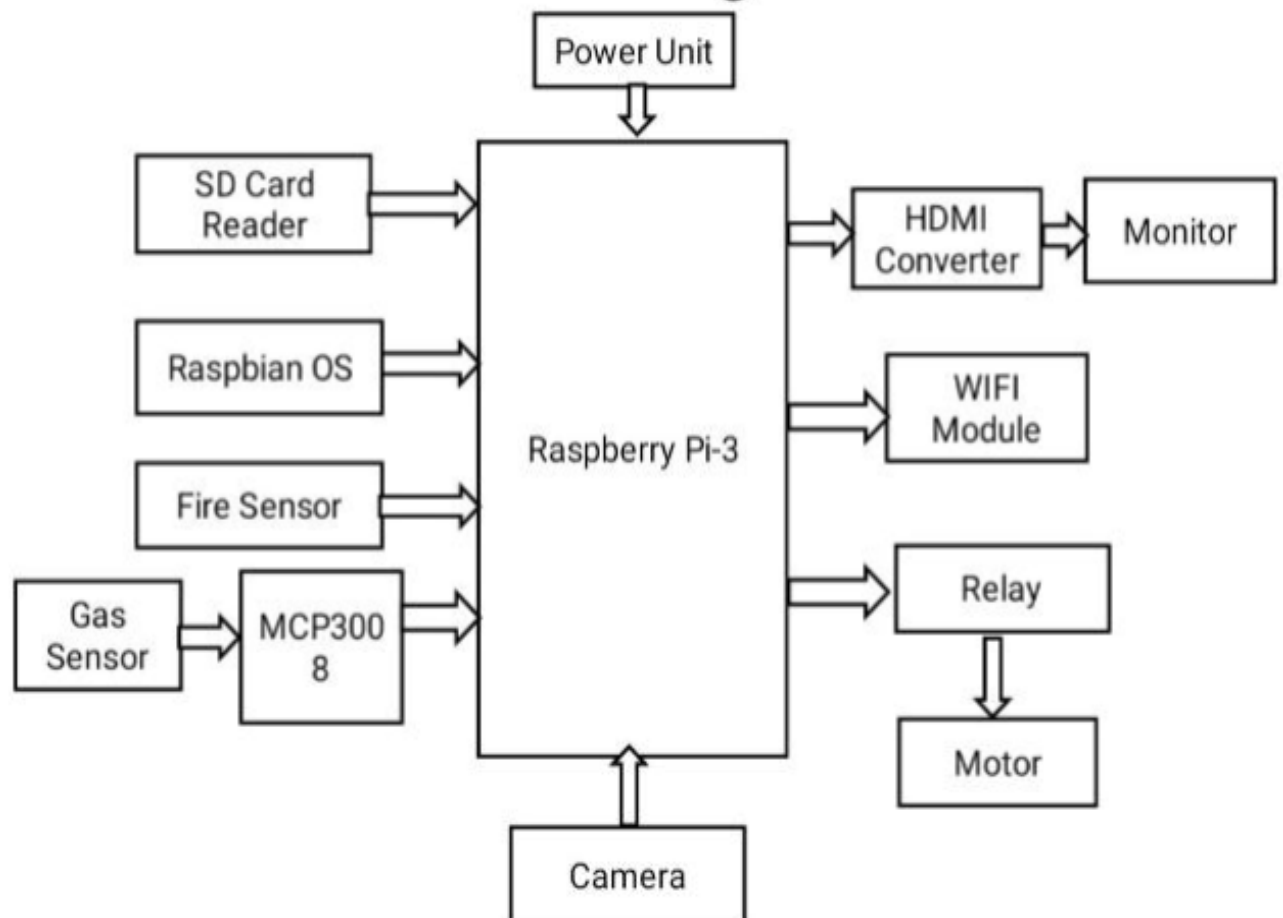


SOFTWARE COMPOSITION

A. The Raspberry Pi Development Software

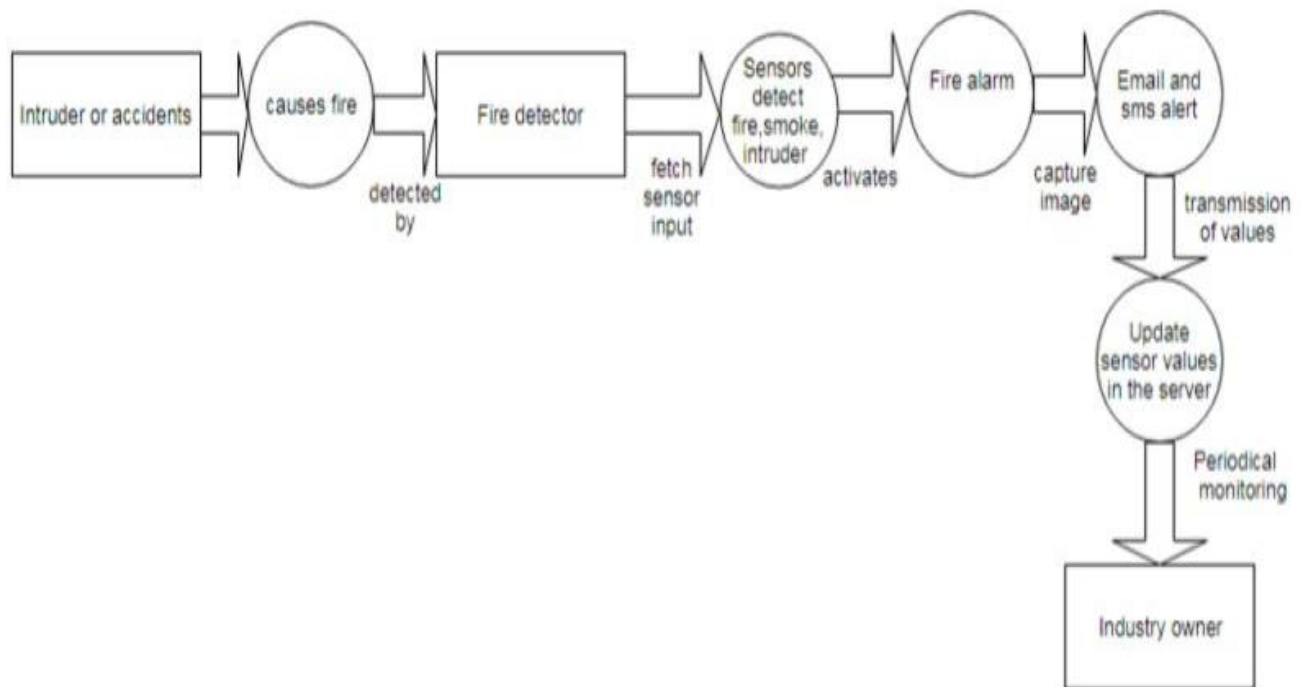
The RASPBIAN OS is implemented in the raspberry pi for the processing the sensor value and stored in the SD card. The PYTHON language is used to develop the main program and OPEN CV is used the machine learning language and for including libraries and header file. These algorithm came used in the image capturing and processing and tracking moving objects, identify the objects. Php and XML language is used for the IOT page to store the sensor values.

Block Diagram



V. WORKING

FLOW DIAGRAM



Initially the raspberry pi is set as the main device control and GSM module is connected to a zone. The gas and flame sensor, camera and PIR

module is connected to all rooms of the zone. When the person is entered to the room the PIR module is sensed and the camera turns on the person image is captured and then the image is synchronized and send to the mail via internet. if any gas leakage occurs the toxic gas sensed and alarm is raised. If any fire accident is occurred by the person or occurred at any place of the room or zone the image is captured and stored in the email of the authorized person and the fire sensed and alarm is raised the relay is switched on water is sprinkled if the fire range is exceeded it message is to the authorized person and at the same message is send to nearby fire brigade through WIFI

or GSM module. The fire sensed value is seen in the IOT page and the image captured is seen the email of the authorized person.

RESULT

The Fire Monitoring and Alerting system is described with the drawbacks of the existing system. The requirements and the implementation methodologies of the system are clearly explained. Industrial safety is a major concern and therefore this system can help in emergency situations with immediate response and quick action.

CONCLUSION

I ANJEESHNU BANERJEE HEARBY CONCLUDE THAT THIS SYSTEM IS A WORKING MODEL AND CAN BE ADOPTED BY INDUSTRIES IRESPECTIVE OF THERE SCALE (LARGEOR SMALL) AND CAN BE VERY HELPFUL IN TACKALING AND COMBATING TRESPASS AND ACCIDENTS, AND FOR PRACTICING GOOD CYBER DEFENCE.

SCOPE FOR FUTURE WORK

The system can further be developed by adding more sensors and using face recognition and image processing to identify the intruder.

An android application can be developed to provide confirmation on the decision to be taken on the outbreak of a fire. The sensor data can be combined with algorithm and big data analytics to develop better emergency evacuation strategies and analyse the entire system.

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