



SURVEILLANCE ROBOT FOR WEB DATA MONITORING USING RASPBERRY PI

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Abstract: Surveillance robot presents a contemporary approach for surveillance at remote and border area's victimization multifunctional automation supported current IOT utilized in defense and military applications. By means that of this, we tend to advance a surveillance automation which may be integrated into any reasonably home. The controller of the bot are going to be the powerful Raspberry Pi 3 Model B. A digital camera hooked up to the Pi monitors the world and sends a notification once any intrusive or obstruction is detected. The live streaming ability of the Pi permits the camera feed to be analyzed from any location victimization net. With such a system, each user can feel a lot of protected. Associate field Raspberry pi sends a wireless command that is received on website and consequently automaton moves. Streaming is completed victimization USB camera. It contains gas sensing element and temperature sensing element so, it is often used conjointly in disaster occurred areas like earthquake, fire, etc. Gas sensing element can discover the harmful gases that are gift at the disastered space and conjointly temperature sensing element is mounted thereon thus, it will live the temperature within the fireplace accidents as early precautions to assist fireplace fighters.

Index Terms -surveillance, Raspberry Pi 3 Model B, USB camera, live stream, Gas sensor, Temperature sensor

I. INTRODUCTION

Robotics is Associate in Nursing art of planning, applying by exploitation automaton in human endeavors. An automaton could be a machine that is meant to perform a specific task supported the programming done by the user. It will perform multi task at a time. Today most of the industries are machine-driven. The event of automation introduces the robots into the industries to perform the risky jobs that can't be done by the human. The mobile automaton was totally controlled by the net page and also the commands from the UNIX platform via RASPBERRY PI was received by the small controller. Here the system is projected with the assistance of low price PIR sensing element and smoke sensing element to trace out the intruders and to discover the fireplace accidents by exploitation Raspberry pi. The Internet-based mostly automatic system is enforced to manage a robot field mover. The management will be done by employing a computer based mostly technology. This automaton is developed to attach with web through HTML [1]. The traditional systems need continuous observation by some dedicated personnel that isn't doable in each unit. Hiring Associate in Nursing unknown person to try to therefore will raise privacy problems. The CCTV cameras put in of late even have restricted vision as a result they're stationary modules. If Associate in Nursing unwelcome person moves far from the sector of read of a CCTV camera, it cannot follow or track his motions. {the solution|the Associate in Nursingswer } to any or all higher than problems is to possess a police work automaton which might monitor the areas wherever it's put in and send notifications to the owner once an intrusion happens. It conjointly permits the user to login to the Raspberry Pi's digital camera from any remote location and examine live feed of no matter is occurring in his premises. The price effectiveness and device options of the automaton enables it to be used simply by each user.

II. LITERATURE SURVEY

Several projects and systems have been introduced in developing a robust home security system and surveillance. With a common motto, they've developed systems using varying processors and features.

In [2], the author discusses a system developed for remote surveillance using a raspberry pi, usb cam and HTML web page to monitor the system. A webpage controlled remote is used to switch on the PC, camera and robot. Once the mobile phone is called and specific set of keys are pressed, corresponding relay switches activate all the components required in the remote surveillance. Then to login to the remote PC, it uses a VNC server and the Windows app built on the PC. The app then sends respective signals to the mobile robot using RF technology. Looking at it from a broader perspective, we use GSM technology to activate the system, Internet to gain access of the remote PC and RF technology to control the robot. The lag technology to control the robot. The lag between each system has not been considered in the system, which is a very crucial factor. When experimented with a similar setup, the response time between pressing the button on the Windows app and the robot's movement can extend up to even a minute or more. The RF technology used to control the robot requires line of sight communication between the transmitter and receiver module. It also has limited range and cannot be used in long halls. The robot cannot be controlled from another room either. The advantage of using Raspberry Pi 3 Model B is that it has on-board Wi-Fi, allowing it to connect to the home's router. This allows easy movement in every nook and corner of the house without any hassle. The lag is also only dependent on the internet speed, which can be easily upgraded. The paper in [3] describes a system for smart surveillance of homes using a PC with on-board camera. The image processing algorithm uses background subtraction to detect motion by fixing certain threshold above which it decides that intrusion is detected. It also uses Gaussian blur to smoothen the high frequency noise which may occur while capturing the images using different conditions. Once motion is detected, the Arduino which has a buzzer connected to it. As soon as motion is detected, the buzzer goes on. Simultaneously, this system is that it doesn't send any notifications to the user regarding the intrusion. Uploading the images to Drop box is a good idea for remote the camera clicks pictures and uploads it to the Dropbox. The obvious drawback of access but not for instant notifications. Moreover, using a PC's camera for motion detection makes it a very bulky system. It cannot be moved around or controlled from a remote location. The another disadvantage of using a PC is that it should always be connected to the power supply. It incurs too much of wastage of electricity. The PC is also capable of doing a multitude of tasks and using it solely for surveillance is an under utilization of resources. By doing so, the cost of implementation of the project also increases, making it less suitable for the different kinds of households available. The other advantage of using a microprocessor like Raspberry Pi is that it can be made into a very handy device. This ensures that we can install this system in any position and in any part of the house. The camera mounted on the robot can also be turned in any required direction, in contrast to the stationary one built in the PC. The power consumption is also very less comparatively. Since the Raspberry Pi runs on 5V DC, it can be easily powered from a power bank. That helps us achieve an uninterrupted power supply for the system as a low power consumption rate.

The authors in [4] have developed a surveillance system using Raspberry Pi and the algorithm for detecting motion is written using SimpleCV. The USB camera attached to the Raspberry Pi looks out for any motion and once its detected, it switches on the lights of the room and clicks snapshots of the surrounding area. These images are sent over the internet to the user. This project has the feature of switching on the lights of the room as an added feature and uses a low power processor, compared to the others. But it lacks any authentication feature of the detected intrusion. It will send notifications even when an authorized person moves in front of the system. This is also a stationary module which cannot be moved around. The face recognition feature used in our project provides an extra authentication for the system. It avoids unnecessary storage of images or sending of notifications when the user is at home or in motion in front of the camera. It can also be controlled from any remote location over the internet. Since it has a voice assistant in it, it can be easily controlled by the user using simple voice commands when he is at home

III. EXISTING SYSTEM

The existing system in which a man need to look for monitoring the data. continuous monitoring is needed, human can work only for certain period of time and may also make errors. At high risk areas where man can't go or where places are dangerous to human it is difficult to monitor. They have to take readings manually and continuously look at the site where they are surveying, so they might slow on work and may get tired easily. This system needs presence of human so there are high risks to do such work.

IV. PROPOSED SYSTEM

This project uses a Raspberry pi. It requires USB camera, gas sensor and a temperature sensor. The USB camera is interfaced with raspberry pi, so we can get live streaming of the site. Gas sensor will detect the harmful gases that are present at the disaster area, and also temperature sensor is mounted on it so, it will measure the temperature in the fire accidents as early precautions to help to fire fighters. A HTML web page is designed to control the movement of the robot. IFTTT web hooks are used to get notifications if there is any change occurs in temperature or dangerous gas are present.

V. BLOCK DIAGRAM

The block diagram of the system is shown in figure below. The system consists of Raspberry Pi, temperature, gas sensors and USB camera on input terminal. On the other hand, the output of this system is the live streaming shown in web page which is operated from the HTML web page and sends notifications of change in temperature and presence of harmful gases via IFTTT to user.

Block diagram

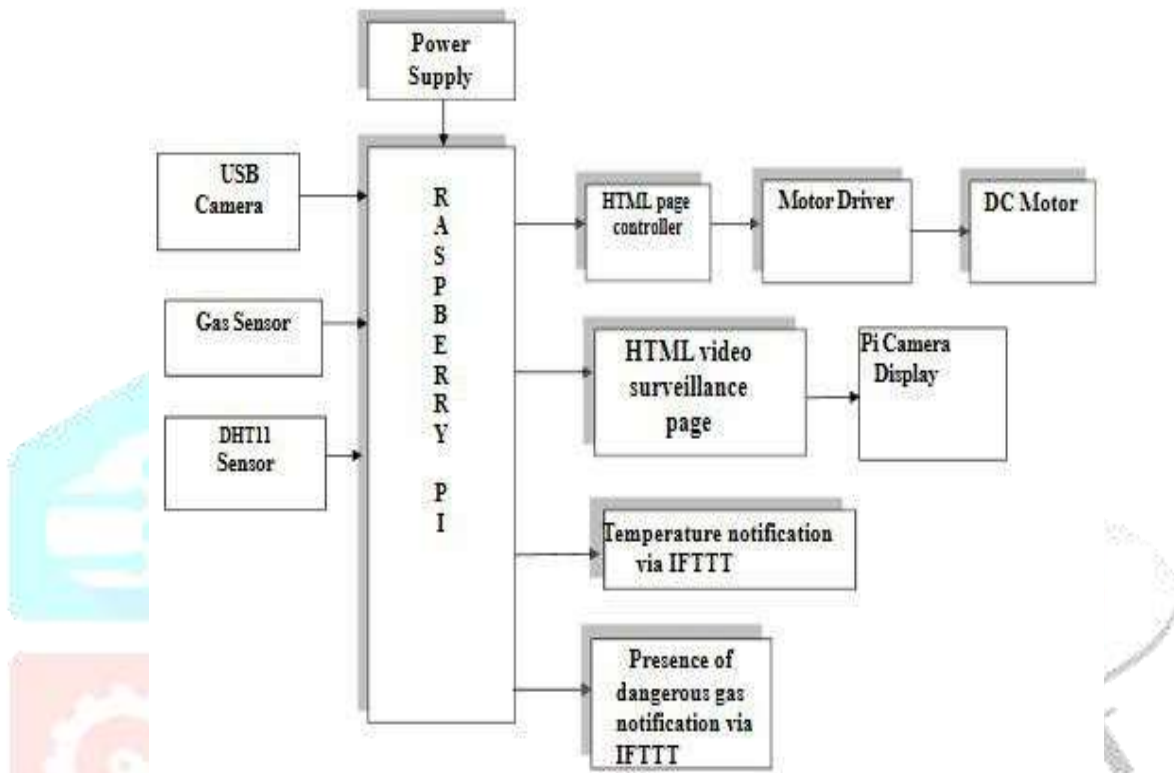


Figure 1. Block diagram

A HTML page is designed to control the motion of the robot and to display the visuals using USB cam. Motors are connected to motor driver. Using a customized web page controls robot be moved in a controlled direction. By the HTML web page we can drive the DC motor of the robot in the desired direction and able to detect the change in the temperature, and humidity if we gone use it in the disaster areas for the precautions of the persons in advance. The change in the temperature, and humidity is notified with the help of IFTTT app.

VI. HARDWARE DESCRIPTION

A. RASPBERRY PI:

The Raspberry Pi 3 Model B can be a third-generation Raspberry pi. This powerful, low price [5,6] and small size single board laptop computer could also be used for many major and minor applications. Raspberry pi 3 has most powerful processors, and it's 10 times faster than previous generation. This third generation pi has further wireless computer network and Bluetooth property that's making it the proper account powerful application. The Raspberry pi 3, contains many ports like camera affiliation, native space network port, GPIO pins that are particularly used for interfacing sensors and switches, USB port for external I/O devices, HDMI ports for monitor and audio jack port.

These all are attached with one board. It does not have any internal storage or own software system, but we have to tend to are able to insert associate Coyote State card with UNIX operating system based OS. [7,8] Refer the fig 2. During this paper our planned system uses a Raspberry Pi 3 Model B. This model board can be a microcontroller kit within build BCM2837 64-bit ARMv8 processor that given internet/Ethernet property, four USB affiliation, 1 GB RAM, Bluetooth four.1, forty GPIO pins, full HDMI port and support UNIX operating system code package like Raspbian.

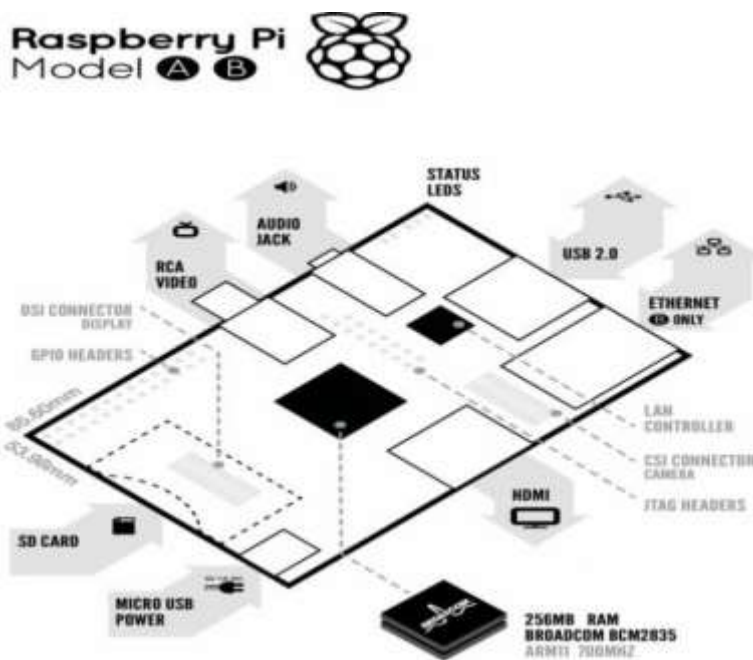


Figure 2. Hardware of raspberry

B.USB CAMERA:

It has integral sensitive electro-acoustic transducer and image sensing element quality CMOS sensing element Image resolution interpolated to 25 mega pixels with 6 light-weight sensors ;

16 MP Image Resolution; USB Interface

Resolution hardware: 500K pixels

Image quality: RGB24 or I420

Exposure: Auto or manual

Angle of view: 58 Degree

Interface: USB2.0 Frame rate: 30 fps (max supply 5v)



Figure 3. USB Camera

C.GAS SENSOR:

A gas detector may be a device that detects the presence of gases in a district, often as a part of a security system. Gas observers are often won,t to detect flammable, flammable, and toxic gases, and chemical element depletion.



Figure 4. Gas sensor

D.DHT SENSOR:

The DHT11 could be a basic, extremist low price digital temperature and wetness device. It uses an electrical phenomenon wetness device and a semiconductor to live the encircling air, and spits out a digital signal on the info pin. 3 to 5V power and I/O. 2.5mA easy lay current use throughout conversion (while requesting data)

Good for 20-80% wetness readings with 5% accuracy

Good for 0-50 °C temperature readings ± 2 °C accuracy

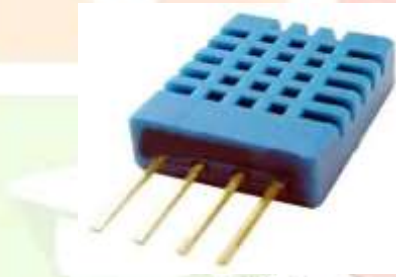


Figure 5. DHT11 Sesor

E. Motor driver circuit

The motor driver circuit may be a low current electronic equipment that drives the DC motor. The GPIO pins area unit created high or low per the user input. This input is employed to manage the robotic vehicle movements.

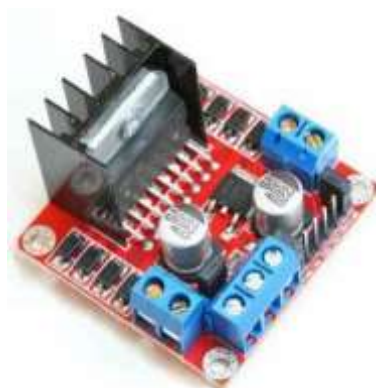


Figure 6. Motor Driver

The motor driver circuit has capable of power the DC motors, which in turn control the movements of the robotic vehicle. It has the voltage of about 5volt and current is about 600milliampere.

F.DC MOTOR

A DC motor is any of a class of rotary electrical machines that converts direct current electrical energy into mechanical energy.

A coil of wire with a current running through it generates an electromagnetic field aligned with the center of the coil.



Figure 7. DC motor

VI.SOFTWARE DESIGNAND IMPLEMENTATION

A. Python Source Code for Raspberry Pi

The entire system is predicated on a Raspbian software package like UNIX system platform. The Raspbian OS is predicated on Debian that optimizes the Raspberry Pi hardware. The artificial language that is used for committal to writing is Python. Python said as a wide used high-level artificial language for all-purpose programming. Python language is formed by Guido van Rossum and was discharged in 1991. Besides Python is understood language that encompasses a style philosophy that emphasizes code readability. It uses White House indentation to delimit code blocks instead of keywords or permed braces. A syntax which allows users to specific ideas in lesser lines of code than attainable in languages like Java or C++. Python artificial language encompasses a compiler that runs mechanically once the Python ASCII text file (.by file) is dead within the terminal, and the.pic file is generated [9]. The software package style flow of spy automaton for a closed-circuit television. Basically, the practicality of system clarifies the cyclic section rotation for automaton movement. From the flow chart, the invoking sequence and also the relationship between numerous functions area unit unreal.

B. HTML JavaScript

HTML provides the essential structure of sites, that is improved and customized by different technologies like CSS and JavaScript. CSS is employed to regulate presentation, layout and info. JavaScript is employed to regulate the performance of various components. Bootstrap is the most well-liked markup language, CSS, and JavaScript front framework for developing websites, mobile internet sites, and a lot of. Bootstrap is totally unengaged to use. The Internet of Things (IoT) will be thought-about as a world network that allows the communication between human to human, human to things and things to things [10]. It's something within the world by providing distinctive identity to every, and each object. The commands will be sent through the online page with the assistance of web. The user management command will be sent from anyplace within the world through a web content. The mechanism is controlled from remote place that isolates the soul from dangerous environments. Because the main code is being dead, first, the mechanism can move forward, checks for human-being within the field, and IR sensors checking for obstacles would possibly precede the mechanism, the mechanism can do these processes at the same time. Once the user giving inputs from the web page, it's hold on in server as a document. At mechanism finish the Raspberry pi running the python script which can scan the document and execute the command according the user inputs. The Raspberry pi is connected, the H bridge IC L293D which can management the direction of motors supported command received from user. From the website the user clicks on the forward button, the mechanism moves forward and similar movements square measure achieved for reverse, left and right. Once spy mechanism gets turned on, user will see

the photograph of moving living objects in web content that square measure taken by pi camera smart phone and all smart phones are so powerful like computer and laptop due to their almost similar kind of essential

VII. SYSTEM DESCRIPTION

Today everyone uses the android based features. So, the controlling of any kind of robotic system using smart phone makes the system's performance efficient, reliable and cost effective. Raspberry pi is connected with Wi-Fi router through Wi-Fi dongle. The Wi-Fi router is connected to Local Area Network (LAN) for establish the internet connectivity to pi. As soon as Raspberry pi is connected with power supply, it is initializing the IP address allocated to the web server and establishes connection with the LAN. Once it connected successfully, we will open the web browser by using static IP. But before access the web server first we want to create the web server, we have to first write a HTML code to make a webpage and we have to link our program with it. We want to create web server because after creating web server we can access to our Pi via IP address remotely from any supported browsers. Now if we open any browser by putting the IP we can access the remote control wirelessly and for taking the live video feed through No IR camera, we install raspicam which is third party software, which helps us to watch live video feed remotely.

VIII. SCHEMATIC DIAGRAM

Raspberry pi is interfaced with USB camera, gas sensor, DHT11 sensor and also interfaced with motor which is connected to motor drive (L293D). Raspberry pi will continuously receives the commands from the html page which was created. A usb camera is interfaced for the continuously monitoring i.e., live streaming for the surveillance. Gas sensor and DHT11 sensor is equipped to sense the gas that is present in the air and sense the temperature if it is high respectively. It will send the notification to the IFTTT which is sensed. Motor driver is made run by pressing the commands i.e., forward, backward, right, left sides by watching live streaming

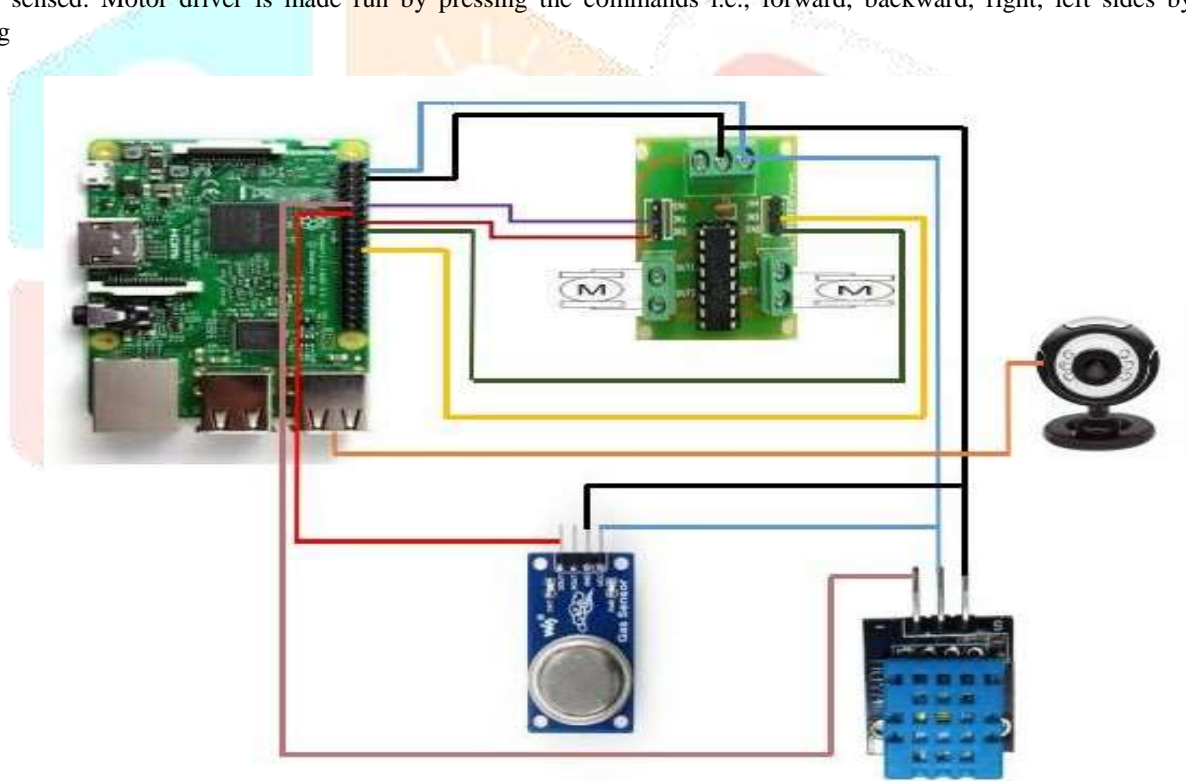


Figure 8. Schematic Diagram

IX. RESULT:

This surveillance mechanism includes a net camera mounted over it, through that we'll get live video feed, and therefore, the fascinating half here is that we are able to management and move this mechanism from an online browser over the web. Because it is often controlled victimization web page, means that it may also be controlled victimization web page in Mobile. We tend to engineer a web page in markup language that has Left, Right, Forward, Backwards links, clicking on that we are able to move the mechanism in any direction. It additionally includes a DHT11 detector and Gas detector to apprise through IFTTT. Once the temperature is high and any harmful gas is detected severally.

The below figure show the side view of the surveillance robot when it is turned on.

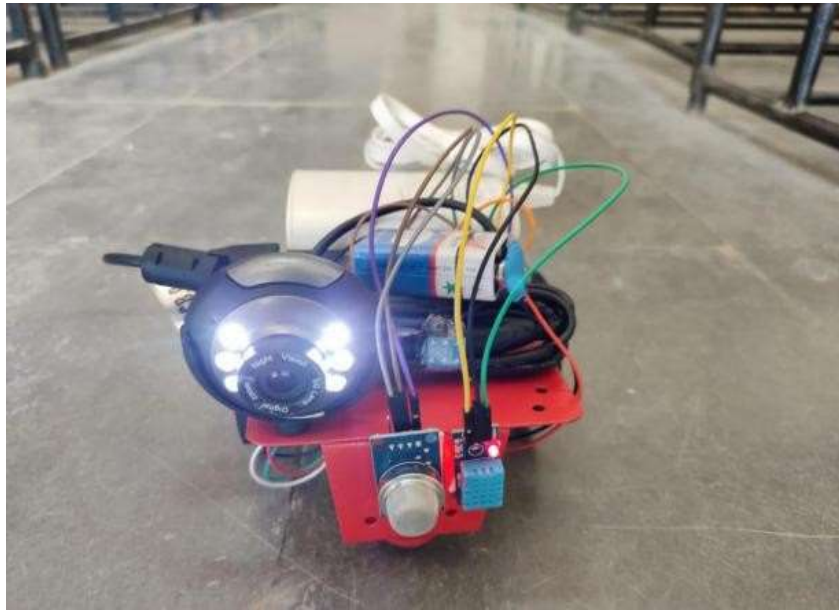


Figure 9. Surveillance robot

The below figure shows the HTML web page which is used to operate the robot



Figure 10. HTML webpage

Below figure shows the snapshot of the notification when the temperature is high

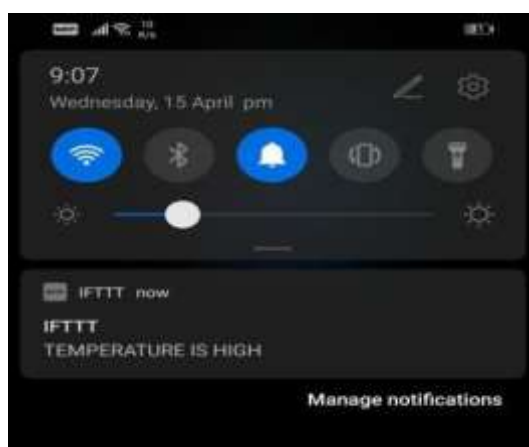


Figure 11. IFTTT Temperature notification

Below figure shows the snapshot of the notification when harmful gas is detected.

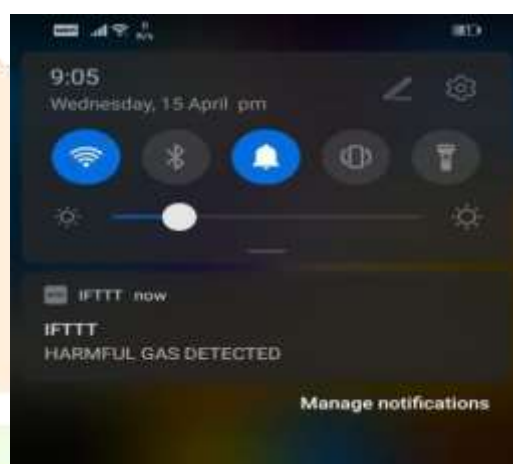


Figure 12. IFTTT Harmfull gas notification

X. CONCLUSION

This project elaborates the design and construction of Smart Electronic in surveillance system and data monitoring. After designing the circuit it enables us to control the robot using customized HTML web page which is connected to a server or can be connected to a private server which will be more secure.

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