

SECURBOT

Ms.J. Eindhmathy¹, Padma Shruthi.S², Princy.P³, Vaishali.T⁴, Varsha Dhanashri.S⁵

¹Assistant Professor, Department of ECE, Saranathan College of Engineering, Tiruchirappalli-620012.

UG students, Department of ECE, Saranathan College of Engineering, Tiruchirappalli-620012.

¹⁻⁵Anna University, Chennai-25.

¹eindhmathy-ece@saranathan.ac.in

⁴vaishalivaishu616@gmail.com

Abstract— Protecting any given area becomes difficult only with the help of human power. So, in order to safeguard a place and to monitor it in the absence of human beings this system has been proposed.

This system uses camera to protect any premises. The robot travels in a predefined path within the given premises and stops at particular point at regular intervals of time. These check points are kept in order to find any change in the output value of each sensor mounted on it. Sensors used are Fire sensor, Sound sensor, Rain sensor and Gas sensor. If any of the sensor values reaches its threshold level, then robot will move towards that particular direction and starts streaming the video to the IoT application. The robot follows the predefined path with the help of IR sensors mounted on it, also it avoids any obstacles in its path with the help of ultrasonic sensor.

Keywords— Raspberry Pi, IoT, Camera, Sensor, Video Stream.

I. INTRODUCTION

Robotics is an advanced technology, which is changing the human life and is found to be used in almost all fields of science and technology. This is because of its advancement in control and automation level. It works like a computer and can be operated on remote control as well. Security Robot is nothing but to keep monitoring over an area by regularly moving or traveling route of the corresponding area. It continuously works in its allocated area. It is mostly used in military areas, Hospitals, shopping mall, Industrial area. The main objective of the idea is to reduce the human effort. Also, it is very user-friendly, as this can be used anywhere with broadband internet connection.

II. LITERATURE SURVEY

In [1], This paper we suggest a robot patrolling security that uses night vision camera to protect any premises. The robotic vehicle is traveling at different intervals and is fitted with camera and sound sensors for the night vision. It uses a predefined line to patrol along its route. It monitors every area using 360degree rotating HD camera to detect any intrusion. Any sound after the firm is closed and on its predefined course it begins moving towards the sound. It then scans the area using its camera to recognize human face found. It records and begins to relay photographs of the situation immediately after identification of the sound or human face. This is where we use

IOT Local Area Network (LAN) to receive transmitted images and display them with warning sounds to the user.

In [2] this project, we propose a security patrolling robot that uses night vision camera for securing any premises. The robotic vehicle moves at particular intervals and is equipped with night vision camera and sound sensors. It uses a predefined line to follow its path while patrolling. It stops at particular points and moves to next points if sound are detected. It monitors each area to detect any intrusion using 360degree rotating HD camera. It captures and starts transmitting the images of the situation immediately on sound or human face detection. Here we use IoT Local Area Network (LAN) for receiving transmitted images and displaying them to user with alert sounds. Thus, we put forward a fully autonomous security robot that operates tirelessly and patrols large areas on its own to secure the facility.

In [3], This paper reviewed two algorithms for detecting human being in night vision videos. Proposed hot-spot algorithm uses black body radiation theory and the background subtraction algorithm uses the difference image obtained from the input image and a generated background image. The result analysis is done of the experiments performed on these approaches.

In [4], The project aims to build an autonomous robot using raspberry pi as a processing chip. An HD camera is used to provide and detect the obstacle from the real world to the robot. The robot is capable of avoiding the obstacle occurring in its path using an obstacle detection algorithm and move in an obstacle free path. The pi camera module will detect the obstacle in real time basis and using image processing algorithm it will detect the obstacle and feedback to the raspberry pi wherein it will change the path of the robot and divert it to obstacle free path.

In [5], In this paper, we introduce a new security mechanism to safeguard women during abnormal activities. New security mechanism has been proposed based on the patrolling robot using the Raspberry Pi. Here night vision

camera can be used for securing any premises. To improve the accuracy of the classifier, various machine learning models are used. Algorithms like Boosting, Bagging, Stacking and Enhanced reweight mechanism in Ensemble are used.

III. DESIGN METHODOLOGY

A. EXISTING SYSTEM

Protecting any area seemed to be quite difficult with only human beings as safe guards. Sometimes, the person gets exhausted or he/she may become incautious. At that time, anything can happen at that area. Like theft, fire accident or any poisonous gas leakage etc.

Women safety is also an issue in today's World. Women feel insecure when they step out of their home. To provide women safety, many developers have come with their own ideas. Codes like *91# are used to provide emergency services, which will alert police control. Also, some applications were developed to track the location using GPS. Sometimes, the device having that application may drain out of power and in such case, it is difficult to track the person.

Also, many equipment has been designed to help women when they are in danger situation. But the disadvantage of this method is that, the person has to carry that equipment always with her and need to press the emergency button to send the alert signal to the control room. Sometimes they may forget to carry the device or they may find it difficult to take the device out and send signal during emergency times.

All these methods may not help in finding the troublemakers. But with the development of science and technology it becomes very easy to protect any premises without human intervention or providing safety to women. So, to overcome problems like theft, abnormal activities and to replace human security guards, we have an idea of developing a system called "SECURBOT" using Raspberry pi and IoT.

B. PROPOSED SYSTEM

In this proposed system, a camera is connected to Raspberry Pi, the microcontroller. The camera is turned ON once the output value of the sensor reaches the threshold level. Sound sensor is used to detect any unwanted noise in a quite area. Once the noise is detected, the robot automatically moves towards that area and starts to stream the video to the IoT website. Similarly, smoke (Gas), fire and also rain is detected by the corresponding sensors mounted on the robot and the robot follows the path accordingly. This robot works continuously without getting tired or bored and streaming video to broadcast everything when any abnormal situation is encountered.

1) Camera and Sensors:

A camera mounted on the robot is connected to Raspberry Pi, the microcontroller. This camera is turned ON automatically, once the output value of any sensor reaches the

threshold level. Sound sensor is used to detect any unwanted noise in a quite area. Once the noise is detected, the robot automatically moves towards that area and starts to stream the video to the IoT website. Similarly, smoke (Gas), fire and also rain is detected by the corresponding sensors mounted on the robot and the robot follows the path accordingly.

2) Motion and Control:

The robot uses IR sensor to follow the predefined path. Ultrasonic sensor is mounted on the robot in order to avoid any obstacle in its path. The robot uses DC gear motors for its movement. These motors are connected to the motor driver L298N 2A, which takes low-current as input and turn it into a high current signal which can drive the motors. The microcontroller is powered by a 12volt battery.

3) Transmitting Data:

The robot uses IR sensor to follow the predefined path. Ultrasonic sensor is mounted on the robot in order to avoid any obstacle in its path. The robot uses DC gear motors for its movement. These motors are connected to the motor driver L293D, whose function is to take a low-current control signal and then turn it into a higher-current signal that can drive a motor. The microcontroller is powered by a 12volt battery.

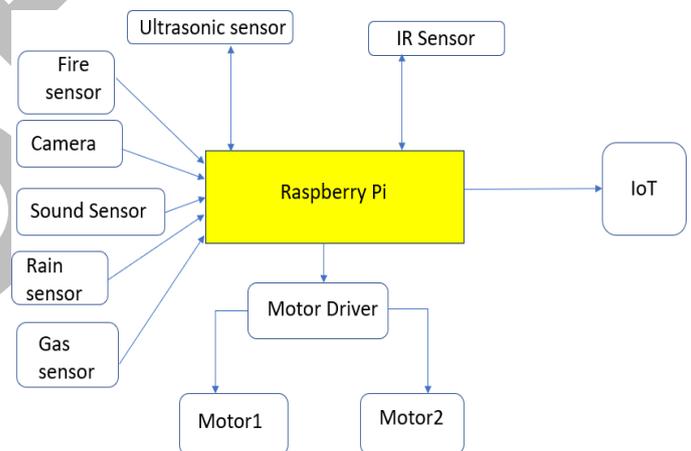


Fig.1 Block Diagram of the Proposed System

IV THEORY

Raspberry pi is a mini computer, which controls all the activities of this robot. The sensor data received from all the sensors is processed in the microcontroller. The processed data is sent to the IoT user interface.

IR sensors make the robot to travel in its predefined path. Black line is used to provide the predefined path. When the light emitted from IR sensor falls on the black line it gets

absorbed and will not be reflected to the photo diode. The ultrasonic sensor makes the robot to move without any collision with the objects in its way. When any object comes in the robot's path, then it takes another way and moves freely without any obstacles.

Fire sensor, Rain sensor, Gas sensor are mounted on the robot. When the premise being protected is under any danger from fire or any chemical being leaked in the particular premise or the goods in it are being damaged by the rain, then it is immediately detected and the information is sent to the premise authorities.

The user interface is an IoT platform, where the user can get data from the robot and take necessary steps to protect their premise from any danger before it becomes worse.

IV. RESULT

The prototype is tested and works successfully. This section consists of the results and the hardware setup.

The hardware implementation of our bot is shown in figure 3.

After all hardware and software setups, our SECURBOT starts moving towards its predefined path with the help of IR sensor and finds any obstacles in the moving path by the connected ultrasonic sensor. When any mischief or calamities happen like gas leakage, fire accident or any noise in the premise the particular sensors' output goes high, the camera is turned ON for live video-streaming in the Blynk IoT App.

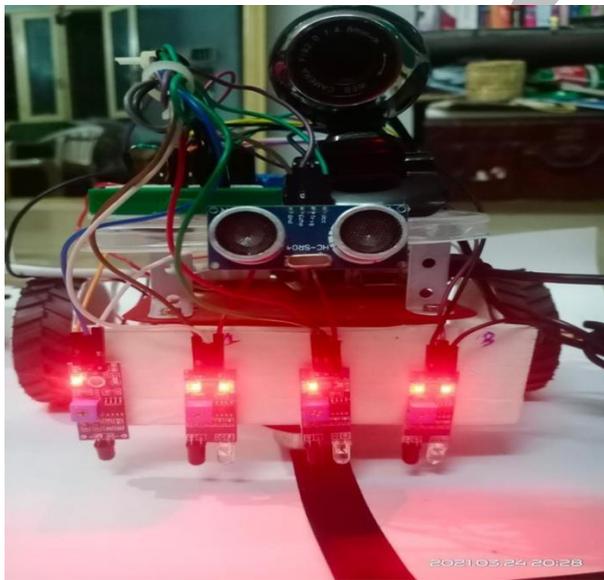


Fig.2 Hardware Implementation

After all hardware and software setups, our SECURBOT starts moving towards its predefined path with the help of IR sensor and finds any obstacles in the moving path by the connected ultrasonic sensor. When any mischief or calamities happen like gas leakage, fire accident or any noise in

the premise the particular sensors' output goes high, the camera is turned ON for live video-streaming in the Blynk IoT App.

V. OUTPUT

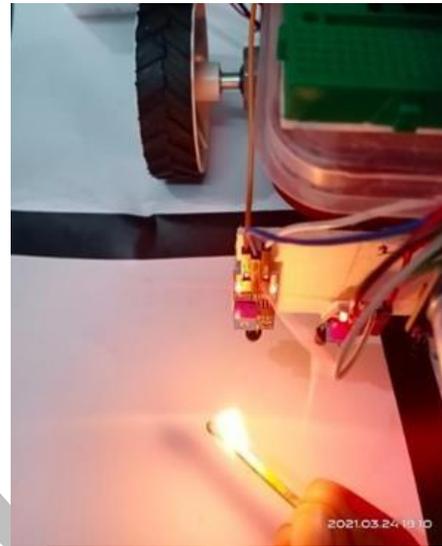


Fig.3 Fire Accident

When the bot is exposed to fire, the fire sensor detects it and the information is sent to microcontroller. The microcontroller processes the data and makes the camera to turn and starts to stream the live video the Blynk IoT app.

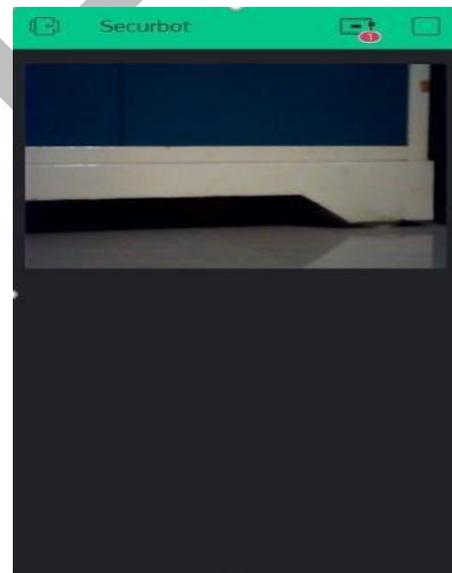


Fig.4 Video streaming in Blynk App

VII CONCLUSION

An overview of the design, implementation, testing and performance of a secure robotic vehicle developed for the purpose of detecting living and non-living things and displaying it at the user interface through an IoT application.

According to this system, whole area surveillance is done using the web camera and also automatic system when any of the sensors' value reaches the threshold level and will follow the predefined path and starts to stream the video to the Blynk application.

The Raspberry pi is used to control the movement of the robot. The experimental result that is the fetching of a good quality image is quick and clear. It can also measure the temperature values and detect harmful gases. It can also use for industry, surveillance of robot, office and museum etc.,

As they replace human at some region it is necessary that the robot will be protect our nation from the enemy. The system is capable of providing live streaming of images and alert the user. This system is a fully automatic system for patrolling purposes.

VII REFERENCES

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