

IoT BASED NIGHT PATROLLING ROBOT

A Project Report Phase – II

Submitted in partial fulfillment of the requirements for the award of
Bachelor of Engineering degree in Electronics and Communication Engineering

by

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

SCHOOL OF ELECTRICAL AND ELECTRONICS

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A” by NAAC

**JEPPIAAR NAGAR, RAJIV GANDHI SALAI, CHENNAI -
600 119**

APRIL – 2023



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BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of Zindha Madhar S.S (39130702), Tajmul Ahmed T (39130701) who carried out the project entitled "Iot BASED NIGHT PATROLLING ROBOT" under our supervision from November 2022 to April 2023.

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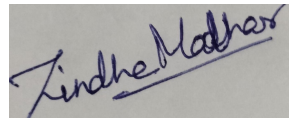
We Zindha Madhar S.S, Tajmul Ahmed T hereby declare that the Project Report entitled IoT BASED NIGHT PATROLLING ROBOT Done by us under the guidance of Dr. I REXLIN SHEEBA, M.E., Ph.D., is submitted in partial fulfillment of the requirements for the award of Bachelor of Engineering degree in Electronics and Communication Engineering.

DATE: 20.04.2023

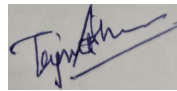
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ABSTRACT

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 stops at different points and if sound is heard it travels to next points. To patrol the allocated field, system uses the following IR-based path system. It monitors every area using camera to detect any intrusion. It has the capability of tracking sound at the premises. 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. We are therefore proposing a fully autonomous security robot that works constantly and patrols wide areas alone to protect the facility. various industries and sectors, and one of the most promising areas is robotics. In this context, an IoT-based night patrolling robot has been designed and developed to enhance the security measures in residential and commercial premises during the night hours. This robot is equipped with sensors, cameras, and wireless communication modules that allow it to collect and transmit real-time data to a central control system. The robot can also be remotely controlled and monitored through a web-based interface, enabling operators to detect and respond to potential security threats in a timely and efficient manner. The implementation of such an IoT-based night patrolling robot can significantly improve the security and safety of various properties, while reducing the need for human intervention and minimizing operational costs.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

A significant proportion of Indian firms might have faced data theft issues recently. Around 41 per cent of these companies saw such instances, compared to the global average of 29 per cent, showed a survey by a risk management and consultancy firm, released on Monday. India's number is higher than other countries such as the United States, the United Kingdom and Japan. Autonomous security robots are a new groundbreaking innovation in advanced security and surveillance technology. Guards patrolling an area with flashlights and batons never worked very well; however, today there is an immergence of smart security systems with intelligent sensors, embedded systems, autonomous control mechanism and mobile application. The first security surveillance robot was proposed by Everett, H. & Gage, D.W,1999 in "Mobile Detection Assessment and Response System (MDARS)". Since then, security robots have become a growing interest with increasing developments in research and application. The idea behind this is to secure the whole area of a building or premises. Any small sound results in the alert and robot automatically goes to the area and captures the image of that area and sends it to the user. The camera plays an important role in making an automatic robotic system. During the occurrence of an abnormal event like theft, the patrol robot detects the sound and captures the image of the intruder. The image of the intruder is sent to the security department via Email and Short Messaging Service. An automatic patrolling vehicle acts as a security patroller in the security system, which can monitor those dead zones of the traditional fixed surveillance system. Countless applications today are mobile service security robots, including autonomous navigation, security patrolling, housework, search-and-rescue operations, material handling, manufacturing, and automated transportation systems. Autonomous navigation remains one of the primary challenges in the mobile-robot industry; many control algorithms and techniques have been recently developed that aim to overcome this challenge. We use line follower with IR Sensors to perform night patrol navigation. The security patrol robot will utilize several sensors and motors to navigate indoors. It will also be able to communicate and be controlled via Wi-Fi.

1.2 PROBLEM STATEMENT

Women's safety is becoming a major worry in many parts of the world, and there is still worry in isolated locations for both women and men. Women half-filled of the world's population. But their survival has always been a concern, whether it's on the roads, trains, cabs, schools, or elsewhere, when it comes to living with honor and dignity. Women's empowerment in the country can be achieved once their safety and security are assured, whether at home, in isolated locations, or while traveling.

1.3 OBJECTIVE

The proposed system, Arduino is installed with the night vision camera that helps the system find the intruders and go for the automation. The robot covers a specific area and checks for any intruders when an intruder is detected, the owner is alerted by the buzzer sound. We propose a robot patrolling security which uses night vision camera to secure any premises. The robotic vehicle moves at specific intervals and is equipped with camera and sound sensors for night vision. In patrolling it uses a predefined line to follow its path. It stops at specific points and if sound is detected moves to next points. To patrol assigned area, the system uses IR-based path following system. It monitors each area using camera to detect any intrusion. It is capable of tracking sound at the premises. Any sound after company is closed and its predefined path begins to move towards the sound. It then scans the area using its camera to detect any identified human faces It captures and begins to transmit images of the situation immediately upon detection of sound or human face.

CHAPTER 2

LITERATURE SURVEY

2.1 LITERATURE SURVEY

Jian Wang et.al (2011) proposed an embedded remote video control device, focused on ARM and quick motion Stimulus algorithm. Harbin Herlongjiang proposed current H.264 codec-based video chaotic encryption schemes may be applied to two classes: before H.264 encoding, the original video data is encrypted with chaos; after H.264 encoding, it is encrypted with chaos. The main disadvantage of the two classes of schemes is that the contradictory problem between desirable safety and rapid frame rate is not well resolved. This paper presents a novel H.264 codec-based video-chaotic encryption scheme to cope with the problem, where the original video data is encrypted by a stream cipher and position scrambling with chaos after H.264 encoding. In particular, H.264 hardware encoding, multi-core multi-threading, H.264 data format protection and adaptive memory selection strategy are adopted for making the suggestion.

A. V. Shinde et al. (2019) developed Design and Implementation of a Remote Controlled Night Patrolling Robot Using IoT a remote-controlled night patrolling robot using IoT technology. The robot is equipped with various sensors, including temperature, gas, and motion sensors, which are used to detect any potential security threats. The robot can be controlled and monitored remotely through a web-based interface, which provides real-time data and alerts everyone possesses grate danger. By using the technology of combined minds of different fields we can make use of the robots. As you can see these robots are being used in wide range, both autonomous and manually. Robots are being used in military operations and transportation also. There are even few that will do things that no one can imagine. Ahsanul Hoque etal in used a robot with a remote controlled arm which can analyze a place or object using its sensor and send back the signal if anything occurred that alerts it danger protocol, by using the arm of the robot the particular area or object is scrutinized manually, in that they used SMS as signal but it can be developed by using processed image As in the they used artificial intelligence, that it works on the basis of the different data on criminals and the places where the crime rate is high and it patrols in the consisted way using navigation system.

S. Rajendran et.al (2020) developed a Network video capture framework is introduced in this paper using the nice ARM9 board support package (BSP) S3C2440. This application device captures video, shares between networked devices, and also alerts the controller with a short message service warning, as the client needs. This system operates in an environment in real time, and is supported by RT Linux embedded. This system provides low cost and high efficiency intelligent monitoring systems with low power consumption, such as elevators, home security systems, etc. Power consumption small. This real-time system provides a client video monitor with the help of friendly ARM9 BSP, unlike other embedded systems.

S. R. Varma et.al (2021) developed a Smart Security System Using IoT and Robot for Night Patrolling that integrates a night patrolling robot with an IoT-based control system. The robot is equipped with various sensors, including temperature, humidity, and gas sensors, which are used to detect any potential security threats. The system also includes an AI-based algorithm that analyzes the data and triggers alerts in case of any security threats.

Multi-environment robot for surveillance and live streaming is designed to install real-time surveillance system possible within a local network. The live streaming is accomplished using mpeg streamer and the server-client model is built using java as IP-based deployment offers access from image quality and is also advantageous in terms of scalability and versatility. But IP-based systems require some networking knowledge and these systems are too expensive than the analog ones A server-client model incorporates this robot controlled with raspberry pi. This client-server model is built on java, and can therefore work on any system like windows, Mac, or Linux. This entire model is linked to a local network and can be managed from anywhere by anyone accessible in that specific local network. MJPG streamer conducts live streaming. We proposed a framework to create a live streaming and monitoring system in real time using this whole model is linked to a local network so it can be operated from anywhere by anyone accessible in that specific local network. MJPG streamer conducts live streaming. Raspberry pi, with Wi-Fi connectivity installed. The pi will record the video of the location in real-time during monitoring process. Video capture is done via commands that are provided to the raspberry pi through the device.

Raspberry pi connection with the motor driver is done using Raspberry Pi's General Purpose Input Output (GPIO) pins. The GPIO pins are connected to the

motor-shield input pins. The motor shield's exit pins are connected to the motors. The motor shield and the raspberry pi are connected by a portable charger with 2-amp current. Upon proper attachment the raspberry pi is able to boot up. For controlling the motors, a Python program is written where the GPIO pins will deliver the output from the raspberry pi to the shield. The robot movement is controlled through the directions mentioned on the web page created using Hyper Text Markup Language (HTML) code and webpage Universal Resource Locator (URL) address. The Raspberry Pi model B communicates this process through Wi-Fi. The camera module is installed in its port and is enabled in raspberry pi configurations.

The Raspberry pi and Open CV Smart Security Camera is a surveillance device built to be used within a warehouse facility. Using a raspberry pi, this system is conceived using a low cost safety camera with night vision capability. This system has the ability to detect and detect human smoke which can be used to prevent possible crimes and potential fire. The researchers have developed a light-footed surveillance camera that can identify the condition of the scene being monitored and also notify or alert the event. This system also offers nighttime security, as it has the potential to provide night vision. Night vision capability is accomplished by simply eliminating infrared (IR) filter from an ordinary webcam and can thus be used with the aid of the IR Light Emitting Diode illuminator for night vision sensing. The system can also use background subtraction algorithm to detect movement of an object. When a moving body is detected, it may be marked as person or smoke by the system. When smoke is detected the device may alert fire or unauthorized individual in the form of an alarm and email.

Face recognition is still a very difficult task when the image of the input face is noisy, obstructed by other obstacles. Low-resolution, camera not facing and not properly lit. These problems contribute to the extraction of the feature and Face recognition system unstable as a consequence. In this paper the system proposed incorporates the novel idea of using hair-like characteristics, which were widely used in Item recognition and the probabilistic facial classification Reconnaissance. The system proposed is simple, real-time, efficient and robust against most of the problems described. Experimental findings on public databases show the proposed. The system actually outperforms state of the art facial recognition systems.

Describes a machine learning approach for the detection of visual objects which

can process images Extremely fast and attain high detection rates. That's it. Three key contributions distinguish work The former Is the implementation of a new representation of pictures, called "Integral lineage" which enables our detector to measure its features very quickly The second is a learning process AdaBoost based algorithm, which selects a small number of essential visual features and yields from a larger collection Extremely elliptical The third contribution consists of a method for combining ever more complex classier in a "cascade" that allows background regions of the classier Image to be discarded quickly while spending more calculation on promising regions like objects Might be the cascade Seen as a special focus-of-attention mechanism for object Which, unlike previous approaches, provides statistical guarantors who are unlikely to have the object of interest in discarded regions, In the face recognition domain the machine Returns equivalent detection rates to the best previous systems. The Detector is used in real-time applications 15 frames per second without the use of differentiating pictures or detecting skin colours.

2.2 Development of the System

There is a need to develop a device that can detect the operation in this area and send the inspection device nearby a message. Within this framework, they render a spy robot using Raspbian operating system with remote monitoring and control algorithm.

The spy robot system is connected to three types of equipment including an Arduino board, a camera and a night vision sensor. The information collected about the activities that operate on the front of the camera is sent to users via the web server which can be posted simultaneously on the web page. Cheng Tang et.al (2013), do a night out on the road based on a planar reflection model in 2013. It has given diverse road detection ideas and different monitoring concepts.

Road and street surveillance is also very important to conduct various activities such as identification of pedestrians, any suspicious behavior, etc. This system grades the pixels of the route image. Various projects are planned for daytime activities so far but no such work is done for night. This technology centers the identification for any insufficient nighttime practices. As this device is based on vision and can discern the path according to the view, when some other thing, as for birds or car, get inside the photo it will face difficulty. Here a planar reflection model is practical with an infrared

camera to distribution of the strength of the different pixels. For that, a classification based on pixels is used to test whether or not the various pixels belong to the lane. If it only decides the surface of the road then the further cycle starts.

Kirk Mac Tavish et.al (2017) proposed a visual odometry with headlights which measures relative transfer for mobile robotic systems with a series of camera images. A camera can be used to get vast quantities of input data, which are comparatively cheap sensors, making it highly costly functional captures in mobile robots. As this is a passive part, however, it will be dependent on external strength, which can decrease its accessibility.

Some of the other services outlets for lighting purposes as for headlights can be used. With this can use headlamps as an alternative light source; the paper examines the VO stereo outdoor output with the lighting conditions for mainly 10 kms of 30-hour travel area. The scope of visibility, a complex source of light, speed highlights etc. are among these different challenges.

2.3 Surveillance using IoT

A Surveillance System using Internet protocol of Raspberry Pi was implemented in which the Raspberry Pi and internet protocol are used to build a surveillance device with a spy robot. A survey of a mobile robot with GPS observations is suggested in this paper. When it comes to the robot's monitoring, GPS technology is crucial. The system can further be improved to provide outputs of high accuracy and stability. Chinmay A. Dandekar (Electrical Department, VIVA Institute of Technology, India) VIVA Institute of Technology 9th National Conference on Role of Engineers in Nation. Arduino-controlled war field spy robot with a night vision wireless camera and an Android application was developed. The main goal of creating this robot is to track human activities in war zones or border regions to minimize enemy infiltration. The robot is equipped with a night vision wireless camera that can relay images of the battle ground to avoid human casualties. The range of distance of the system might be increased to improve its efficiency. IoT has become increasingly popular in recent years, as it offers a range of benefits for monitoring and securing various environments. IoT-enabled surveillance systems use a combination of connected devices and sensors to collect and analyze data from the environment, providing real-

time alerts and insights. In public safety, IoT sensors can be installed in public spaces such as parks and streets to monitor traffic flow, detect accidents, and monitor potential criminal activity. This can improve the response time of emergency services and help prevent accidents and crime. IoT-enabled cameras and sensors can be installed in homes to monitor activity and detect potential intruders, providing homeowners with increased security and peace of mind. This technology can also be used in industrial settings to monitor equipment, detect malfunctions, and ensure worker safety. environmental monitoring is another important application of IoT surveillance systems. IoT sensors can be used to monitor air and water quality, detect environmental hazards, and track weather patterns, helping to prevent and mitigate environmental disasters. surveillance using IoT offers a range of benefits, including enhanced safety, real-time monitoring, and improved situational awareness. However, it is important to ensure that these systems are implemented in a secure and privacy-respecting manner to protect personal data and prevent misuse.

CHAPTER 3

PROPOSED SYSTEM

An IoT-based night patrolling robot is a machine designed to patrol an area during the night while utilizing internet connectivity and sensors. Its primary objective is to ensure the safety and security of the area by identifying and reporting any unusual or suspicious activity. The robot's design should enable it to navigate easily without getting stuck or damaged and withstand harsh weather conditions. Sensors such as infrared, ultrasonic, LIDAR, motion, and sound should be incorporated into the design to detect obstacles and unusual activity. Additionally, the robot should be connected to the internet and equipped with a powerful processor and memory for data storage and processing. It should have a reliable power source, preferably rechargeable batteries, to sustain it for long hours. Security features should also be included in the robot's design to prevent unauthorized access or control.

3.1 AIM

The aim of a night patrolling robot is to provide surveillance and security in areas that require monitoring during nighttime hours. These robots are designed to move autonomously and can be equipped with a variety of sensors such as cameras, infrared sensors, and microphones to detect and respond to potential threats.

Night patrolling robots can be used in a variety of settings, such as industrial facilities, warehouses, and outdoor environments, to enhance security and prevent unauthorized access. They can also be used in public spaces such as parks, parking lots, and city streets to monitor and respond to potential security threats. Overall, the aim of a night patrolling robot is to increase security and provide peace of mind for individuals and organizations by keeping a watchful eye on their surroundings during nighttime hours.

In the current approach, the patrol robot must be commanded remotely by a person who must monitor the region via remote control, necessitating the use of additional human resources. Some solutions necessitate the use of a smartphone to control the night vision robot. Because some people use a local host web page, the

control range is confined to the local network. Due to a lack of parts, autonomous operation necessitates the use of a workforce. As a result, a great deal of human work is required. Also, because this is a time-consuming operation, errors may arise.

The IoT sensors in the night patrolling robot can collect data such as temperature, humidity, and motion detection, which can be analyzed to identify potential security breaches or safety hazards. The robot can be equipped with cameras, infrared sensors, and microphones to detect and record any unusual activity, and transmit this data to a central monitoring system for further analysis.

The use of IoT in night patrolling robots can also enable remote monitoring and control, allowing security personnel to monitor and control the robot's movements and actions from a central location. This can improve situational awareness and response times, as security personnel can quickly respond to potential threats. Security: Night patrolling robots can provide enhanced security in various environments, such as warehouses, industrial facilities, and public spaces. Surveillance: These robots can be equipped with cameras and sensors to monitor and detect any suspicious activity during nighttime hours. Search and rescue: Night patrolling robots can be used in emergency situations, such as natural disasters or building collapses, to search for survivors and provide assistance. Environmental monitoring: These robots can be used to monitor environmental conditions during nighttime hours, such as air and water quality. Agriculture: Night patrolling robots can be used in agriculture to monitor animal intrusion, detect thefts, and perform other tasks that require nighttime monitoring. Maintenance: Night patrolling robots can be used in industrial facilities and power plants to monitor equipment and detect any malfunctions or anomalies that need maintenance.

There is no requirement for regular monitoring in our proposed system. It's completely automatic. It does not produce any faults, and the time it takes to do any activity is quite short, making this system a worthy robot. The IR Sensor is utilised in this project to make the robot travel automatically along a predetermined course. A sound sensor is used to determine the sound level in a specific region. The photos are collected by the camera and then sent to the control room.

3.2 PROPOSED METHODOLOGY

In this proposed device, Raspberry pi is equipped with the night vision camera that helps the user to go for automation and helps to find the person or any problem detected using the sound sensor and automatically goes to that area and captures the image and sends it to the user using IOT technology according to the sound generated. The robot has a range of knowledge to protect the greater region. This robot uses two infrared sensors that can detect obstacles robot on both hands. When the barrier does is at the front of the robot it changes its direction to the opposite side of it.

Raspberry pi is installed with the night vision camera which help the system to go for the automation and help to find the human or any problem detected using the sound sensor and according to the sound produced it automatically goes to that area and capture the image and send it to user using IoT technology

In the robotic world, Microphone is used to detect sounds in the real time and send them to the monitoring system. The live photos and videos are recorded by the vision system. Two generators are enough to power the module for robot movement. Because the number of gears in the motor is small, less power consumption will be received. This robot will be moving front and backwards using infrared sensors with the help of wheels with the use of Dc engine. Dc engine transforms electrical power into mechanical power. This motor consists of 60 torque, this torque helps to move the wheels. Here a 12volt battery is used to supply the power to the motor. Where the it is used to connect to the Wi-Fi. After connecting to the Wi-Fi, the captured pictured and will be visible in the operators mobile.

There is a sound sensor using in the robot. This sound sensor will sense the sound with the particular frequency and after sensing the sound the robot will move towards the sound recognized side and the camera will be switched on and the camera will record the video with the audio file.

3.2.1 APPLICATION

- Used for the safety of women
- Used for the safety of children
- Used for the safety of physically challenged people
- Applicable as legal evidence of crime

- Remote regions can likewise be investigated

3.3 FLOWCHART

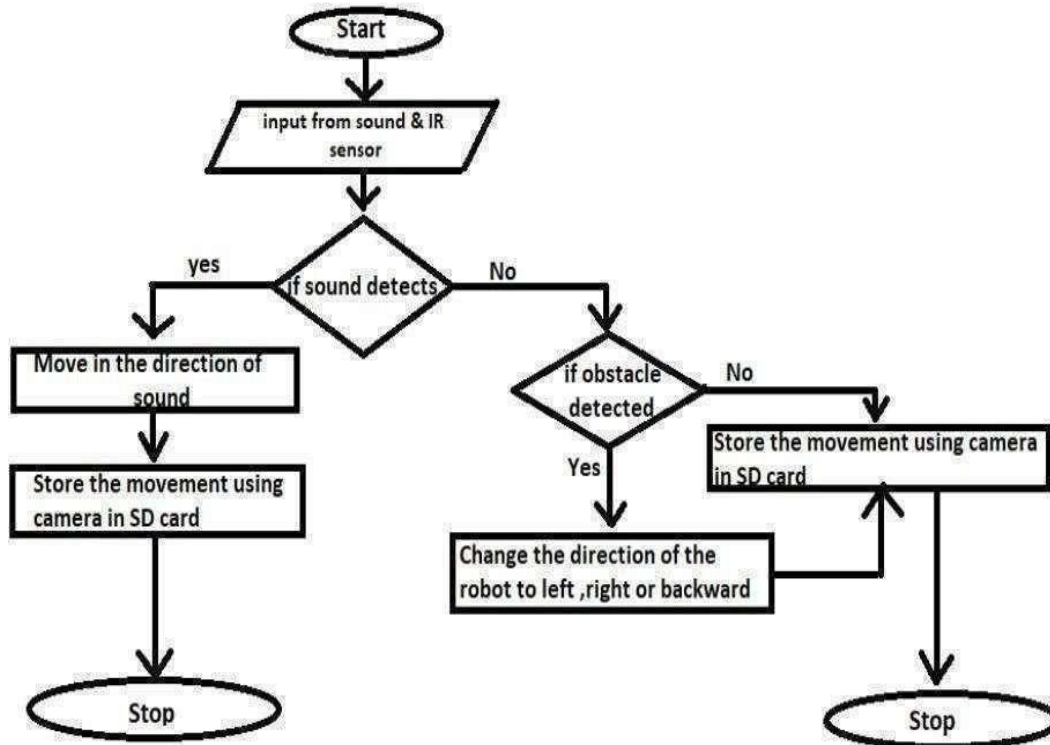


Fig: 3.1: FLOWCHART

Using strength statistics, the robot looks for a fine course first. While on patrol, the robot follows any intruder sit detects, takes a photo of them, and uploads the images in real time. All inspection factors are identified and signed in electronically by the robotic strategies, after which the inspection aspect variety and sign-in time are uploaded.

3.4 BLOCK DIAGRAM OF NIGHT PATROLLING ROBOT

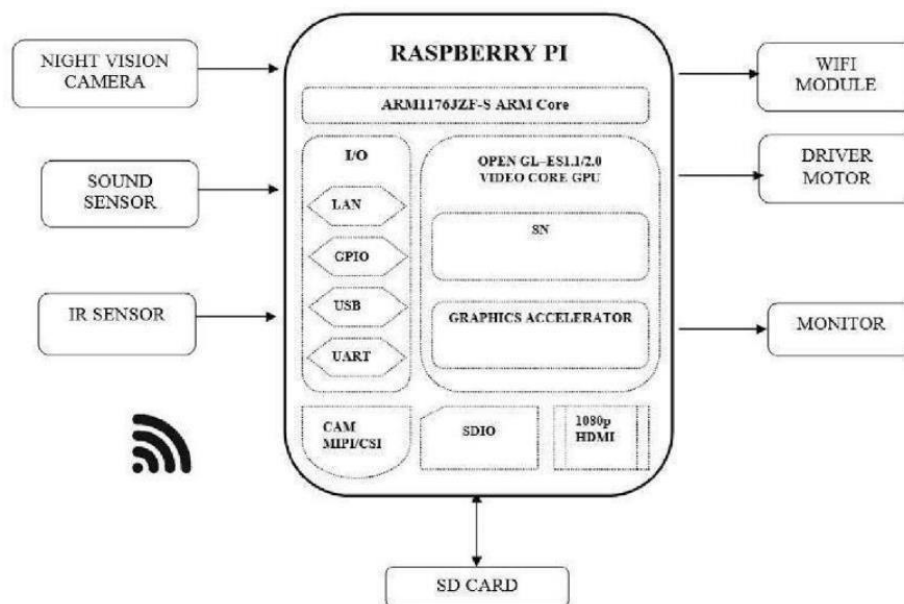


Fig: 3.2: BLOCK DIAGRAM OF NIGHT PATROLLING ROBOT

3.4.1 BLOCK DIAGRAM DESCRIPTION

In this project IR Sensor is used to make the robot move automatically following a specific path. Sound sensor is used to know the sound in the particular area. IoT is used to send the capture image to the person. Connect USB camera with raspberry pi. Connect power supply for Raspberry pi. Plug the HDMI cable in Raspberry pi from the monitor using VGA to HDMI converter cable. Connect USB Mouse and USB keyboard to the Raspberry pi.

3.5 HARDWARE REQUIREMENTS

- Raspberry pi 3
- Raspberry pi Camera
- Sound Sensor
- Dc Motor
- 9V Battery
- Ultrasonic Sensor

3.5.1 RASPBERRY PI 3

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B.

Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs.

The Raspberry Pi 3 is the third generation Raspberry Pi. It replaced the Raspberry Pi 2 Model B in February 2016. The Raspberry Pi 3 has an identical form factor to the previous Pi 2 (and Pi 1 Model B+) and has complete compatibility with Raspberry Pi 1 and 2.



Fig: 3.3: RASPBERRY PI 3

The best part about all this is that the Pi 3 keeps the same shape, connectors, and mounting holes as the Pi 2. Dual Core Video Core IV® Multimedia Co-Processor. Provides Open GL ES 2.0, hardware-accelerated OpenVG, and 1080p30 H.264 high-profile decode.

To get started we will need to:

- A monitor or TV screen to set-up your Pi
- A keyboard to interact with your Pi
- A mouse to navigate your Pi

- A power supply
- An SD card with the latest version of New Out Of Box Software (NOOBS), to install the operating system that you would like to use.

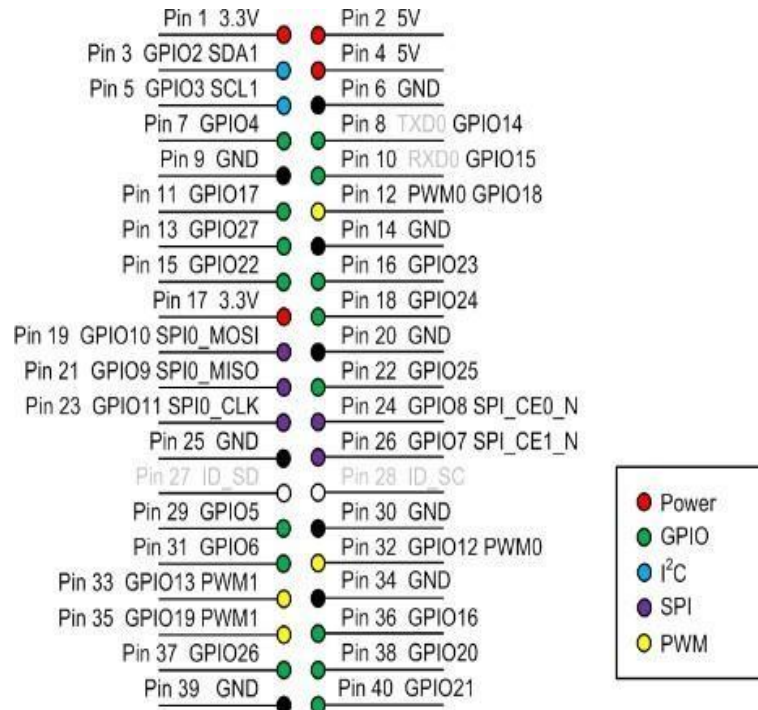


Fig: 3.4: PIN CONFIGURATION OF RASPBERRY PI

To get sound and video cables are required to connect the screen or monitor to display. For those with monitors that accept VGA, a HDMI to VGA adaptor is needed in addition to a HDMI cable, unless you use the composite video output from the Pi.

For an internet connection, the Pi B+ and Pi 2 B have an ethernet port. which has the option of adding a WiFi Adapter/Dongle which may mean that the need of an USB Hub if ran out of USB ports. The Pi 3 already has 802.11 b/g/n wireless LAN and Bluetooth 4.1 (Bluetooth Classic and Low Energy).

3.5.1.1 FEATURES

- A 1.2GHz 64-bit quad-core ARMv8 CPU
- 802.11n Wireless LAN
- Bluetooth 4.0
- Bluetooth Low Energy (BLE)

- 1GB RAM
- 40 GPIO pins
- Ethernet port

3.5.1.2 APPLICATIONS

- Server/cloud server
- Security monitoring
- Environmental sensing/monitoring (e.g., weather station)
- IOT applications
- Robotics
- Wireless access point
- Print server

3.5.2 RASPBERRY PI CAMERA

The Raspberry Pi Camera Module v2 is a high quality 8 megapixel Sony IMX219 image sensor custom designed add-on board for Raspberry Pi, featuring a fixed focus lens. It's capable of 3280 x 2464 pixel static images, and also supports 1080p30, 720p60 and 640x480p60/90 video. It attaches to Pi by way of one of the small sockets on the board upper surface and uses the dedicated CSI interface, designed especially for interfacing to cameras.

The Raspberry Pi Camera Module Version 2 is a small and lightweight camera module that is easy to use. It can be easily connected to the Raspberry Pi board via the CSI port, and it can be controlled using the official Raspberry Pi camera software. The camera module has a compact design, making it ideal for projects that require a portable camera.

One of the key features of the Raspberry Pi Camera Module Version 2 is its improved low-light performance compared to the previous version. This makes it ideal for applications that require night-time or low-light photography. Additionally, this camera module has been designed to be compatible with a wide range of Raspberry Pi projects, including robotics, surveillance, and photography.

The board itself is tiny, at around 25mm x 23mm x 9mm. It also weighs just over 3g, making it perfect for mobile or other applications where size and weight are important. It connects to Raspberry Pi by way of a short ribbon cable. The high quality Sony IMX219 image sensor itself has a native resolution of 8 megapixel, and has a fixed focus lens on-board. In terms of still images, the camera is capable of 3280 x 2464 pixel static images, and also supports 1080p30, 720p60 and 640x480p90 video

- 8 megapixel native resolution sensor-capable of 3280 x 2464 pixel static images
- Supports 1080p30, 720p60 and 640x480p90 video
- Camera is supported in the latest version of Raspbian, Raspberry Pi's preferred operating system



Fig: 3.5: CAMERA

3.5.2.1 APPLICATION

- CCTV security camera
- Motion detection
- Time lapse photography

3.5.3 SOUND SENSOR

One type of module is used to detect the sound is a sound sensor. This is usually used for measuring the sound strength. This system uses a microphone to

provide buffer data, peak detector, and an amplifier. This sensor detects a vibration and processes a microcontroller's voltage signal to o/p.

The sound sensor is one type of module used to notice the sound. Generally, this module is used to detect the intensity of sound. The applications of this module mainly include switch, security, as well as monitoring. The accuracy of this sensor can be changed for the ease of usage. This sensor employs a microphone to provide input to buffer, peak detector and an amplifier. This sensor notices a sound & processes an o/p voltage signal to a microcontroller. After that, it executes required processing. This sensor is capable to determine noise levels within DB's or decibels at 3 kHz 6 kHz frequencies approximately wherever the human ear is sensitive. In smartphones, there is an android application namely decibel meter used to measure the sound level.

- Pin1 (VCC): 3.3V DC to 5V DC
- Pin2 (GND): This is a ground pin
- Pin3 (DO): This is an output pin



Fig: 3.6: SOUND SENSOR

The working principle of this sensor is related to human ears. Because human eye includes a diaphragm and the main function of this diaphragm is, it uses the vibrations and changes into signals. Whereas in this sensor, it uses a microphone and the main function of this is, it uses the vibrations and changes into current otherwise voltage. Nowadays, a lot of security events are initiated due to some sort of sound which includes gunshots, aggressive behavior, breaking the glass. But cameras with inbuilt sound exposure facilities can add huge value to the security system. Because

they give an alert automatically when real and potential incidents occur. Then immediately they activate quick and appropriate actions to reduce the consequences.

3.5.4 DC MOTOR

A machine that converts DC electrical power into mechanical power is known as a Direct Current motor. DC motor working is based on the principle that when a current carrying conductor is placed in a magnetic field, the conductor experiences a mechanical force.

When an electric current is applied to the motor, it creates a magnetic field that interacts with the magnetic field of the permanent magnets. This interaction creates a torque that causes the rotor to rotate.

DC motors are widely used in a variety of applications, including robotics, automation, and transportation. They are preferred for their simple construction, ease of use, and low cost. DC motors are available in a wide range of sizes and power ratings, making them suitable for both small and large-scale applications.

The speed and direction of a DC motor can be controlled by varying the voltage and polarity of the applied current. This makes DC motors highly versatile and suitable for a wide range of applications.

An electric motor is an electrical machine which converts electrical energy into mechanical energy. The basic working principle of a DC motor is: "whenever a current carrying conductor is placed in a magnetic field, it experiences a mechanical force". The direction of this force is given by Fleming's left-hand rule and its magnitude is given by:

- $F = BIL$
- B = magnetic flux density, I = current,
- L = length of the conductor within the magnetic field.



Fig: 3.7: DC MOTOR

3.5.5 9V BATTERY

9-volt battery, in its most common form was introduced for the early transistor radios. It has a rectangular prism shape with rounded edges and a polarized snap connector at the top. This type is commonly used in walkie talkies, clocks and smoke detectors. They are also used as backup power to keep the time in certain electronic clocks.

This format is commonly available in primary carbon-zinc and alkaline chemistry, in primary lithium iron disulfide, and in rechargeable form in nickel-cadmium, nickel-metal hydride and lithium-ion. Mercury oxide batteries in this form have not been manufactured in many years due to their mercury content.

9V battery has a rectangular prism shape with rounded edges and a polarized snap connector at the top. A zinc-carbon (6F22) battery is a dry cell battery that delivers a potential of 1.5 volts between a zinc metal electrode and a carbon rod from an electrochemical reaction between zinc and manganese dioxide mediated by a suitable electrolyte.

It was introduced for the early transistor radios. It is usually conveniently packaged in a zinc can which also serves as the anode with a negative potential, while the inert carbon rod is the positive cathode. An advantage is that several nine-volt batteries can be connected to each other in series to provide higher voltages.



Fig: 3.8: BATTERY

3.5.5.1 FEATURES

- Output voltage: 9v
- Current capacity: 400mAh
- Approximate Volume: 0.2 cu. in. (3.3 cu. Cm.)
- Approximate Weight: 0.4 oz. (11 gm.)

3.5.5.2 APPLICATIONS

- Walkie talkie
- It is used to assorted electronics projects.
- Use a 9V battery clip to easily connect your 9V battery to your Arduino.

3.5.6 ULTRASONIC SENSOR

Ultrasonic sensor is an instrument that measures the distance to an object using ultrasonic sound waves. An ultrasonic sensor uses a transducer to send and receive ultrasonic pulses that relay back information about an object's proximity. High-frequency sound waves reflect from boundaries to produce distinct echo patterns.

Ultrasonic sensors are used primarily as proximity sensors. They can be found in automobile self-parking technology and anti-collision safety systems. Ultrasonic sensors are also used in robotic obstacle detection systems, as well as manufacturing technology. In comparison to infrared (IR) sensors in proximity sensing applications, ultrasonic sensors are not as susceptible to interference of smoke, gas, and other airborne particles.

An ultrasonic sensor is a device that uses sound waves with frequencies above the range of human hearing (typically above 20 kHz) to detect and measure the distance of objects. The sensor emits a high-frequency sound wave and measures the time it takes for the wave to bounce back after hitting an object. By measuring the time delay and knowing the speed of sound, the distance to the object can be calculated.

Ultrasonic sensors are commonly used in various applications, including robotics, automation, and distance measurement. They can be used to detect the presence of objects, measure distances, and even determine the level of liquids in containers. They are widely used in industries such as automotive, manufacturing, and healthcare.

There are two types of ultrasonic sensors: active and passive. Active sensors emit sound waves and measure their reflections, while passive sensors detect sound waves emitted by other sources. Active sensors are more commonly used and can provide accurate distance measurements.



Fig: 3.9: ULTRASONIC SENSOR

3.5.6.1 WORKING

Ultrasonic sensors work by sending out a sound wave at a frequency above the range of human hearing. The transducer of the sensor acts as a microphone to receive and send the ultrasonic sound. Our ultrasonic sensors, like many others, use a single transducer to send a pulse and to receive the echo. The sensor determines the distance to a target by measuring time lapses between the sending and receiving of the ultrasonic pulse. The working principle of this module is simple. It sends an ultrasonic pulse out at 40kHz which travels through the air and if there is an obstacle or object, it will bounce back to the sensor. By calculating the travel time and the speed of sound, the distance can be calculated. Ultrasonic sensors are a great solution for the detection of clear objects. For liquid level measurement, applications that use infrared sensors, for instance, struggle with this particular use case because of target translucence.

When the ultrasonic sensor is activated, it emits a high-frequency sound wave. This sound wave travels through the air and when it encounters an object, it is reflected back to the sensor. The sensor then detects the reflected sound wave and calculates the time it took for the sound wave to return.

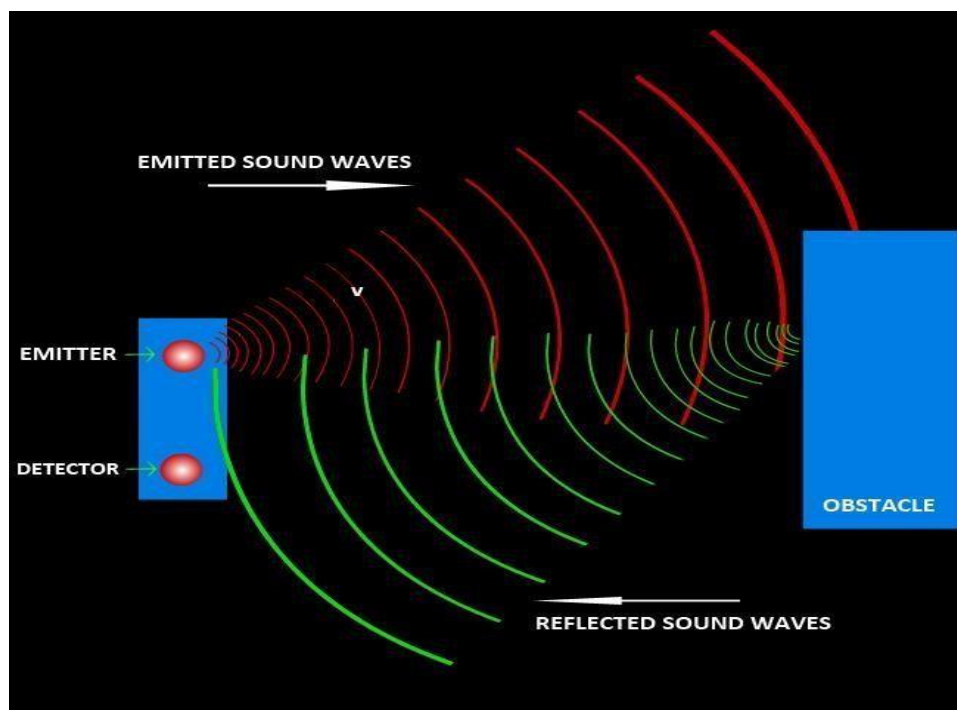


Fig: 3.10: WORKING OF ULTRASONIC SENSOR

The time-of-flight measurement is used to determine the distance of the object. The sensor sends a trigger signal and starts a timer. When the sound wave is reflected back by the object, it is detected by the sensor, which stops the timer. The time elapsed between the start and stop of the timer is proportional to the distance of the object from the sensor.

The distance calculation is based on the speed of sound in air, which is approximately 343 meters per second (at room temperature and atmospheric pressure). The distance can be calculated by multiplying the time taken by the sound wave to travel to the object and back by the speed of sound, and dividing the result by two.

4.5.6.2 ADVANTAGES

When used for sensing functions, the ultrasonic method has unique advantages over conventional sensors

- Measures and detects distances to moving objects.
- Impervious to target materials, surface and color.
- Solid-state units have virtually unlimited, maintenance-free lifespan
- Detects small objects over long operating distances
- Resistant to external disturbances such as vibration, infrared radiation, ambient noise and EMI radiation.
- Ultrasonic sensors are not affected by dust, dirt or high-moisture environments.
- The Sound Course of Action.
- Design for Applications.
- High Volume, Low Cost Manufacturing.
- Private Labeling.
- Short Development Cycles.
- Exclusive Custom Designs for OEMs.
- Short Range Communications and Positioning.
- Collision Avoidance Systems.
- Obstacle Detection and Ranging.
- On/Off Road Vehicles, Tracked Vehicles.
- Factory Automation.

3.6 SOFTWARE REQUIREMENTS

- RASPBIAN
- LAMP Server
- VNC Viewer
- IoT Cloud Data

3.6.1 RASPBIAN

Raspbian is a free operating system based on Debian optimized for the Raspberry Pi hardware. An operating system is the set of basic programs and utilities that make your Raspberry Pi run. However, Raspbian provides more than a pure OS: it comes with over 35,000 packages, pre-compiled software bundled in a nice format for easy installation on your Raspberry Pi.

The initial build of over 35,000 Raspbian packages, optimized for best performance on the Raspberry Pi, was completed in June of 2012. However, Raspbian is still under active development with an emphasis on improving the stability and performance of as many Debian packages as possible.

- An SD card 4GB
- A PC with Windows operating System.
- The Raspbian Wheezy .IMG file.
- Raspberry Pi 2

Raspbian Wheezy .IMG file can be downloaded from the official Raspberry Pi website for free of cost. Under the header “Raspbian ‘wheezy’”, download either the torrent or direct download. The torrent has the potential to be faster, but some firewalls may block the required ports and you may have to use the direct download instead.

Once the ZIP file downloaded to your computer, unarchive it. There will be a single .img file inside. This is the disk image you will flash to the Raspberry Pi’s SD card. To install Raspbian, you will need an SD card that has 2 GB of space or more—this cheap 16 GB Class 10 SD card works great on the Raspberry Pi and gives you plenty of room to add media and other programs once Raspbian is installed.

3.6.2 LAMP SERVER

A LAMP server is a popular web development and hosting platform that combines the Linux operating system, the Apache web server, the MySQL database management system, and the PHP programming language. The acronym LAMP stands for Linux, Apache, MySQL, and PHP.

The Linux operating system provides the foundation for the LAMP server, providing a stable and secure environment for web development and hosting. The Apache web server is used to serve web pages and applications to users, and can be configured to handle a wide range of web development tasks.

MySQL is a popular relational database management system that is used to store and retrieve data in web applications. It is highly scalable and can handle large amounts of data with ease. PHP is a server-side scripting language that is used to create dynamic web content and to interact with databases.

Together, these technologies provide a powerful and flexible platform for web development and hosting. LAMP servers can be used to create a wide range of web applications, from simple static websites to complex e-commerce sites and web-based applications.

One of the key benefits of the LAMP server is that it is open-source, meaning that the software is freely available for use and modification. This has led to a large and active community of developers and users who contribute to the ongoing development and improvement of the platform.

Overall, the LAMP server has become a popular choice for web development and hosting, and its combination of Linux, Apache, MySQL, and PHP provides a powerful and flexible platform for building web applications of all types and sizes.

3.6.2.1 LINUX

Linux is an open-source operating system that has gained immense popularity over the years due to its stability, security, and flexibility. One of the key features of Linux is its open-source nature, which allows users to modify and distribute the source code. Linux is also known for its stability, as it can run for long periods of time without

needing to be rebooted. In terms of security, Linux is generally considered to be more secure than other operating systems due to its design and the fact that it is less targeted by malware and viruses.

Another advantage of Linux is its customizability. Users can configure Linux to meet their specific needs and preferences, making it a versatile choice for a wide range of applications. Linux also supports a wide range of hardware and software, making it compatible with many different systems and devices.

Linux can be accessed through both a command-line interface (CLI) and a graphical user interface (GUI), which gives users a choice in how they interact with the system. Package management systems like apt-get, yum, and pacman are used to manage software installation, updates, and removal on Linux.

3.6.2.2 *APACHE*

Apache is a popular and widely-used open-source web server software that has been in existence for over two decades. It is a versatile web server software that runs on a variety of operating systems, making it accessible to a wide range of users. Apache is known for its modularity, which allows for the addition and removal of modules to enhance its functionality as needed.

In terms of security, Apache is considered to be a secure web server software with many built-in features and settings to protect against attacks and vulnerabilities. It is also designed for high performance, with features such as caching and load balancing to optimize the delivery of web content.

Apache is relatively easy to set up and configure, with many resources available to help users get started. It is often used in conjunction with other software, such as PHP and MySQL, to create a LAMP stack for web development and hosting.

Apache has become the most widely used web server software in the world and is trusted by a wide range of users and organizations for its reliability, performance, and security.

3.6.2.3 *MySQL*

MySQL is an open-source relational database management system (RDBMS) that is widely used in web development and other applications. It was first released in 1995 and has since become one of the most popular database systems in use today.

MySQL is known for its reliability and stability, with a proven track record of powering mission-critical applications. It is designed for high performance, with features such as caching and indexing that optimize the speed of database queries. MySQL can handle large amounts of data and can be easily scaled up or down to meet changing needs.

MySQL is also known for its flexibility, as it can be used with a variety of programming languages and web development frameworks. This makes it a versatile choice for web development and allows developers to use the tools and technologies they are most comfortable with.

In terms of security, MySQL has many built-in security features and can be configured to meet a variety of security needs. It also supports encryption and other security measures to protect sensitive data.

MySQL is often used in conjunction with other web development technologies, such as PHP and Apache, to create a LAMP stack for web development and hosting. It is also used in many other types of applications, including data warehousing, e-commerce, and online gaming.

3.6.2.4 PHP

PHP is a popular open-source scripting language that is widely used for web development. It was first released in the mid-1990s and has since become one of the most popular programming languages on the web.

One of the key features of PHP is its flexibility. It can be used for a wide range of web development tasks, from simple scripts to complex web applications. PHP also allows for the creation of dynamic and interactive web content, such as online forms and user registration systems.

PHP is an open-source language, meaning that the source code is freely available for modification and distribution. This has led to a large and active community of developers and users who contribute to the ongoing development and improvement

of the language.

In addition to its flexibility and interactivity, PHP is also known for its ease of use and integration with other software and technologies. It can be easily integrated with web servers and databases, making it a powerful tool for building complex web applications.

Finally, PHP is often used in conjunction with popular content management systems such as WordPress and Drupal, which allows for the creation of sophisticated and dynamic websites without requiring extensive programming knowledge.

3.6.3 VNC VIEWER

VNC Viewer is a software application that allows you to remotely access and control another computer using the Virtual Network Computing (VNC) protocol. This means you can see and interact with the desktop of a remote computer as if you were sitting in front of it.



Fig: 3.11: VNC CONNECT

To use VNC Viewer, you will need to have a VNC server installed and running on the remote computer you want to connect to. The VNC server software allows the remote computer to share its screen and respond to input from the VNC Viewer.

Once you have the VNC server set up on the remote computer, you can download and install the VNC Viewer software on your own computer. Then, you can enter the IP address or hostname of the remote computer into the VNC Viewer and connect to it.

Once connected, you will see the desktop of the remote computer in a window on your own computer. You can use your mouse and keyboard to interact with the remote computer just as if you were sitting in front of it. You can open and close applications, move files around, and perform any other tasks you would normally do on that computer.

3.6.4 IoT CLOUD DATA

IoT cloud data refers to the data generated by IoT (Internet of Things) devices that is stored and processed in the cloud. The IoT devices collect data from various sources such as sensors, cameras, and other connected devices, and transmit it to the cloud for processing and analysis.

The cloud provides a scalable and secure platform for storing and processing large amounts of IoT data. Cloud providers offer various services such as data storage, processing, and analysis, which can be customized to meet the specific needs of an IoT application.

IoT cloud data can be analyzed using various techniques such as machine learning, data mining, and predictive analytics to gain insights into the behavior and performance of the devices, as well as to identify patterns and trends in the data. These insights can be used to optimize the performance of the devices, improve operational efficiency, and reduce costs.

One of the main benefits of using IoT cloud data is that it enables real-time monitoring and control of IoT devices from anywhere in the world. This can be

particularly useful in industrial applications, where real-time monitoring of equipment can help to prevent downtime and improve productivity.

CHAPTER 4

HARDWARE AND SOFTWARE RESULTS

4.1 SOFTWARE RESULTS

The recommended method for flashing an SD for use in a Raspberry Pi is a program called Win32DiskImager. Once you've downloaded the Win32DiskImager application and extracted the ZIP file, download the Raspbian distribution. Once the ZIP file downloads, extract the .img from the .zip.

In Win32DiskImager, ensure you select the correct drive letter for your SD card. In my case, the SD card was drive F:/. Yours may be different, so check in Windows Explorer to make sure you have the correct letter. Do not choose C:\, since that is your main hard drive.

Also, select the .img file you extracted from the Raspbian distribution above using the file picker. Once you have made sure you have the correct .img file and drive letter for your SD card, click "Write" (not read) to flash the SD card. This will take less than five minutes on average and you can see the current progress in the Win32DiskImager window. Once the flash completes, you can exit the program.

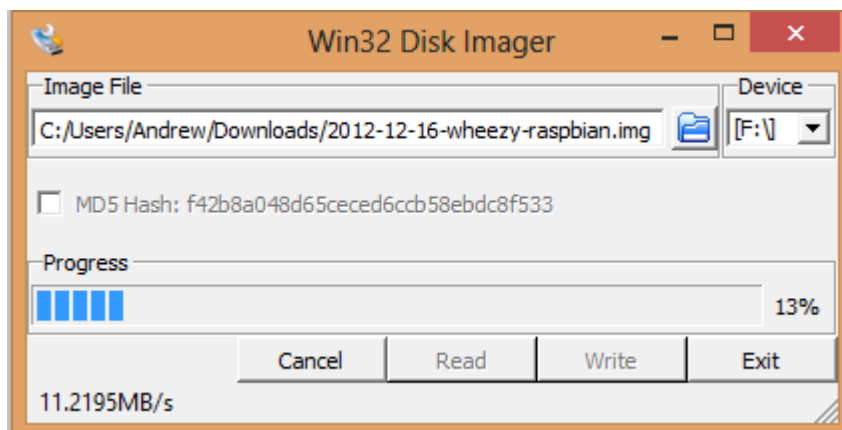


Fig: 4.1: INSTALLATION OF FLASH SD CARD

4.2 SETTING UP RASPBERRY PI

Once we have flashed the disk image using the methods above, place the SD card into your Raspberry Pi, plug in the HDMI monitor, any keyboards and mice, and then the power cable. Your Raspberry Pi should now begin to boot and you should be able to see Raspbian on your screen. The Raspberry Pi boots and asks for a user name and password which is pi and raspberry respectively by default.

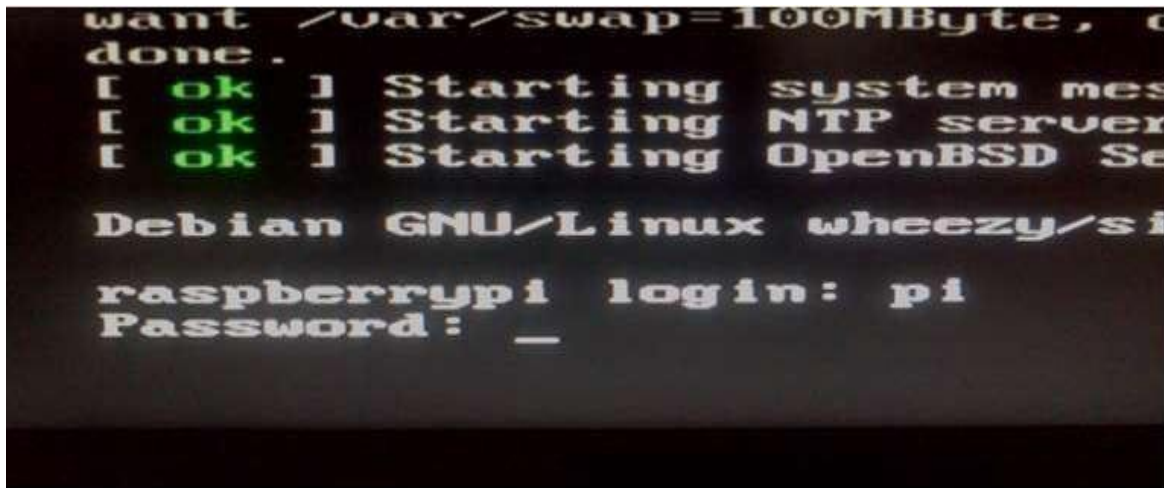


Fig: 4.2: RASPBERRY PI SETUP

4.3 WIFI ON RASPBERRY PI

Raspberry Pi is a small and affordable single-board computer that can be used for a wide range of projects, including building a wireless network using WiFi. Here are the steps to connect your Raspberry Pi to a WiFi network:

- Make sure your Raspberry Pi is connected to a monitor, keyboard, and mouse, or use SSH to connect to it remotely.
- Open the terminal on your Raspberry Pi or connect to it remotely using SSH.
- Update your Raspberry Pi to ensure you have the latest software packages by entering the following command:



```
sql
Copy code

sudo apt-get update
```

Fig: 4.3: COMMAND FOR RASPBERRY PI SOFTWARE VERSION

- Once the update is complete, install the wireless tools package
- Next, you need to determine the name of your wireless network interface. You can do this by entering the command “ifconfig”.
- Scan for available wireless networks by using the command “sudo iwlist wlan0 scan”.
- This command will display a list of all available wireless networks and their details, including their SSID (network name) and security type.
- Find the SSID of the network you want to connect to and note its name.
- Add the following lines to the file



```
makefile
Copy code

network={
    ssid="your_SSID"
    psk="your_password"
}
```

Fig: 4.4: SETTING UP WIFI NAME AND PASSWORD ON RASPBERRY PI

- Replace "your_SSID" and "your_password" with your own network name and password.
- Press Ctrl+X to save and exit the file.
- Restart the Raspberry Pi to apply the changes.
- After the restart, your Raspberry Pi should connect to the wireless network automatically.

4.4 INSTALLING APACHE WEB SERVER ON RASPBIAN

The Apache web server is currently the most popular web server in the world, which makes it a great default choice for hosting a website. Raspbian OS is based on Linux OS therefore we can follow the steps.

We can install Apache easily using Linux package manager, apt. A package manager allows us to install most software pain-free from a repository maintained by Linux. You can learn more about how to use apt [here](#).

Open terminal and type the command “sudo apt-get install apache2”.

Since we are using a sudo command, these operations get executed with root privileges. It will ask you for your regular user's password to verify your intentions.

You can do a spot check right away to verify that everything went as planned by visiting your server's public IP address in your web browser (see the note under the next heading to find out what your public IP address is if you do not have this information already):

`http://your_server_IP_address`

OR

`http://localhost`

you should see the following on web browser:



It works!

This is the default web page for this server.

The web server software is running but no content has been added, yet.

Fig: 4.5: APACHEE WEB IP ADDRESS

4.5 INSTALLING PHP

PHP is a preprocessor; it's code that runs when the server receives a request for a web page. It runs, works out what needs to be shown on the page, then sends that page to the browser. Unlike static HTML, PHP can show different content under different circumstances. Other languages are capable of this, but since WordPress is written in PHP, that's what we need to use this time. PHP is a very popular language on the web; large projects like Facebook and Wikipedia are written in PHP.

- Update your system: Before installing any new software, it's a good idea to update your system to make sure you have the latest software packages and security updates. On a Linux system with the following command

```
sql                                                                    Copy code
sudo apt-get update && sudo apt-get upgrade
```

Fig: 4.6: COMMAND FOR PHP INSTALLATION

- Install PHP: Once your system is up-to-date, you can install PHP using your system's package manager. On a Debian-based Linux system, such as Ubuntu or Debian
- Verify the installation: After installation is complete, you can verify that PHP is installed and working by creating a simple PHP script and running it in your web

browser. To do this, create a new file named test.php in your web server's document root directory (usually /var/www/html/ on a Linux system).

4.6 TEST PHP

Create the file index.php:

```
sudo nano index.php
```

Put some PHP content in it:

```
<?php echo "hello world"; ?>
```

Now save the file. Next delete index.html because it takes precedence over index.php: `sudo rm index.html`

Refresh your browser. You should see "hello world". This is not dynamic but it is still served by PHP. If you see the raw PHP above instead of "hello world", reload and restart Apache like so:

```
sudo /etc/init.d/apache2 reload sudo /etc/init.d/apache2 restart
```

Otherwise try something dynamic, for example:

```
<?php echo date('Y-m-d H:i:s'); ?>
```

Or show your PHP info:

```
<?php phpinfo(); ?>
```

4.7 HARDWARE RESULTS

Women's protection has been a major issue in many areas of the industry in recent years. For both men and women, there is also apprehension in isolated areas. As a result, one can recommend a security patrolling robot based on the Raspberry Pi. The device secures every location by using camera mounted on a robotic vehicle. The robotic vehicle follows a specific path and is equipped with a cam and sound sensors.

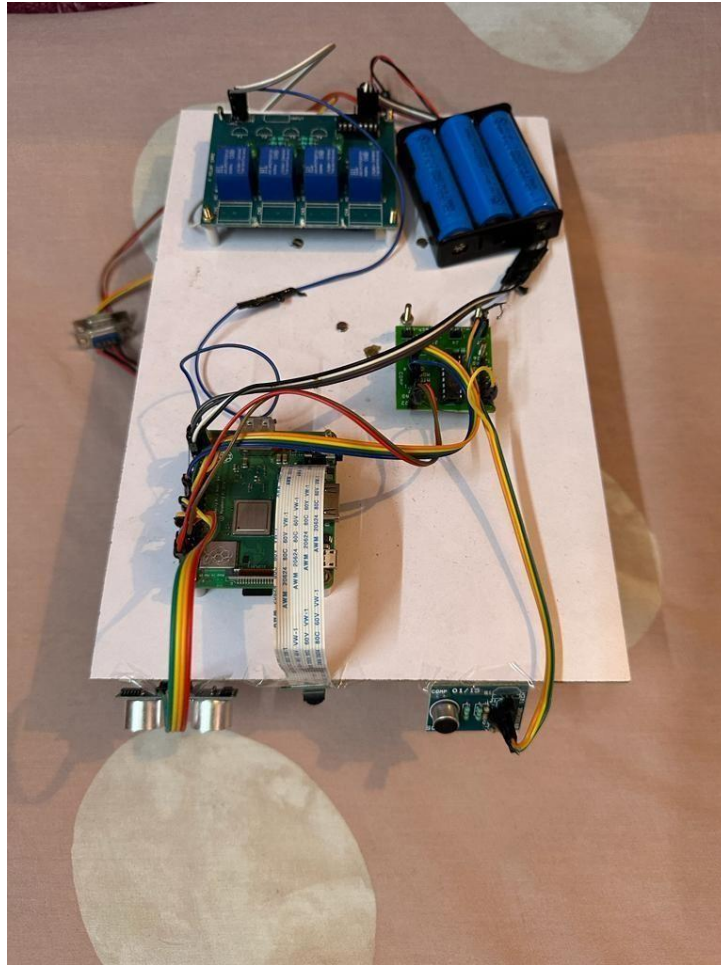


Fig: 5.1: HARDWARE MODULE

If sound is heard, it comes to a halt at specific factors and goes on to the next. For patrolling the assigned site, the system employs an ir-based course-following device. It uses a combination of two high-definition cameras to track each area for any potential problems. It has the ability to project sound inside the building. After the environment has quieted down, the robotic detects some sound and begins off evolved shifting in the direction of the sound on its predefined track. It then scans the area with its digicam to see if there are any human faces. It captures and begins transmitting the images of the scenario to the IOT one can site right away. one can are using IOT gecko to receive and view transmitted snap shots to the user, complete with warning sounds. To relax the capability, one can suggest a fully self-contained safety robotic that operates continuously and patrols large areas on its own.

The idea is to provide protection to women who have a special interest or a minor contact with sound results inside the warning to situation authority. The robot

then goes to the specific location and captures an image of it, which it then sends to the person. The Raspberry Pi (small effective CPU) in conjunction with the digicam is critical in the development of an automated robotic system. For securing any place, the system uses cameras and a microphone mounted on the rover automobile. Whether a sound is heard, or if the sound is not detected, dynamic routing is used. For patrolling the assigned area, the system uses an infrared (ir)based course following unit. It uses a combination of high-definition cameras to track and detect any problems.

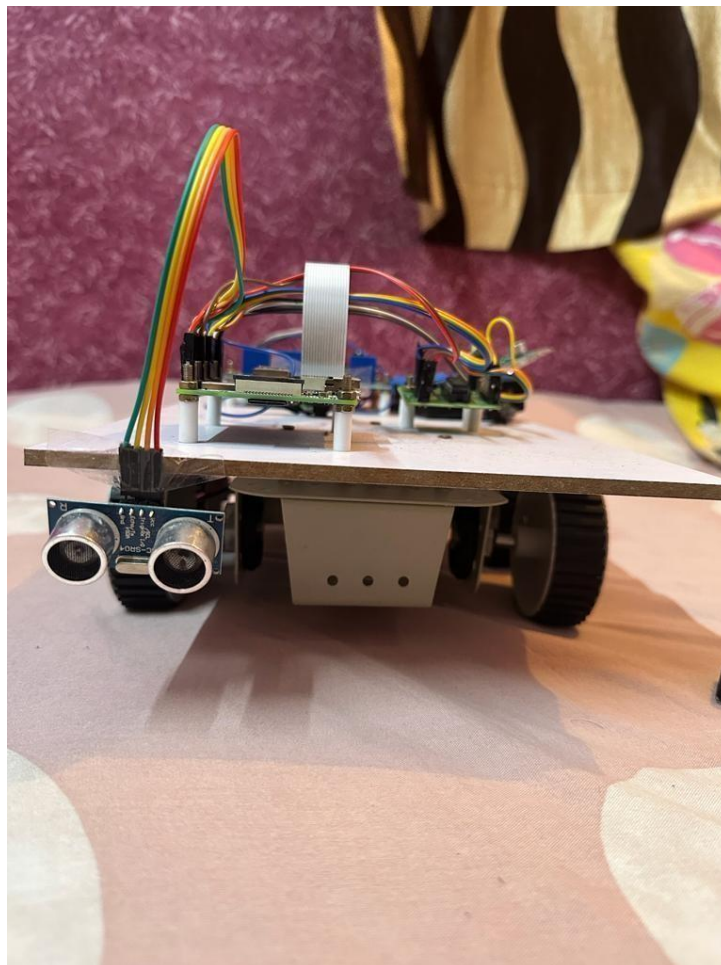
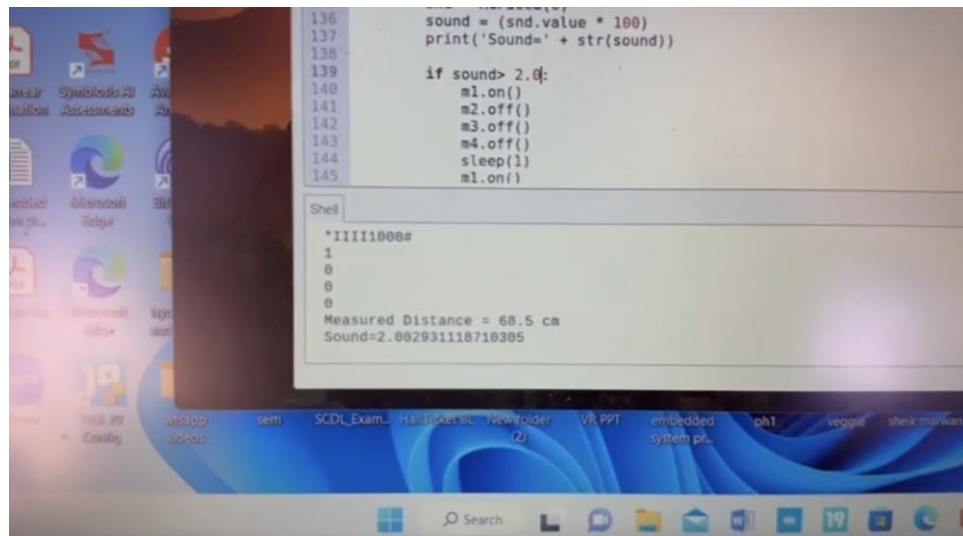


Fig: 5.2: RESULTS THROUGH ULTRASONIC SENSOR

After the area is silent, the robot detects and evaluates any sound, then starts transferring closer to the sound along its predetermined and complex path. Then it scans the area with its camera to see if any human faces are identified. It will seize

and instantly begin transmitting images of the situation to the IOT one canbsite. The IOT is responsible for receiving transmitted images and showing them to the user along with warning sounds. As a result, one can propose a completely self- contained security robotic that works continuously and patrols large areas on its own to protect the phone can grid. Today, the Internet of Things is crucial for obtaining high-quality final results for real-time problems.



```
136     sound = (snd.value * 100)
137     print('Sound=' + str(sound))
138
139     if sound > 2.0:
140         m1.on()
141         m2.off()
142         m3.off()
143         m4.off()
144         sleep(1)
145         m1.off()
```

```
Shell
*IIII1000#
1
0
0
0
Measured Distance = 68.5 cm
Sound=2.002931118710305
```

Fig: 5.3: SOUND AND DISTANCE OUTPUT

For patrolling the assigned area, the unit uses an infrared (ir)based path following device. It uses a combination of high-definition cameras and video display systems in each area to detect any problems. Its possible that sensors will sound at the place, revealing whats going on. After the area is silent, robotic detects and evaluates any sound, and it begins off evolved transferring towards the sound on its pre defined and complex path. Then, using its digicam, it searches the area for any human faces it detects.



Fig: 5.4: RESULT THROUGH CAMERA

Take pictures of the situation and start transmitting them to the IoT one can site right away. The internet of things is responsible for receiving transmitted images and displaying them to the user along with warning sounds. As a result, one can suggest a fully self-contained security robotic that works around the clock and patrols large areas on its own to keep the facility secure. These days, getting the best result for a real-time problem necessitates the use of IoT.

CHAPTER 5

CONCLUSION AND FUTURE WORK

5.1 CONCLUSION

This device is an autonomous smart way for night vision patrolling. It involves the construction of a security robot that uses a night vision camera to ensure the safety of its surroundings. Improvement would undoubtedly result in a significant increase in security. The method for creating a robot for observation design is proposed in this paper. Using the concept of IOT, it solves the problem of limited extent observation. With the help of a PC/portable, one can physically monitor the robot, such as taking desired pictures and adjusting camera settings such as Brightness, Shutter speeds, Exposure, and so on. Checking by programme should also be feasible. Along these lines, this Robot is small in scale and moves into territories where human access is impossible. The Robot is difficult to spot and blends in with the surroundings. One of the most important advancements in the gadgets sector is remote innovation. This breakthrough is being used to support our company as a crucial piece of reconnaissance. This results in a highly efficient and functional robot that reduces human labour while still performing convincing checking tasks

5.2 FUTURE WORK

The future scope of this project is that we can control the system through image processing i.e capture the image of the person through camera and process it if it is blur and also IoT enables this system to Provide more safety to women's. The future scope is wide and various IoT technologies can enable this system more efficient to use.

There are numerous changes that can be made in the current design to improve the working of the robot. Different types of features can also be added to the robot for enhancements. Some added features and changes in the patrolling robot

REFERENCE

1. H. Bertozzi, A. Broggi, M. Del Rose, C. Caraffi, M. Felisa and G. Vezzoni, "Far-infrared stereo vision for pedestrian tracking," *Computer Vision and Image Comprehension*.
2. J. Ge, Y. Luo, & G. Tei, "Drive assistance systems for realtime pedestrian detection and monitoring at night," *Intelligent Transportation Systems, IEEE Transactions on*, vol. Nine, no.2, pp. 283-298, 200. vol.106, no.2, pp. 194–204.
3. By J.M. A 'lvarez, A. Lopez, "Illuminant invariance- detection,"*Intelligent Transportation Networks, IEEE Transactions on*, No. 99, pp.based path 1– 10, 2010
4. O. Ramstrom, H. Christensen, "A way to navigate unmarked paths," in *Symposium on Intelligent Vehicles, I2005. Procedures. IEEE, 2005, IEEE*.
5. A. Dahlkamp, D. Stevens, A. Kaehler, S. Thrun and G. Bradski, "Self controlled identification of monocular roads in desert terrain," in *Proc. Of Robotics: Structures and Sciences (RSS), 2006*.
6. K. Labayrade, J.P. and D. Aubert In *Intelligent Vehicle Symposium, 2002, Tarel, Real Time Obstacle Detection in stereovision on nonflat road geometry by v-disparity representation. IEEE. IEEE, vol. 2002 2, 646 651 pp*.
7. In R.L. Cook, K.E. Torrance, "A computer graphics reflectance pattern," *ACM Graphics Transactions (TOG)*, vol. 1, Vol. 1, pages 7– 24, 1982.
8. T.B. Phong "Computer-generated images enlightenment," *ACM Communications*, vol. 18, no. 6, pp. 311–317
9. "Review of human detection techniques in night vision" in *2017 International Conference on Wireless Communications, Signal Processing and Networking (WiSPNET)*
10. Eun Som Jeon et al., "Human detection based on the generation of a background image by using a far-infrared light camera", *Sensors*, vol. 15, no. 3, pp. 6763-6788, 2015.

APPENDIX

SOURCE CODE

```
import tensorflow.keras
from PIL import Image, ImageOps
import numpy as np
from picamera import PiCamera
import time
from time import sleep
import os
import RPi.GPIO as GPIO
from gpiozero import LED
import requests
import serial
from time import sleep
from picamera import PiCamera
from gpiozero import MCP3008
ser = serial.Serial('/dev/ttyS0', baudrate=9600,
                    parity=serial.PARITY_NONE,
                    stopbits=serial.STOPBITS_ONE,
                    bytesize=serial.EIGHTBITS
m1=LED(26)
m2=LED(20)
m3=LED(21)
m4=LED(19)
#set GPIO Pins
GPIO_TRIGGER = 18
GPIO_ECHO = 24
#set GPIO direction (IN / OUT)
GPIO.setup(GPIO_TRIGGER, GPIO.OUT)
GPIO.setup(GPIO_ECHO, GPIO.IN)
```

```

camera = PiCamera()
camera.start_preview()
camera.stop_preview()
m1.off()
m2.off()
m3.off()
m4.off()
def distance():
    # set Trigger to HIGH
    GPIO.output(GPIO_TRIGGER, True)
    # set Trigger after 0.01ms to LOW
    time.sleep(0.00001)
    GPIO.output(GPIO_TRIGGER, False)
    StartTime = time.time()
    StopTime = time.time()
    # save StartTime
    while GPIO.input(GPIO_ECHO) == 0:
        StartTime = time.time()
    # save time of arrival
    while GPIO.input(GPIO_ECHO) == 1:
        StopTime = time.time()
    # time difference between start and arrival
    TimeElapsed = StopTime - StartTime
    # multiply with the sonic speed (34300 cm/s)
    # and divide by 2, because there and back
    distance = (TimeElapsed * 34300) / 2
    return distance
oc=0
lt=0
while True:
    r =requests.get('http://iotclouddata.com/23log/030/getstatus.php')

```

```
print(r.text)
print(r.text[7])
print(r.text[8])
print(r.text[9])
print(r.text[10])
if r.text[7]=='1':
    m1.on()
    m2.off()
    m3.on()
    m4.off()
    lt=1
elif r.text[8]=='1':
    m1.off()
    m2.on()
    m3.off()
    m4.on()
    lt=2
elif r.text[9]=='1':
    m1.off()
    m2.off()
    m3.on()
    m4.off()
    lt=3
elif r.text[10]=='1':
    m1.on()
    m2.off()
    m3.off()
    m4.off()
    lt=4
else:
    m1.off()
```

```

        m2.off()
        m3.off()
        m4.off()
        lt=0
dist = distance()
print ("Measured Distance = %.1f cm" % dist)
if dist < 10:
    m1.on()
    m2.off()
    m3.off()
    m4.off()
    sleep(1)
    m1.on()
    m2.off()
    m3.on()
    m4.off()
    sleep(1)
    m1.off()
    m2.off()
    m3.off()
    m4.off()
    sleep(1)
snd = MCP3008(0)
sound = (snd.value * 100)
print('Sound=' + str(sound))
if sound> 2.0:
    m1.on()
    m2.off()
    m3.off()
    m4.off()
    sleep(1)

```

```
m1.on()
m2.off()
m3.on()
m4.off()
sleep(1)
m1.off()
m2.off()
m3.off()
m4.off()
sleep(1)
camera.resolution = (640, 480)
camera.start_recording('my_video.h264')
camera.wait_recording(5)
camera.stop_recording()
```

RESEARCH PAPER

IOT BASED NIGHT PATROLLING ROBOT

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Abstract—In this project, we propose a security robot that uses night vision cameras to patrol any building.

The robotic vehicle travels at irregular intervals and is equipped with night vision cameras and sound sensors. It patrols the area along its route using a predetermined line. If sound is detected, it moves on to the next point after stopping at various points. The following IR-based path system is used by the system to patrol the designated field. It uses cameras to monitor every area and look for intrusions.

Index Terms—Raspberry Pi, Robot, Sensors, Artificial Intelligence.

I. INTRODUCTION

The overall goal of this project is to protect the area within a specific distance. Any sound you hear will cause a notification to be sent to the user via IoT. Robot is equipped with a night vision camera, which allows us to view live video on a smartphone. The robot will take pictures and send them straight to the user. In this project, the night vision camera is crucial to making the robotic device automatic. robotic computer operation. Everett and Gage made the initial proposal for the primary security robot surveillance in "Mobile Detection, Assessment, and Response System (MDARS)" in 1999. From that point on, interest in security robots has grown along with advancements in research and application. It will function somewhat similarly to a PC. Here, a variety of observation platforms, including screens, CCTV, and others, are available. In these kinds of structures, the person who is fixed and organised in that particular area can only see what is happening there. Additionally, from this position, he or she can monitor the situation at that precise moment. It also

provides confidentiality on both sides, which is an additional benefit. Another addition is the Raspbian OS. The operating system being used here is Raspbian OS. The use of robots in our daily lives has led to a rapidly growing need for a variety of jobs. Although there have been numerous studies and applications of security robots, their affordability is constrained by the technology they use. Robots that can operate independently are a novel branch of robotics that promises to revolutionise surveillance and technology in the future. The protection devices of today, Guards patrolling the area with torches and batons have always outperformed devices made of intelligent sensors and embedded systems, as well as tools and mobile apps that can be used in hazardous settings like minefields. Use of personal is risky, much like dangerous gas leaks. a security robot that uses Ultra-Wide Band technology to locate hidden areas indoors. It is frequently used in dangerous situations where using staff would be extremely risky. Several mobile security robots patrol different levels of a building. When a strange circumstance occurs, the portable robot notifies the directed PC of the connected area (floor number) of the incident. Versatile assistance security robots today include self-driving cars, security surveillance, housework, search and rescue missions, material processing, production, and automated transit systems. A powerful self-governing route structure should be used by a flexible automaton. regardless of the application. One of the main challenges facing the field of portable robots is the self-governing path; numerous control calculations and strategies have recently been developed in an effort to overcome this challenge. A few sensors and engines will be used by the security watch robot to conduct

autonomous interior exploration. Additionally, it can communicate with and be controlled by the user via Wi-Fi.

II. OBJECTIVE

The main objective of the project are as follows:

- 1.To create a night patrolling robot for the surveillance.
- 2.To record the video and send inform to the server.

III. LITERATURE SURVEY

Based on Illuminant Invariance, Road Detection

The algorithm's ability to adjust to changing the scene's lighting and the appearance of other cars will be improved by the online model. The suggested algorithm operates in still images and is independent of both road geometry and time constraints. According to quantitative and anecdotal experiments on real-world road patterns with heavy traffic and shadows, the technique is immune to shadows and changes in illumination. The suggested method also beats algorithms based on hue-saturation-intensity (HSI) in terms of efficiency.

A method for following unmarked roads

In order to ensure robustness, the majority of the approaches that have been presented so far are based on geometry or spectral models, and fitting the model to the picture data. A probabilistic generative model-based strategy is presented for use on unmarked roads in a variety of weather and illumination circumstances. A number of test scenes are used to evaluate the method, and it is contrasted with other widely used methods in the literature.

Mining Criminal Dataset Using Gradient Boosting Algorithm

Few people have attempted to contrast all of these approaches with the data that they have produced. Large data bases that can predict or examine criminal activity and criminal activity in the community are maintained by police stations and other related criminal justice organisations. Based on prior crime statistics, we may also predict criminal behaviour. We have predicted the criminology and the causes of crime using these subjects as the basis for the data mining concept. The

suggested algorithm can predict more important features with greater efficiency and accuracy.

Arduino based battlefield assistive robot

The addition of a night vision tracking device, and it will record and capture to the operator any i details relating to the automaton. This feature allows the robot to transmit real-time videos with night vision while also preventing enemy detection in a combat zone. We have also added a GSM gadget and a metal detector, which will alert us to any bombs that may be buried beneath the robot vehicle.

Night vision patrolling robot using sound sensors

The study's objective was to create an intelligent robot that offers superior safety at a cost that, when long-term effects are taken into account, is significantly less than the going rate. The idea was to build a rover that would use modern technology to explore the area autonomously, search for anomalies, and alert the control centre as soon as they were discovered. The robot has GPS.

IV. BLOCK DIAGRAM

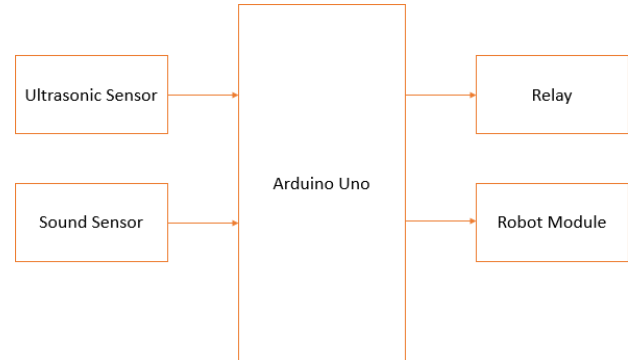


Figure 1 Block Diagram

V. EXISTING AND PROPOSED SYSTEM

Existing System :

The patrol robot must be operated remotely, requiring a person to monitor the area while using a remote control, which requires more human resources. For some systems, operating the night vision robot requires a smartphone. The

control range is restricted to the local network range because some people use local host webpages. Because it has few parts and needs labour to operate, autonomous operation.

Proposed System :

According to the sound generated, the Node MCU in the proposed system automatically travels to that area, takes a picture, and uses IOT technology to send it to the user. This night vision camera aids the user in going for automation and helps to find the person or any problems detected using the sound sensor. The robot has a wealth of knowledge to safeguard the wider area. This robot has two infrared sensors on both hands that can recognise obstacles. The robot shifts its direction to the opposite side of the barrier when it moves towards the robot's front. A microphone is used in the robotic world to capture sounds in real time and send them to a monitoring system. The vision system captures the live images and videos. The module for robot movement can be powered by just two generators.

VI. HARDWARE AND SOFTWARE USED

Hardwares Used:

Raspberry Pi
Relay
Ultrasonic Sensor
Sound Sensor
DC Motors
Battery

Softwares Used:

Python

VII. COMPONENT DESCRIPTION

Raspberry Pi:

The Raspberry Pi Foundation, a charity in the UK that promotes charge of promoting computer knowledge and understanding of computers The company that produces the Raspberry Pi series of single-board computers is called education. given that 2012 launch of the component,

multitudinous duplications and variations are readily accessible. The newest Pi variant has a quadrangle- CPU core frequency was over1.5 GHz and 4 GB, 256 MB of RAM and a single-core 700 MHz CPU were present in the initial Raspberry Pi.. The Raspberry Pi not only features a Linux operating system, but also a collection of GPIO (general purpose input/ affair) legs that enable you to investigate the Internet of effects and manage electrical components for physical computing.(IoT).

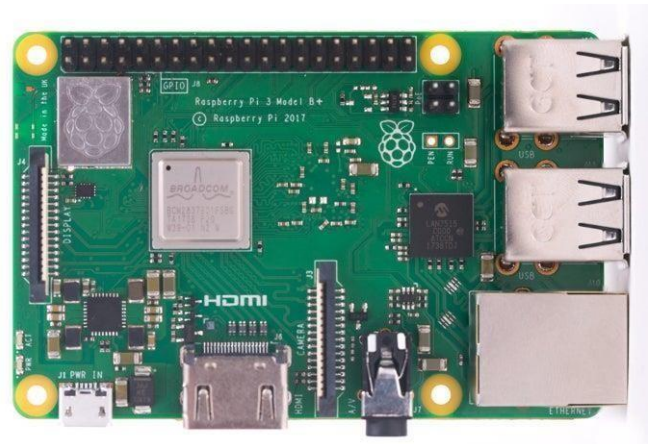


Figure 2 Raspberry Pi Board

Ultrasonic Sensor

An ultrasonic detector is a piece of equipment that converts the sound that is reflected back into an electrical signal and employs ultrasonic sound swells to calculate the distance to a designated object. When compared to ultrasonic waves, audible sound travels at a slower pace.(i.e. the sound that humans can hear). The two primary components of an ultrasonic detector are the emitter (which generates sound using piezoelectric chargers) and the sensor.(which encounters the sound after it has travelled to and from the target). The detector measures the quantum of time that elapses between the sound emitted by the transmitter and its interaction with the recipient in order to calculate their respective distances. D is the formula: $D = 12 T \times C$. The expression for this is (where D is the distance, T is the duration, and C is the sound speed of 343 m/s). computation. For example, if a scientist placed an ultrasonic device pointed at a box and it took 0.025 seconds for the sound to bounce

back, the distance between the two would be $D = 0.5 \times 0.025 \times 343$ or approximately 4.2875 meters.



Figure 3 Ultrasonic Sensor

Sound Sensor:

A sound detector is a small circuit board with an electret microphone on it that receives aural signals from the air or free space and transforms them into electrical signals. The sound detector can produce an analogue or digital affair. It's extremely stoner-friendly, provident, low power, and compatible with common controls and digital/ analog ICs. The integration of sense modules into detector inputs is simple and only necessitates a small number of external factors.



Figure 4 Sound Sensor

Relay Module:

Simple electrical devices are relays. Similar to how manual switches are used to physically shut or open circuits, relays are switches that connect or separate two circuits. There are many different types of relays, including electrical and solid state. There is a lot of use for electrical relays. Let's look inside this circuit first before understanding how it works. Relays come in many various varieties, but they all function in the same way.



Figure 4 Relay

DC Motor :

A DC motor is an electronic device that converts electrical energy from direct current into mechanical energy. A beautiful field develops in the air space when the DC motor's field coil is activated. The diameters of the building determine the orientation of the generated glamorous field. The dazzling field enters the building on the field coil's north pole side, and it leaves the structure on the field coil's south pole side.



Figure 5 DC Motor

Motor Driver:

An intertwined circuit chip called a motor motorist controls the motors in bedded circuits and independent robots. The most extensively utilised motor motorists in robots are ULN2003. A motor motorist is commodity that directs the motor to move in response to commands. It controls a real motor that requires high input voltage by harkening to the regulator's low voltage. Grounded on the instructions it receives from the regulator, it directs the motor in the asked direction.



Figure 6 Motor Driver

Battery :

A battery is a device that transforms chemical energy into electricity to hold energy and discharge it. In order to generate energy chemically, typical batteries typically use one or more electrochemical cells. Alkaline, lithium- ion, lithium- polymer, and nickel- essence hydride batteries are the most typical battery types, although numerous other accoutrements can and have been used in batteries. It is possible to connect batteries in a parallel or sequential network. Batteries come in a wide variety of kinds, and the multicolored battery types are what are used in colorful bias. Hearing aids are fueled by much smaller batteries than buses, which are used to initiate the vehicles. Batteries are crucial to daily living in general.



Figure 7 Battery

VIII. RESULT

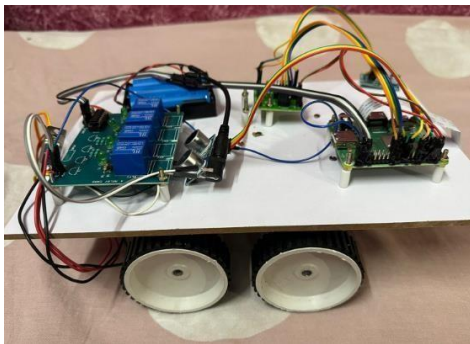


Figure 8 Kit Image

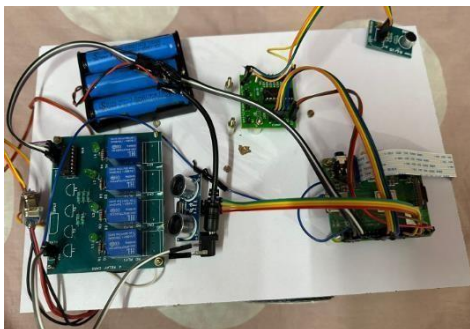


Figure 9 Kit Image

IX.

CONCLUSION

According to this design, the entire area is covered by night vision cameras, along with a programmed frame that, when a sound is heard, directs a robot to a specific position where it takes film of the area and sends them to the stoner via IOT. This design that's now finished has been programmed to be an excellent path for night vision monitoring.

X. REFERENCES

1. <https://ieeexplore.ieee.org/document/5594640>
2. <https://ieeexplore.ieee.org/abstract/document/1505177>
3. https://papers.ssm.com/sol3/papers.cfm?abstract_id=3418733
4. <https://ieeexplore.ieee.org/document/8288962>
5. <https://www.irjet.net/archives/V7/i8/Velammal/NCRACES-39.pdf>
6. "Mobile Detection Assessment and Response System", Everett, H. & Gage, D.W, 1999
7. "Team Mobile Robots Based on Intelligent Security System", S. Chia, J. Guo, B. Li and K. Su,, 2013.