



e-ISSN: 2319-8753 | p-ISSN: 2347-6710

IJIRSET

International Journal of Innovative Research in
SCIENCE | ENGINEERING | TECHNOLOGY



INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN SCIENCE | ENGINEERING | TECHNOLOGY

Volume 11, Issue 5, May 2022

ISSN INTERNATIONAL
STANDARD
SERIAL
NUMBER
INDIA

Impact Factor: 8.118



9940 572 462



6381 907 438



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Night Vision Patrolling Robot and Alert System

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ABSTRACT: In this paper, we propose a security robot with a night vision camera that can guard any site. The robotic vehicle travels at irregular intervals and has night vision cameras and sound sensors. It patrols a predetermined route along a predetermined line. It stops at various points, and if sound is detected, it moves on to the next location. To patrol the assigned field, the following IR-based path system is used. It employs a 360-degree rotating HD camera to monitor all areas and detect intruders. It can detect and track sound in its surroundings. It then scans the area with its camera for any human faces it may find. It quickly starts recording and relaying photographs of the situation after detecting a sound or a human face.

KEYWORDS: Night Vision, Sound sensor, IoT, Robot, Android.

I. INTRODUCTION

The goal is to protect the entire region. Any small sound results in the robot sending a notification to the person concerned. The night vision camera allows us to see live video through the smartphone sends and capture the area and send it to the user. The night vision camera is crucial in making the robotic device autonomous. Control and automation are an important and emerging component of robotics, which is a modern technology that is transforming human existence. Robots work like computers and can be controlled remotely. Patrolling is simply keeping track of an area where the corresponding robot patrolling area is constantly moving and travelling in the area allotted to the robot.

The system secures any location by mounting cameras on a robotic vehicle. The robotic vehicle follows a predetermined path and is outfitted with camera and sound sensors. While patrolling, it uses a predefined area to follow its path. If sound is detected, it stops at specific points and moves to the next. For patrolling the assigned area, the system employs an RF-based control system. It uses a combination of cameras to monitor each area and detect any problems. It is capable of monitoring sound in the premises. After the area is quiet, the robot detects any sound and begins moving towards it along its predefined path. It then uses its camera to scan the area for humans.

It immediately captures and begins transmitting images of the situation to the Receiver Section. In this case, we use RF to receive transmitted images and display them to the user along with alert sounds. To secure the facility, we propose a fully autonomous security robot that operates continuously and patrols large areas on its own.

II. RELATED WORK

[1] implemented a surveillance system based on the Internet Protocol of the Raspberry Pi. Women's safety is becoming a major concern in many parts of the world, and both men and women are concerned in remote areas. Women account for half of the world's population. But, when it comes to living with honour and dignity, their survival has always been a concern, whether on the roads, trains, cabs, schools, or anywhere else. Women's empowerment in the country can be realised once their safety and security are guaranteed, whether at home, in remote areas, or while travelling. A surveillance device with a spy robot is built using a Raspberry Pi and the internet protocol. It goes over various approaches to border surveillance. Border armies must be cautious when patrolling the border area, but even with extreme caution, it is impossible to find all minor accidents in the middle of the night. As a result, a device capable of detecting activity in this area and transmitting a message to the nearby security control unit is required. They create a spy robot using the Raspberry Pi operating system and a remote monitoring and control algorithm. The spy robot is composed of three parts: a Raspberry Pi module, a night vision camera, and a sensor. The system runs on a Raspberry Pi, which is relatively expensive.

[2] created a mobile robot with GPS and a location recognition system. This paper proposes a survey of a mobile robot using GPS observations. When it comes to monitoring the robot, GPS technology is critical. The system can be improved further to produce outputs with high accuracy and stability.

[3] created a road night using a planar reflection model. It has generated numerous road detection concepts as well as numerous monitor tracking concepts. Road and street surveillance is essential for a variety of tasks, including pedestrian identification, detection of suspicious activity, and soon. This method categorises the road's image pixels. The system's efficiency can be increased further by adding obstacle detection and a GPS module to share its location.

[4] implemented a night rider:visualodometry system with headlights. This technology estimates relative motion for a mobile robotic device using a series of camera images. A camera can capture large amounts of data and is a relatively inexpensive sensor, making it an excellent choice for use in mobile robots. Solar cells can be used to support the system, reducing its reliance on an external power source. The system's image size and face recognition efficiency must be improved.

Sound source localization and real-time facial expression recognition for security robot research [5,10] resulted in the development of a security robot with sound source localization and real-time facial expression recognition capabilities. Real-time facial expression recognition is made possible by image acquisition devices and advanced data processing capabilities.

[6,8, 9] created an Arduino-controlled war field spyrobot with a night vision wireless camera and an Android application. The primary goal of developing this robot is to track human activity in war zones or border regions in order to reduce enemy infiltration. To avoid human casualties, the robot is outfitted with a night vision wireless camera that can relay images of the battleground. The system's range of distance could be increased to improve its efficiency.

[7][11][12] published a paper on an IOT-based smart multi-application surveillance robot. The primary goal of this paper is to design and construct a surveillance robot that can reduce wartime casualties. Until the intruder is attacked by the soldiers, the robot serves as a surveillance robot, capturing details about the intruder's surroundings. The system can be expanded to send alert messages. As a result, the proposed system is designed to overcome some of the aforementioned disadvantages.

III. PROPOSED SYSTEM

The system's main goal is to engage in night patrolling in the assigned area and to function with minimal human intervention using its features. Because it must avoid colliding with objects in its path while moving towards the sound source, it is equipped with an ultrasonic sensor for obstacle detection. It has four different microphones aimed in four different directions to pinpoint the location of the source of sound. The signal from the sound sensor is processed and sent to the microcontroller. The patrolling robot detects the direction of the sound and sends the information along with the robot's current location based on the microphone that received the sound. The robot has a GPS module that must be interfaced with the user's device (smart phone or laptop) in order to know its location and live stream the video captured by the cameras. IoT played a critical role in interfacing the robot with the user device.

A. Work Analysis:

The rover's night vision camera is used for area surveillance, as well as an autonomous system in which, when sound is detected, the robot will follow a specific path and proceed to the spotted location, capture the area, and send it to the specific assigned place server via IOT. This is a smart, automatic technique for night time patrol. The proposed design will address significant challenges encountered at night while also providing security via advanced technologies. While society's attitudes may or may not change, this device will help women feel more self-sufficient.

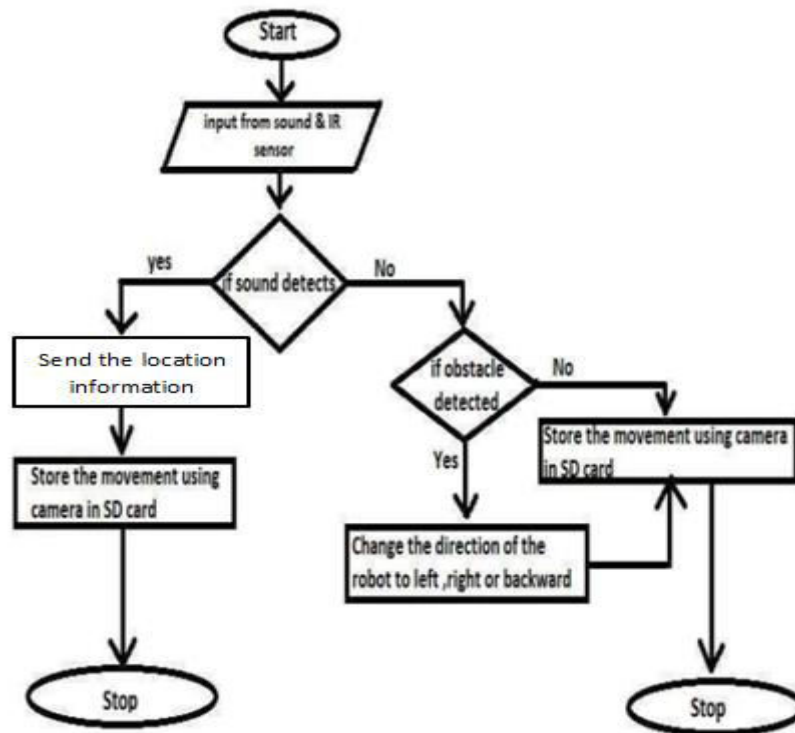


Figure: Flow Chart

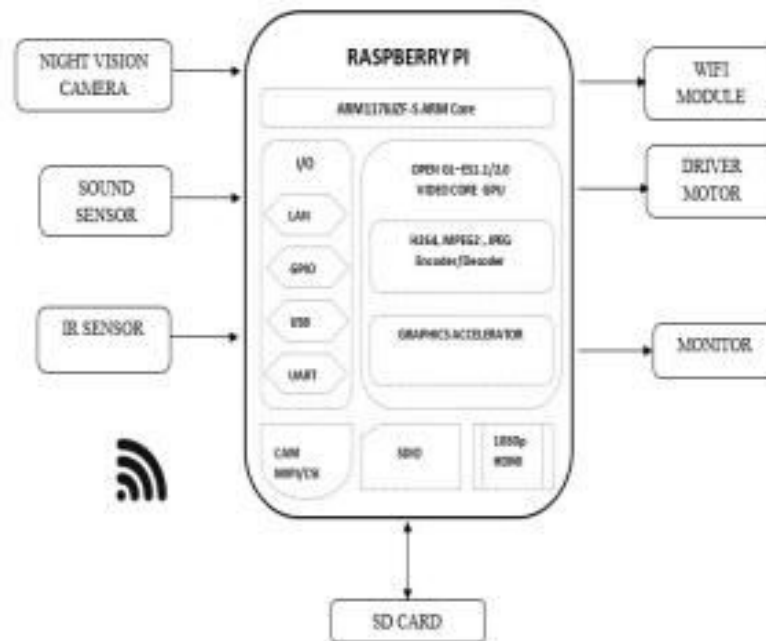


Figure: Block Diagram

Applications

- Operation Search and Rescue
- Military actions.
- Surveillance along the border
- Performing manoeuvres in a hazardous environment

IV. CONCLUSION

Even Women's safety is currently the most pressing issue in all parts of the world, owing to increased violence against them. The current system either lacks one of these features or requires a high-end microcontroller, to function properly. As a result, the proposed night patrolling robot makes the best use of its features, such as ultrasonic sensors, cameras, and IoT, to patrol in its assigned area with the least amount of human intervention.

The proposed design will use advanced technology to monitor the areas at night and provide security. While society's attitudes may or may not change, this device will help women feel independent.

According to this project, the entire territory surveillance is completed using a night vision camera and a programmed framework that, when it detects some sounds, can send the information along with the location of the nearest place to assigned mobile numbers in the system, and catch the region and catch the picture and send it to the user using IOT. This completed project is a programmed brilliant path for night vision viewing.

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Impact Factor: 8.118



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