

IOT based Night Patrolling Robot

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ABSTRACT

Women's security has become a crucial requirement in our metro cities and other urban areas. To address this need, a simple and cost-effective safety gadget is necessary, leveraging advanced technology and smart electronics. This project focuses on designing and implementing a prototype for an electronic robot that can serve as a safety device in the future. The device incorporates components such as nodemcuesp8266, ESP32 cam Board, GPS module (Neo-6M), buzzer, PIR sensor, and sound sensor. Its primary function is to activate whenever a woman detects danger through sound or the presence of a person on the road. It tracks the woman's location using GPS and sends emergency notifications, via IoT, to pre-registered mobile numbers and the police control room. Additionally, the ESP32 camera live streams the victim's situation. This system offers the advantage of being compact, portable, and user-friendly. By utilizing sophisticated components, it ensures accuracy and reliability.

Keywords - Node MCUESP8266, ESP32 cam Board, GPS module, buzzer, PIR sensor and sound sensor.

I. INTRODUCTION

It will be a great step towards the rise of automation and Safety. The best way to reduce probability of becoming a victim of violent crime (robbery, sexual assault, rape, domestic violence) is to recognize, defense and look up resources to help you out of hazardous situations. If a woman is in dilemma or get split from friends during a night out or someone is following with bad intention (sexual assault) or don't know how to find back residence then this device with her will guard her and bring assistance when she needs it by giving her current location and health

conditions to her associates and control center through SMS and call. This device not only provides family and police support but also helps in getting medical support as fast as possible. The main objective of the system is to involve in night patrolling in assigned area and to function with least human intervention with the help of its features. Since it need to move without colliding with objects in its path while moving towards the sound source it is provided with ultrasonic sensor for obstacle sensing. Depending on the microphone which received the sound, patrolling robot detects the direction of the sound and moves towards the sound. The robot has

GPS module which has to be interfaced with the device of user in order to know its location and to live stream the video it captures with the help of cameras. It also has Bluetooth module which has to be interfaced with user device in order to monitor the robot's movements.

II. BLOCK DIAGRAM

In this project, To drive the servo motors, motor drivers and other components 12V DC supply is required and the 12V DC supply voltage is fed from battery to NodeMCUESP8266. To switch ON/OFF the patrolling robot SPDT switch is used. NodeMCUESP8266 requires Wi-Fi connection for acquiring the data. When the input power is applied to the patrolling robot, the motor gets energized and it converts electrical energy into mechanical energy which indicates the movement of the robot.

After launching of robot through Blynk app, it starts patrolling and observes the surrounding if sound or any obstacle such as person is detected, it stops the movement and send alerts to the personal mail or any connected E-mail. PIR Sensor measures the Infrared Radiation for detecting the person. Sound Sensor is a module that detects sound waves through its intensity. Green led, Red led and Buzzer are the output devices which gives alerts.

ESP32 Cam requires Wi-Fi connection for surveillance purpose. It provides the live streaming of the threat caused to the person through blynk IOT server. Servo motor is used for surveillance of ESP32 Cam in 360 degrees. Laser is used to shoot the dangers person. i.e, to panic the dangers person that something is going to happen to him. GPS tracker tracks the latitude and longitude values of the person location through interaction of the satellite by using GPS Antenna.

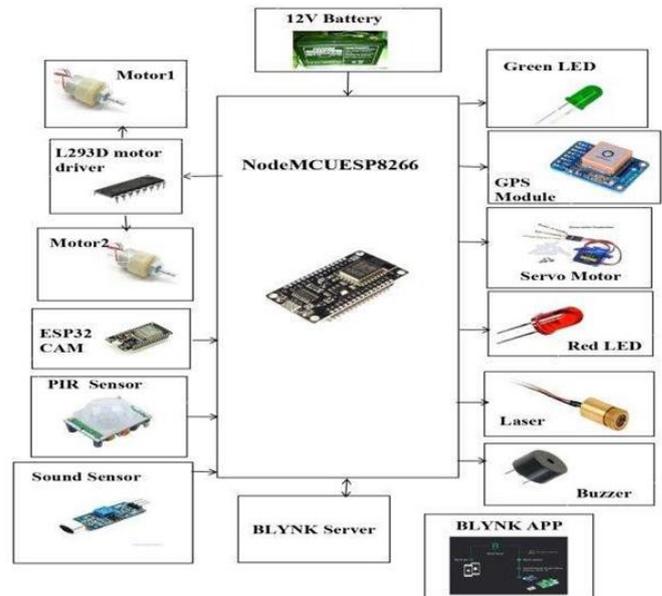


Fig. 1: Block Diagram

III. FLOW CHART

The algorithm for the program written in Node MCU is as indicated below:

- Step 1: The robot is initially turned on, and patrolling begins. First, the robot looks for a way to get around.
- Step 2: The robot checks for the internet connectivity and takes photographs of any suspected intruder and uploads them immediately while it is on patrol.
- Step 3: The robot follows the person in the desired direction and sees if any sounds are detected or not.
- Step 4: As soon as Sound is detected, it uploads the data through the blynk App via notifications and mails.
- Step 5: If the situation of the victim is so worst then we can immediately shoot the attacker using Laser.
- Step 6: The person's progress can also be known to authority immediately takes safety measures with the assistance of a GPS tracker, PIR, and Sound Alerts.
- Step 7: If there are no persons are detected or no instructions are received, then the patrolling is stopped at that point.

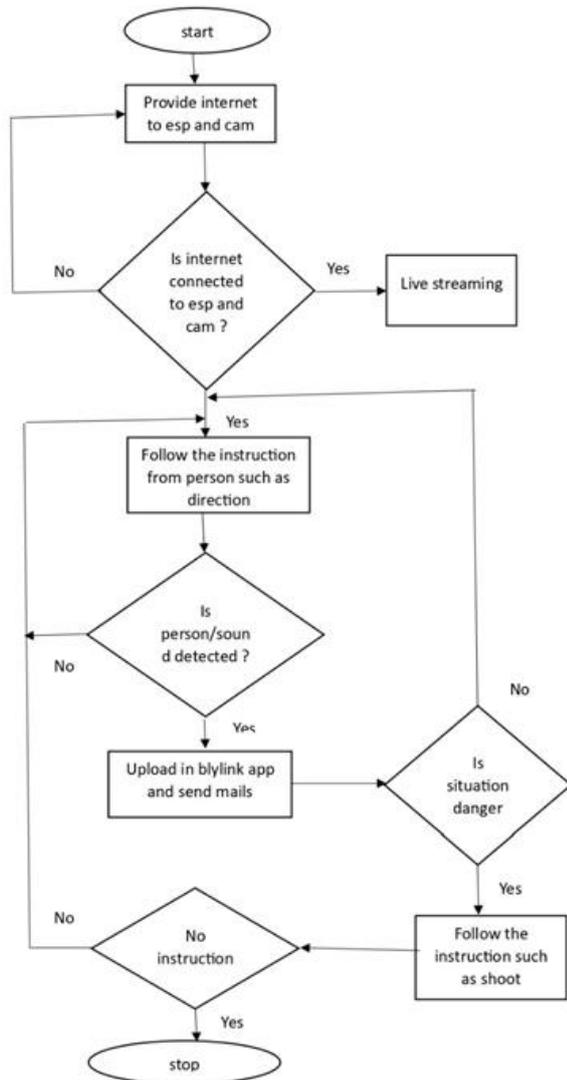


Fig. 2: Flow chart

IV. IMPLEMENTATION

The implementation of Iot Based Night Patrolling Robot for Women Safety involves the integration of both hardware and software components. In this section, we describe the hardware and software implementation details, including the components used, their connections, and the programming involved.

A) Hardware Details

Various hardware components are required to implement an IoT-based night patrol robot for

women's safety. These components include NodeMCUESP8266 module, ESP32 CAM, PIR sensor, sound sensor, DC motor, L293D motor driver IC, GPS module, servo motor, laser and regulated power supply. The NodeMCUESP8266 module is faster and available in dual-core designs. It can also operate in an ultra-low power mode, making it ideal for battery-saving applications. A PIR sensor detects human movement at a desired location. A sound sensor is a type of module used to sense sound and detect sound intensity. The L293D Motor Diver IC can be used to drive two DC motors with the same IC. A GPS module is used to locate a person. The ESP32-CAM is a full-featured microcontroller that also has an integrated video camera and a microSD card slot used to monitor the victim's situation. A servo motor is used to rotate the camera. Lasers are used to shoot attackers. The IoT-based night patrol robot is powered by a regulated 12V power supply.

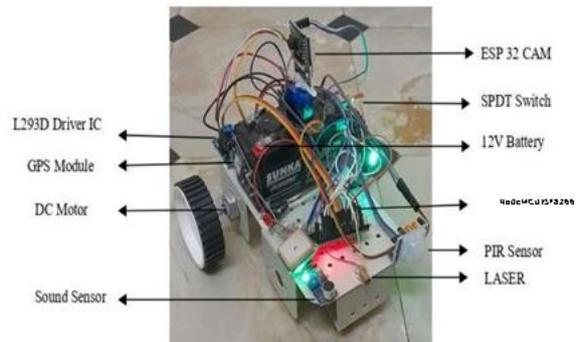


Fig. 3: Hardware module

B) Software Details

The software components used in this project play a crucial role in analysing and processing the data collected by the hardware components. The Arduino Integrated Development Environment (Arduino Software (IDE)) includes a text editor for writing code, used to upload programs and communicate with the hardware, allowing for the collection and processing of data from the NodeMCUESP8266. Blynk App was built for the Internet of Things. Enables remote hardware control, sensor data display, data storage and visualization.

V. TESTING RESULTS

Case 1:

- Initially the Robot is Switched ON.
- When Someone is detected in front of the Robot, PIR Sensor is activated.

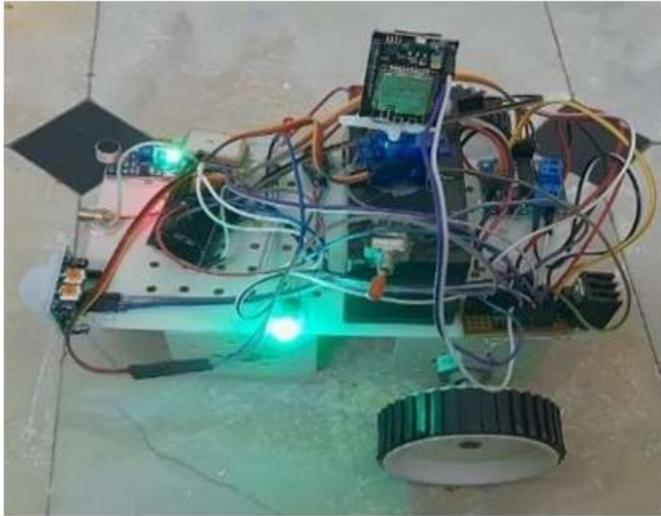


Fig. 4: PIR Sensor is Activated

- The PIR Sensor Alert is Shown in the Blynk App.
- The PIR Sensor Alert is also sent to the registered Email ID with which we can track the progress of the victim's situation.



Fig. 5: PIR Sensor Alert

Case 2:

- When Sound is detected, Sound Sensor is Activated.

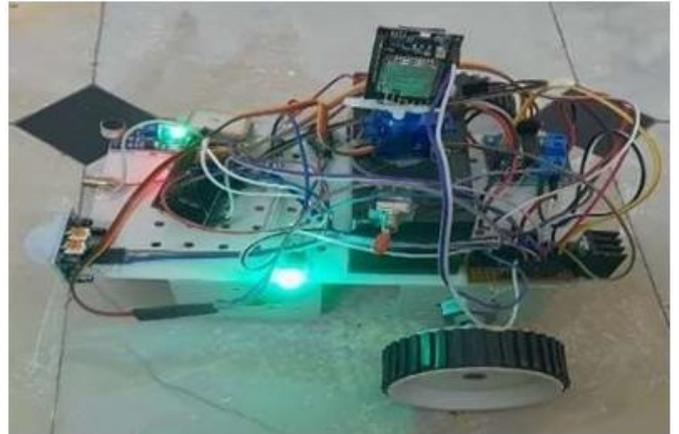


Fig. 6: Sound Sensor is Activated

- The Sound Alert Notification is Shown in the Blynk App.
- The Sound Alert is also sent to the registered Email ID with which we can track the progress of the victim.



Fig. 7: Sound Sensor Alert

Case 3:

- The Victim is tracked by the GPStracker.



Fig. 8: GPS Location by the latitudes and Longitudes.

Case 4:

- The Laser is activated.



Fig. 9: Laser is ON

- The Laser is activated when the person is in dangerous situation.
- The person can shoot the attacker from the Blynk App itself.

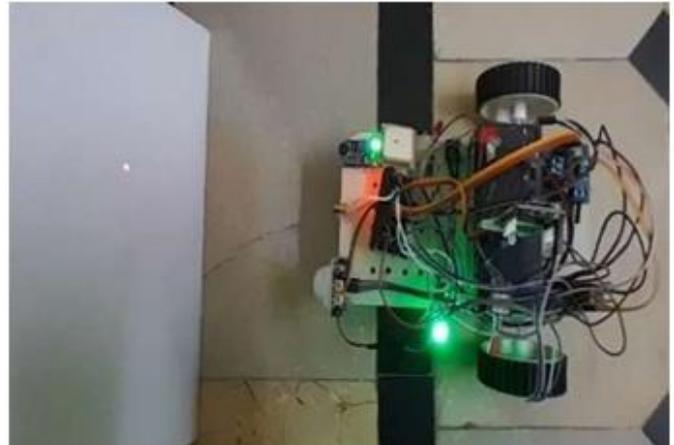


Fig. 10: Laser Shooting

Case 5:

- The live Location of the person is being displayed by the ESP 32 CAM.
- The servo motor is used to rotate the camera.

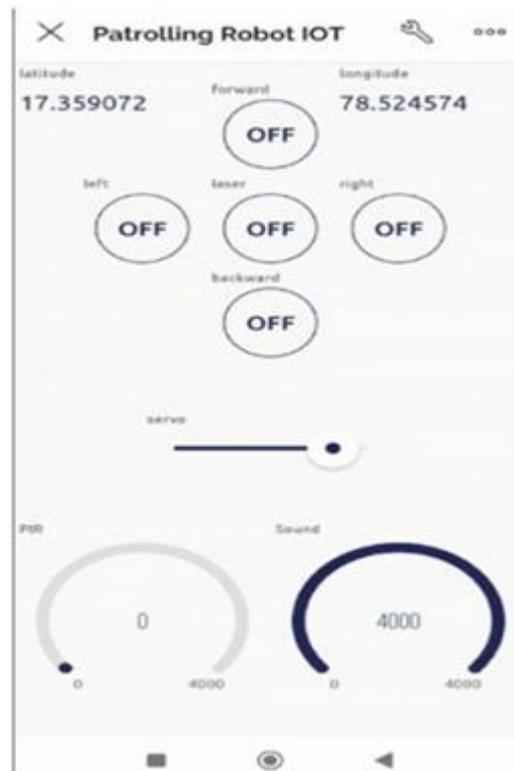


Fig. 11: Servo Motor action for Rotation of camera.

- The visuals can be monitored in the webserver.

VI. CONCLUSION

This device is an autonomous and intelligent method for night vision patrol. The idea is to build a security robot that uses cameras to ensure the safety of its surroundings. We use the IOT concept to solve the problem of limited scope observations. A PC/portable device can be used to physically monitor the robot. We can Take the desired photos and adjust camera settings such as brightness, shutter speed and exposure. A programmatic check should also be possible. In that sense, this robot is small and moves in places where people cannot enter. Robots are hard to perceive and blend harmoniously into their environment. The result is a highly efficient and functional robot that reduces human effort while performing compelling control tasks.

VII. REFERENCES

- [1]. D. C. Jullie Josephine, G. N. P, S. Frank, A. Manikandan, S. Bhavaneskumar and T.Sakthivel, "Night Patrol Robot for Detecting and Tracking of Human Motions using Proximity Sensor," 2022 International Conference on Edge Computing and Applications (ICECAA),Tamilnadu,India, 2022, pp. 912-915, doi: 10.1109/ICECAA55415.2022.9936381
- [2]. F. Khalid, I. H. Albab, D. Roy, A. P. Asif and K. Shikder, "Night Patrolling Robot," 2021 2nd International Conference on Robotics, Electrical and Signal Processing Techniques (ICREST), doi:10.1109/ICREST51555.2021.9331198.
- [3]. Dr.M.Sivachitra, T.NaveenRaj, V.G.Rekhasri, N.Sowmiyaa.(2021).Women Safety Night Patrolling Robot. Annals of the Romanian Society for Cell Biology, 15706–15714.
- [4]. K. Aravind Kumar, G. Praveen Kumar, S. Jayadhar Reddy, R.Manjula, "IOT Based Night Patrolling Robot with Arduino and ESP32", IJAST, vol. 29, no. 04, pp. 4742 -, Jun.2020.
- [5]. Poojari Manasa, K.Sri Harsha, Deepak DM, Karthik R,Naveen Nichal O, "Night Vision Patrolling Robot using NodeMCU," by Journal of Xi'an University of Architecture & Technology, ISSN No : 1006-7930 ,Volume XII, Issue V, 2020
- [6]. "Review of human detection techniques in night vision" in 2017 International Conference on Wireless Communications, Signal Processing and Networking.
- [7]. Kaumalee Bogahawatte and Shalinda Adikari, "Intelligent Criminal Identification System," Proceedings of the IEEE International Conference on Computer Science and Education, vol. 8, no. 3, pp.633-638, 2013.
- [8]. By J.M. A 'lvarez, A.M. Lopez, "Illuminant invariance- detection," Intelligent Transportation Networks, IEEE Transactions on, No. 99, pp.based path 1–10, 2010.
- [9]. C.Micheloni, G. L. Foresti, C.Piciarelli, and L. Cinque, "An Autonomous Vehicle for Video Surveillance of Indoor Environments," by IEEE Transactions on Vehicular Technology, vol. 56, no. 2,pp. 487-498,2007.
- [10].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.

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