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IOT Based Women Safety Night Patrolling Robot

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ABSTRACT

The paper presents the idea that revolves around women's safety, Women have mostly become a victim of Workplace and public place harassment which in turn are leading them to quit their passion and dream jobs. Women safety night patrolling robot is Engineered with an intention to solve this exact problem. With obstacle sensing abilities and night vision cameras embedded with GPS and Bluetooth module, makes it an effective yet easy to implement device which will address the issue in the most effective way. All its features are properly coordinated with the help of a microcontroller which will not only make it smart but also portable. By giving women a reliable shield, it helps them feel brave enough to take control of their own lives and follow their dreams without being stopped by harassment. Basically, it marks a new time where women everywhere feel included and safe. Furthermore, the paper presents experimental results and discussions, highlighting the system's capabilities in patrolling, sound detection, obstacle sensing, and live video streaming for real-time monitoring and response which addresses future enhancements, emphasizing the potential for further improvements in deploying a fully-fledged security robot with extended coverage and enhanced efficiency.

Key Words: Women Safety, Security Robot, Patrolling, Sensors, Real Time Monitoring.

I. INTRODUCTION

The Internet of Things plays a major role in everyday life. The main difference between a IOT and embedded systems is that in embedded systems, dedicated protocols or software are embedded in the chip, whereas IOT devices are smart devices that sense the environment around the device to make decisions. It is something that can be done. Development of sensor technology, availability of internet-connected devices. Data analysis algorithms allow IOT devices to operate smartly in emergencies without human intervention. As a result, IOT devices are being applied in a variety of areas such as agriculture, medicine, industry, security, and communications applications. The document underscores the critical need for innovative solutions to address women's safety concerns, advocating for the integration of advanced technologies such as robotics, IoT, and real-time monitoring to ensure comprehensive and proactive security measures. It emphasizes the significance of cost-effectiveness, user-friendliness, and reduced human intervention in developing and implementing such systems. The proposed Women Safety Patrolling Robot presents a promising approach to mitigating women's safety concerns, with potential for further enhancements and widespread implementation to address these pressing societal challenges. The Women Safety Patrolling Robot described in the document is designed to address the issue of women's safety by patrolling assigned areas with minimal human intervention. Its main features and capabilities include: Sound Sensing Ability: The robot is equipped with sound sensors to detect any sound in its surroundings. Obstacle Sensing Ability: It uses ultrasonic sensors to detect obstacles in its path and navigate around them. IoT Features: The robot has IoT capabilities, including cameras, GPS module, and Bluetooth module, to transmit live video and location data to a user's device. Autonomous Operation: It is designed to function autonomously, moving into areas where human access is limited or impossible. Directional Sound Detection: The robot has four microphones facing different directions to detect the source of sound and move towards it. Night Vision: It uses a night vision camera to ensure the safety of its surroundings, especially in low-light conditions. Remote Monitoring: Users can physically monitor the robot, adjust camera settings, and receive live video feeds using a PC or portable device. Security and Safety Focus: The robot is specifically designed to provide security and safety to women, especially in areas where they may feel vulnerable. Integration with Microcontroller: All its features are properly coordinated with the help of a microcontroller, ensuring efficient and functional operation. These features and capabilities make the Women Safety Patrolling Robot a valuable tool for enhancing women's safety and addressing the challenges they face in various environments.

II. LITERATURE REVIEW

An alternate, less technical analysis for female security machines using the Internet of Things (IoT) is proposed by the author [6]. This system can be accessed online, the victim's location can be fine-tuned using GPS, and the victims' loved ones and law enforcement can be notified about the incident. [1]. It is possible to protect women against harassment in several ways. An interactive wrist bracelet is one of the tools employed. They included a button into the wrist band that, when pushed, triggers an alarm, activates a tear gas protection device, and notifies the designated emergency contact. The use of live video streaming is another way to identify the harasser. Smart Shoes for Women's Safety with Implicit Triggers is the goal of the writers of [11]. Our goal in this study is to compile information from a variety of sensors in an effort to pinpoint the victim's precise whereabouts. In order to protect women from thieves in contemporary cities, the article "Women Safety System with Nerve Stimulator utilizing IoT Technology" lays forth a plan to use a nerve stimulator, which can provide an electric shock pulse, to keep them safe.[9]. One or more of the following sensors—pressure or tilt—can activate this device. Without the need for a smartphone, the authors created a one-touch alert system that may summon assistance in an emergency [2]. A small device including a microprocessor and a buzzer has been created for use as an accessory for watches or bands. The individuals working with Orlando Arias... This research delves at wearable gadgets as part of the Internet of Things [3]. These are embedded devices with sensors that gather data from their surroundings. The data is then sent to off-site locations for further processing. Despite their seemingly innocuous nature, these new technologies pose serious threats to users' privacy and security. They make us wonder how easy it is to hack these gadgets and what the repercussions might be if we did. Common design strategies and their consequences on security and privacy are addressed by focusing on the design flow of IoT and wearable devices.

Lifecycle transitions, information linkage, inventory assaults, and privacy violating interactions and presentations are the four hazards that the authors J. H. Ziegeldorf and O. G. Morchon outlined in their technique [5]. Our reference model's threat arrangement sheds light on the locations of risks and provides a framework for thinking addressing them. The paper concludes by examining technical challenges within the context of each threat, which might provide light on potential avenues for further study.

We used an association algorithm to keep track of time at Velocity. It is possible to keep tabs on people's actions using both holistic methods and video monitoring, which is shown in a 2D histogram. A 3D histogram representation of human crowds, however, would not be able to be detected by it [4]. Using temperature and pulse rate sensors to determine the likelihood of an issue and notify loved ones via a smartphone with a push button in the circuit to manually send the message, this research—which incorporates conductive fabric, a Velostat, and a force sensing resistor—focuses on the use of these technologies [10]. Another study details a physical gadget with a number of modules—including an emergency button, GPS, GSM, LCD, and a pulse rate sensor—that is more aimed at helping women feel comfortable going about their daily lives [7]. According to the study "Smart Women Safety Device Using IoT and GPS Tracker," the user may get the message right away by calling the police station, and the precision of the message is dependent on the user's speech. Position data in the form of latitude and longitude is received by the GPS receiver from satellites.8]

III. PROPOSED METHODOLOGY

3.1 Proposed Design:

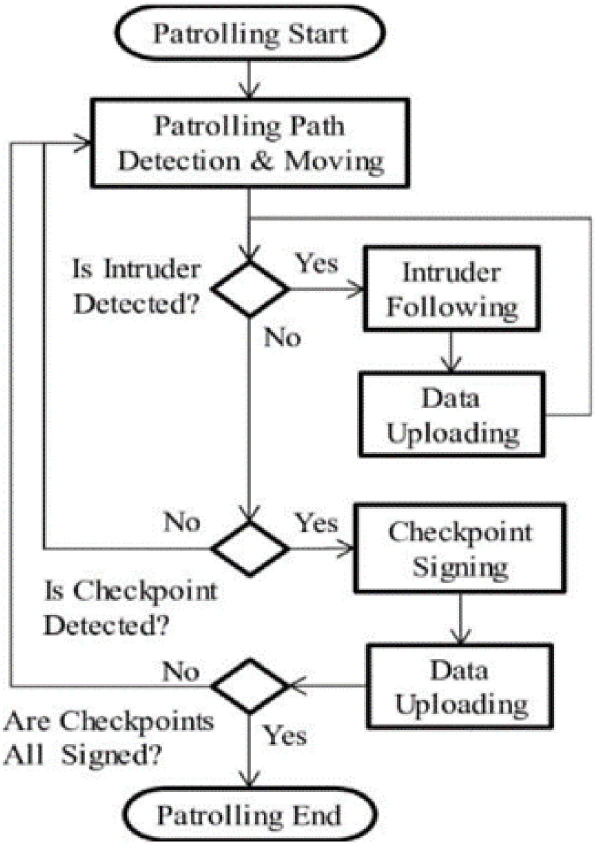


Fig 1: Flow Of Operation

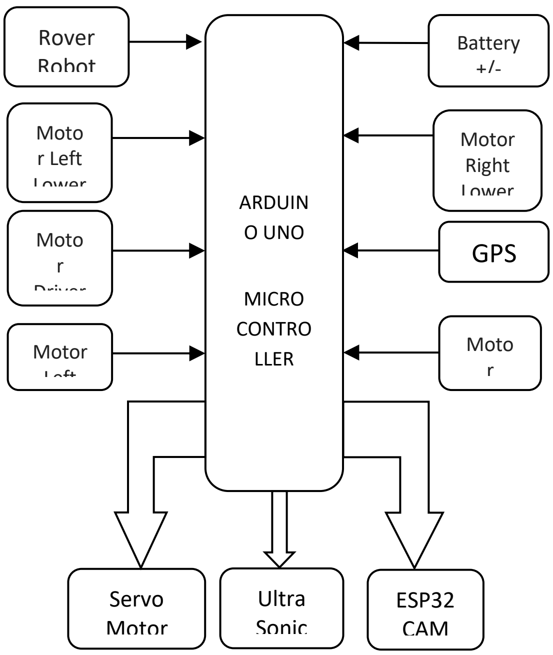


Fig 2: Block Diagram of proposed system

The primary goal of the system is to conduct night patrols in a designated region with little human involvement using its built-in capabilities. It has an ultrasonic obstacle detection sensor since it has to avoid obstacles as it moves towards the sound source.

The robot can track its position and transmit live footage from its cameras via an interface with the user's device, such as a smartphone or laptop.

In order to track the robot's whereabouts, the user must connect it to a Bluetooth module on their smartphone [13]. Interfacing the robot with consumer devices has been greatly facilitated by the Internet of Things (IoT).

To get the real-time position picture, an Arduino microcontroller is used. This is accomplished with the help of the ESP CAM 32 development board. There are two main components to the system's design: the hardware and the software. Using a GPS coordinates and a picture of the target's position, this concept activates the tracking device remotely. A 5v power source, such a portable charger, is all that is needed to power the sensor. Through the use of ESPCAM32, the GPS module is externally linked [12]. The user interface may assist with two of these. Data may be sent and exchanged across modules. After the global positioning system (GPS) has collected the current latitude and longitude, it will transmit those coordinates together with a picture of the current location to any registered or specified Telegraph messaging app.

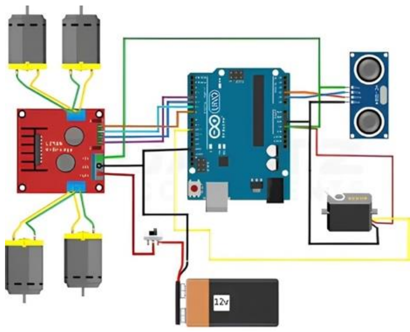


Fig 3: Pin Diagram for the Robot Circuitry

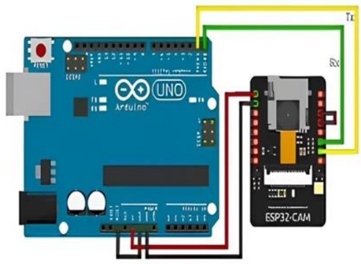
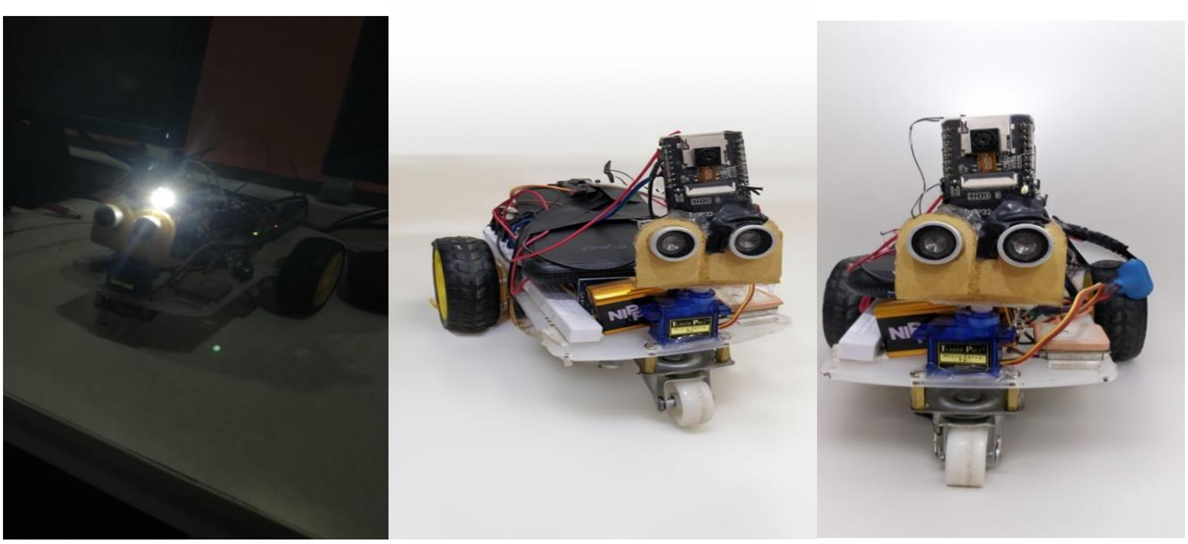


Fig4: Pin diagram for ESP32 – CAM Circuitry

IV. IMPLEMENTATION

So that users can see whether there are any anonymous actions in the live video feed, our robot will even scan for impediments as it moves randomly. If there are others around, it might bring their faces to the forefront. In the region where the robot is patrolling, the user may identify the robot's present position if they detect something anonymous. This is shown at the end. You can check the system's output even when it is traveling at random.

A woman's safety night patrolling robot's route information is included in the output collected when the system was traveling in a random method via the Telegram app. It offers end-to-end encrypted video calling, VoIP, file sharing, and a number of other functions; the RIGHT 2 and LEFT 4 signify that the robot has gone the right path twice and the left direction four times while patrolling, respectively. The iOS version came out on August 14, 2013, while the Android version came out on October 20, 2013. There are five data centres throughout the globe that house Telegram's servers, with the operating hub being in Dubai, UAE.



4.1. Results & Analysis:

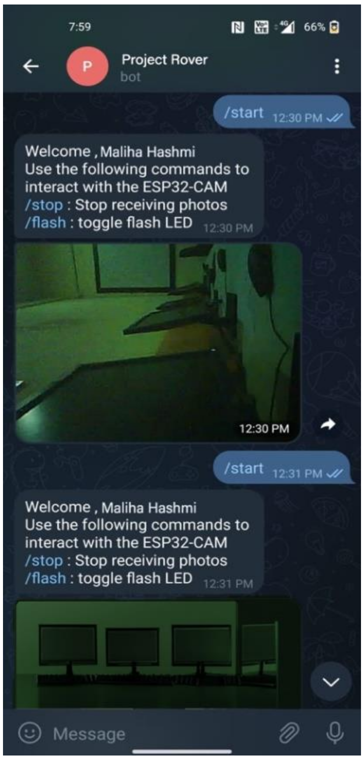


Fig 5: Screenshot of the output

A message is sent to the target device with instructions on how to cease receiving photos or turn the Flash LED on or off. This process begins when the telegram app is asked with the command /start. Night vision is also activated and the flash is used to take images in low light conditions.

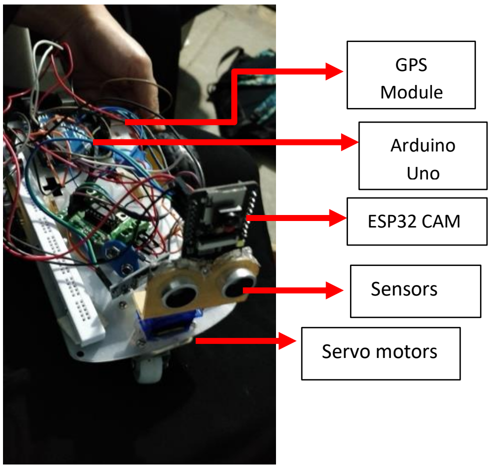


Fig: 6: Hardware overview

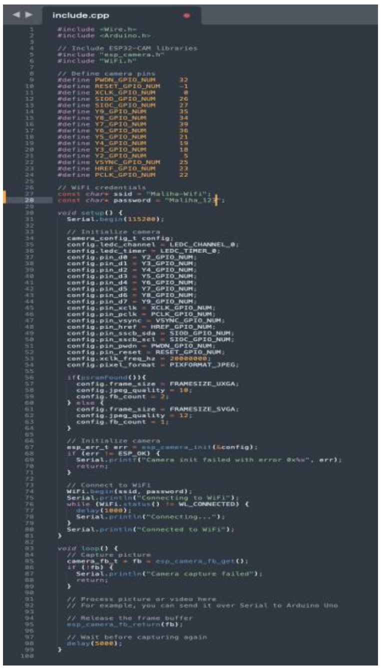


Fig 7: Code overview

Objectives

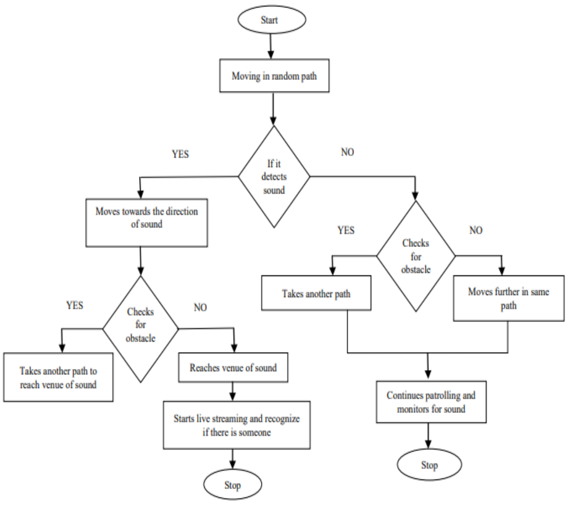
a. Track and get the exact location picture of the subject

b. Send both target location pic and GPS location coordinates

4.2.Technology:

With the use of network connections, microcontrollers may communicate with nearby devices and transmit data to an Internet of Things (IoT) app for processing.

In addition, they can operate with a variety of network protocols, including WiFi, Bluetooth, and cellular networks (2G/3G).



V. CONCLUSIONS

Autonomous and intelligent, this equipment allows for night vision patrols. The task at hand is to build a guard robot equipped with a night vision camera to keep its environment secure. Enhancement would definitely lead to a significant rise in safety. In this study, we provide a methodology for designing observational robots. It addresses the issue of restricted extent observation by using the idea of the Internet of Things. You may physically control the robot's actions, including shooting images and modifying the camera's settings (Brightness, Shutter speed, Exposure, etc.), using a desktop computer or portable computer. This program-specific checking ought to be doable as well. Therefore, this robot is little in stature and can traverse areas inaccessible to humans. The robot is stealthy and hard to see since it fits in with its environment. Remote innovation is a game-changer in the gadget industry. Our organization is using this innovation as an essential piece of reconnaissance. The end product is a fully working robot that can do convincing checking tasks with much less human intervention.

SCOPE

This system can be further improved into a full-fledged security Robot to reduce human work. The system can be provided having 360 ˚coverage along with high end components with higher extend its operation and to increase its efficiency. The system can be provided with additional microphones facing more directions for better detection of direction of source of the sound.

REFERENCES

1. Miriyala, Geetha Pratyusha, et al. "Smart intelligent security system for women." *International Journal of Electronics and Communication Engineering & Technology (IJECET)* 7.2 (2016): 41-46.
2. Thiyagarajan, M., and Chaitanya Raveendra. "Integration in the physical world in IoT using android mobile application." *2015 International Conference on Green Computing and Internet of Things (ICGCIoT)*. IEEE, 2015.
3. Arias, Orlando, et al. "Privacy and security in internet of things and wearable devices." *IEEE Transactions on Multi-Scale Computing Systems* 1.2 (2015): 99-109.
4. Jain, R. A., et al. "Women‟s safety using IOT" *International Research Journal of Engineering and Technology (IRJET)* 4.05 (2017): 2336-2338.
5. Yarrabothu, Ravi Sekhar, and Bramarambika Thota. "Abhaya: An Android App for the safety of women." *2015 Annual IEEE India Conference (INDICON)*. IEEE, 2015.
6. Thavil, J. K., V. P. Durdhawale, and P. S. Elake. "Study on Smart Security Technology for Women based on IOT." *International Research Journal of Engineering and Technology (IRJET)* 4.02 (2017).
7. Zahid Ali; Majid Ali Khan; Omar Bin Samin; Musadaq Mansoor; Maryam Omar "IoT Based Smart Gloves for Women Safety" *Published in: 2021 International Conference on Innovative Computing (ICIC) DOI: 10.1109/ICIC53490.2021.9693086 USB ISBN:978-1-6654-0090-9*

8. G. Uganya; N. Kirubakaran; Bernatin T; M. Boobalan. " Smart Women Safety Device Using IoT and GPS Tracker" *Published in: 2023 Intelligent Computing and Control for Engineering and Business Systems (ICCEBS) DOI: 10.1109/ICCEBS58601.2023.10449302, Electronic ISBN:979-8-3503-9458-0*
9. Vijaya Vardan S P Reddy; K.B.S.L Vamsi; Sekhar. M Chandra; Krishna. M Rama; Y Deepika. " Smart Women Safety Device Using IoT and GPS Tracker" *Published in: 2022 2nd International Conference on Technological Advancements in Computational Sciences (ICTACS) DOI: 10.1109/ICTACS56270.2022.9988463, Electronic ISBN:978-1-6654-7657-7*
10. Suthagar S; Shriganth RA; Subash S; Vasanth M. " Performance Analysis of Velostat, Conductive Fabric and Force Sensing Resistor for Incorporating Safety in Women's Jacket" *Published in: 2024 International Conference on Emerging Smart Computing and Informatics (ESCI) DOI: 10.1109/ESCI59607.2024.10497338, Electronic ISBN:979-8-3503-0661-3*
11. Manikrao Dhore; Himanshu Bhatia; Shraddha Bagav; Prajwal Kadam; Amey Dhuri. " Smart Shoes for Women Safety with Implicit Triggers" *Published in: 2023 World Conference on Communication & Computing (WCONF) DOI: 10.1109/WCONF58270.2023.10235229, Electronic ISBN:979-8-3503-1120-4*
12. V. U. Vaddi, S. R and K. K. B M, "Design and Development of a Quadruped Robot for Edutainment," 2022 IEEE North Karnataka Subsection Flagship International Conference (NKCon), Vijaypur, India, 2022, pp. 1-6, doi: 10.1109/NKCon56289.2022.10126832.
13. Singh, T. Gupta and M. Korde, "Bluetooth controlled spy robot," 2017 International Conference on Information, Communication, Instrumentation and Control (ICICIC), Indore, India, 2017, pp. 1-4, doi: 10.1109/ICOMICON.2017.8279135.