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Women's Safety Night Patrolling Robot

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ABSTRACT :

The rise in violence against women has made their safety a top priority everywhere in the world. They are used to being mistreated, either psychologically or physically. People are giving up on their interests and aspirations as a result of harassment at work and in public settings. Despite a number of anti-harassment laws being implemented by the government, the prevalence of harassment among women has not declined. The best way to lessen violence (such as robberies, sexual assaults, domestic abuse, and so forth) against them is to provide them with amoral support.The Women Safety Patrolling Robot will therefore make an effort to protect women. While the proposed patrolling robot will roam its designated area and look for anonymous behaviors, existing systems use CCTV cameras to record events, which is hardly a preventative method for women's safety. The night patrolling robot will therefore be more beneficial to the women's community. Given what is occurring in the neighborhoods of major cities and other large urban areas, women's security has become one of our country's most pressing needs. In this day of advanced technology and smart devices, a basic safety device that helps victims in the event of unexpected danger is crucial. The design and development of a prototype for an electronic gadget that may one day be used as safety gear are described in depth in this paper. In addition to being subjected to physical and sexual violence, many moms, young girls, and women are disappearing from public areas, streets, and public transportation these days.The majority of cases are regularly filed on topics including assault, intimidation, and kidnapping, and these offenses are becoming more common every day. In order to prevent these offenses, an embedded system-based Safety for Women IoT Night Patrolling During the night, a robot is used for street surveillance to keep an eye on a real-time update to the control room. Additionally, it has a special warning function that activates when it detects an unusually high volume of sound from the surroundings (these things don't happen very often). Every time a lady cries for help, this night patrolling robot alerts the rest of society. The purpose of this prototype is to patrol the street at night.

Keywords: Night patrolling surveillance, Safety technology ,Emergency response, Real-time monitoring, Autonomous robot

1. Introduction :

The design, development, function, and use of robots are the subjects of robotics. Although they can be employed for a variety of tasks and situations, many robots are currently employed in manufacturing processes and dangerous locations. Given the significant global concerns surrounding women's safety, it is imperative that we make progress in this area. The Women Safety Night Patrolling is an effort to improve women's safety by utilizing robots. It will be a significant step in the direction of more automation and safety. The female safety night patrolling robot utilizes all of its features to ensure trouble-free operation. The main causes are fear of physical or sexual abuse or violence against them. Despite the tremendous advancements in technology and the creation of new devices, women and girls continue to face challenges in the twenty-first century. They frequently strive to advance liberty despite differences in politics, religion, ethnicity, and culture. Although it is well known in our society how important women's safety is, it is also the responsibility of individuals to ensure that they are adequately safeguarded. The greatest method to lessen the likelihood of becoming a victim of violent crime is to identify, protect, and seek out resources to assist you in dangerous circumstances, according to women's robot patrolling systems. The project's main objective is to create a robotic system that can patrol areas for women's safety at night. To ward against such dangers, the robot will have an assault mechanism and an emergency response system.

2. Review of Literature :

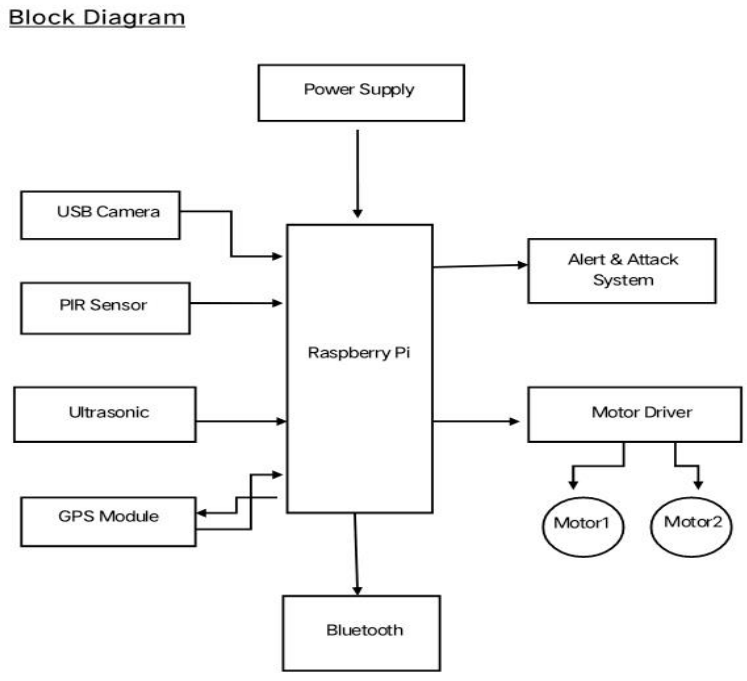
In many parts of the world, women's safety is the top concern. In the suggested framework, B.N. Divya depicts a wellness electronic framework for women's security. They make use of a security camera that uses OpenCV and a Raspberry Pi to provide night vision capabilities. CNN, a deep learning technique, is used to find abnormalities. With the help of OpenCV, the image captured by the Pi camera is sent off the Pi for processing in order to determine the location of the face and person. Methods: Raspberry Pi, OpenCV, Convolutional Neural Network (CNN), and Raspberry Pi Camera [1].

Nowadays, security is greatly enhanced by video surveillance. In stockrooms, offices, classrooms, and outdoor settings, first-class cameras are necessary. The automated car is equipped with sound sensors and a night vision camera and travels at high speeds. It uses its camera to scan the area and identify any apparent human features. Python is the programming language used, and OpenCV is the library used for person recognition. OpenCV, a Raspberry Pi, a night vision camera, and a sound sensor were the methods employed. [2].

One of India's major risks, ladies and young ladies, is security. As soon as possible, this should be changed. A Raspberry Pi-powered insurance monitoring system allows us to reduce concerns about women's health. Using a Raspberry Pi, this insurance tool was primarily developed based on the watching robot. We are constructing a robot vehicle that drives at a unique course and is equipped with digicam and sound sensors, so we can use the nighttime vision digicam to accomplish anything. Any slight sound in the room can be heard by the robot, which then starts to move in the direction of the sound using its predetermined path. After then, it uses its camera to scan the area and look for any faces of people. It captures the images and starts transmitting them to the server. This, in turn, accomplishes the purpose of observing. The following methods were employed: Raspberry Pi, IR sensor, sound sensor, dc motor (robot module), liquid crystal display, motor driver, and HD infrared camera with night vision [3]. The driverless car travels at irregular intervals and is equipped with sound sensors and night vision cameras. It uses a predefined line to watch along a predetermined path. It pauses at various locations, and if the sound is recognized, it moves on to the next location. The designated field is monitored using the IR-based method framework that is included. Any sound begins to travel in the direction of the sound on its predetermined path after the firm has closed. At that point, it uses its camera to scan the area for any potential human faces. As soon as it detects a sound or a human face, it quickly starts taking and sending pictures of the situation. Here, we use the Internet of Things Local Area Network (LAN) to transport the photos and display them to the client together with the audio of the advance notification. Methods: Android, IoT, Robot, Night Vision, Sound Sensor [4].

3. Methodology :

If a woman is in dilemma or gets split from friends or family during an outing or someone is following with bad intentions or do not know how to find a way back home 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 centre through SMS and call. The idea behind this is to provide security to women. Any abnormal activity and small interaction of sound results in the alert of the concerned authority. Then robot automatically goes to the particular area and captures the image of that area and sends it to the user. It uses a predefined and dynamic line and dynamically generated lines to follow its path while patrolling. Rover stops at particular points and moves to the next points if the sound is detected or else the dynamic routing takes place. The system uses an Infrared (IR) based path following system for patrolling assigned areas. It monitors and sensors each area to detect any problem using a combination of two HD cameras. It can monitor and sensors sound on the premises.



Hardware Components:

1. **Raspberry Pi 4:**
- Central processing unit for image processing, motion detection, and sensor data integration.
2. **Bluetooth Speaker:**
- Provides pre-recorded audio alerts or live announcements in emergencies.

- Alerts can include warnings like "Suspicious activity detected" or deterrents like sirens.

3. **PIR Sensor:**
- Detects human presence or unusual motion around the robot.
- Triggers alerts or activates the camera for detailed monitoring.

4. **USB Camera:**
- Streams live video for remote monitoring.
- Can capture images of suspicious individuals or activities.
- Integrates with AI-based models for threat detection (optional).

5. **Ultrasonic Sensors:**
- Placed around the robot for obstacle detection and smooth navigation.

6. **Attack Feature:**
- *Stun Gun/Taser or Pepper Spray Module:* Controlled remotely through the Raspberry Pi.
- Use only as a last resort in verified high-risk situations.

7. **DC Motors with Motor Driver (L298N):**
- Ensures smooth movement and maneuverability during patrolling.

8. **GPS Module:**
- Tracks and logs the robot's location.
- Sends real-time location updates during an alert.

9. **Buzzer and LED Lights:**
- Provides audio-visual feedback for alerts.
- LED lights can flash in emergencies for visibility.

10. **Battery Pack:**
- Powers all components, ensuring enough capacity for extended patrolling (e.g., 12V Li-ion battery).

Software and Technologies:

1. **Programming Language:**
- Python for coding the robot's behavior and sensor integration.

2. **Libraries and Frameworks:**
- *OpenCV:* For image and motion analysis.
- *Pyserial:* For sensor data communication.
- *RPi.GPIO:* To control GPIO pins for motor drivers, buzzer, and LEDs.

3. **Mobile Control:**
- Bluetooth or Wi-Fi-based app for manual override and alerts.

4. **Real-Time Monitoring:**
- Video stream through platforms like Flask or IoT dashboards.
- Alerts sent via SMS (using GSM) or app notifications.

Functional workflow :

1. **Startup:**
- Robot initializes all sensors, camera, and communication modules.
- GPS module starts logging location data.

2. **Patrolling:**
- Robot follows a predefined path using ultrasonic sensors for obstacle detection.
- PIR sensor continuously monitors for human presence.

3. **Threat Detection:**
- Upon detecting motion, the PIR sensor activates the USB camera for video monitoring.
- Raspberry Pi processes camera data to identify suspicious activity.

4. **Emergency Response:**

If a threat is detected:
- Alerts are sent via GSM or IoT to designated authorities.
- Buzzer and LEDs are triggered for audio-visual alerts.
- Bluetooth speaker plays warning messages or deterrent sounds.
- Attack feature (pepper spray or taser) is activated if necessary.

5. **Monitoring and Override:**
- Real-time video and GPS data are accessible via a web or mobile app.
- Manual override allows remote control for critical interventions.

Summary :

The *Night Patrolling Robot for Women's Safety* is a step toward creating safer environments using autonomous robotics and IoT technology. By combining real-time monitoring, emergency response, and defensive features, the system addresses critical safety concerns in a scalable and efficient manner. The robotic system leverages sensors, camera modules, and advanced control mechanisms to monitor the surroundings, detect potential threats, and initiate emergency responses while navigating autonomously through designated areas. the women safety night patrolling robot is a groundbreaking solution aimed at enhancing public safety, particularly for women in urban environments during nighttime. By utilizing cutting-edge technologies such as AI, sensors, cameras, and autonomous navigation, these robots can efficiently patrol public spaces, detect suspicious activity, and provide immediate assistance when needed. These robots serve as both a deterrent to potential offenders and a reliable source of support for women who may feel vulnerable during late hours. Their ability to respond quickly in emergencies, communicate with authorities, and ensure real-time surveillance can significantly improve public safety. Furthermore, the integration of such robots with existing security systems can support human officers, increasing overall effectiveness in crime prevention.

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