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Remote Monitoring and Safety System for Women

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Abstract: ***The escalating risks in contemporary society have made ensuring the protection of women a primary concern. This idea aims to create a real-time safety system with dual functionality by integrating different components to safeguard women. The operating principle entails the interaction of two devices to establish an effective surveillance and tracking system with a suitable alternative. A safety device that fits into a person's baggage is developed for the purpose. The system delivers several notifications to warn individuals with a single trigger of a switch or a vibration sensor, eliminating the need for many other sensors. To begin, the system uses Global Positioning System (GPS) to track the geographical location and delivers SMS/call notifications through Global System for Mobile Communication (GSM) to register contact numbers or a police station in proximity. Secondly, a buzzer alert will notify residents in the neighbourhood. A red led is a second attempt to awaken the surroundings and highlight the urgency of the issue. Through the live recording, a camera captures the attacker as well as a glimpse of the location, which can be viewed online. Finally, a temporary defense might be implemented by creating a shock wave that causes a jolt to an opponent, this time can be used by the person to escape from the area. The second component of the system encompasses the construction of a patrolling robot that moves in the direction of the sound received from the safety device and then continues live monitoring with a camera mounted on top of it that can be viewed by another segment of responsible people currently employed for the purpose.***

Keywords: Global Positioning System (GPS), Live Streaming, Shock Mechanism, Sound Sensor, Siren

I. INTRODUCTION

Security is one of the important concerns in the contemporary world for every single human being from a child to an age-old person However, the world is becoming much more unsafe for women. Around 80% of our country's women fear for their safety. In today's world, most women step out at any time from their house to work. Although many technologies have been introduced to help women, abduction, eve teasing, molestation, and harassment in the workplace still occur in our country. In the last few years, crime rates against women have increased tremendously. There is a lot of discomforts not only during late hours but also in the mornings. Some women have been terrified of strangers for their safety. Women were less likely to leave their homes for employment in previous decades. There-fore they were safer. But in the current situation, women want to be employed and want to work outside, but there is a lack of protection.

IT companies should prioritize the safety of their female employees and take necessary measures to ensure their safety during working hours. One way she addresses this problem is by implementing robust security systems that can efficiently assess and mitigate the risk of potential threats to female employees. This security system includes the installation of CCTV cameras, 24/7 security personnel, implementation of security protocols for employees to follow in an emergency, and self-defense training for female employees to contribute to society. may include measures such as providing The growth and development of women in communities contributes to the workforce.

II. MOTIVATION

The project is driven by a considerably high amount of motivation. Numerous problems have arisen across the country and around the world as a result of inadequate communication and information about the whereabouts of a specific individual in
distress. The major purpose for doing this project is to develop a system in which every individual lives in urban hotspots, people who live on the outskirts of most boundaries, should be able to complete their responsibilities regardless of the limits of their surroundings. The personnel in charge of everything should be kept fully informed with the latest information in order to take prompt action.

The system's accuracy and efficiency should be increased in order to delegate the service to other individuals. This is because there may be instances where the specific person is far away from the place It is possible that the rescue crew will take many hours to get at their location. People's unresponsiveness can also be an issue at times. As an alternative, a person should be able to protect himself in the event of danger. Furthermore, this should fulfill a variety of functions.

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For example, a youngster who has lost his way home, a person suffering from anxiety, a person in poor health, intruder assaults, officers on secret missions, and persons working in difficult conditions. To keep tourists safe on forest visits. But we are keen on women to highlight the seriousness of the problem. Moreover, the highest number of attacks that take place in the society are relate that of women Numerous attempts have been made in various ways to solve this problem. All of this motivated us to contribute to one of those efforts to make a difference.

III. OBJECTIVE

Several procedures have been developed to ensure women's safety. Each system employs a unique collection of techniques to keep women safe. All these attempts have had varying levels of accuracy. Each of those systems comes with its own merits and demerits. Our sole aim of the project is to look into those limitations by introducing alternatives to them by creating a prototype model that combines the functionality of existing methods into a handheld product with multiple choices. The technology statistics have skyrocketed over a decade, and despite the progress, there are problems. The proposed system works even when a segment fails to perform altogether.

The project is a safety device that can be installed inside a bag or thick clothing like jackets and cardigans. If the ideology proves to work and serve the purpose, then the complete functionality can be manufactured as a VLSI chip, which can be used in a wearable such as a smartwatch or embedded in a mobile phone.

The IoT Device includes two inputs: a switch and a vibration sensor. When the panic button is pressed, the GPS module is activated, and geographical information is communicated to the victim's preferred contact numbers via the GSM Module. In addition, an audible siren with a light led is fitted to signal an emergency. The live streaming capability is offered for surveillance and distant analysis of the situation to take appropriate action. The authorities will try to reach the site based on their received information. Meanwhile, the individual's self-defense is the most crucial. A shock mechanism will be installed, which will not hurt the opposing person but produce a jerk at the moment, giving the victim a chance to escape from the place.

IV. EXISTING SYSTEM

Kalpana Seelam and K. Prasanti's paper titled "Innovative Method of Ensuring Women's Safety through Smart Security Technology"[8] was presented at the 2nd International Conference on Inventive Systems and Control (ICISC) in 2018. The paper suggests a unique method of safeguarding women by utilizing a smart security device. The device comprises multiple sensors, including an accelerometer, temperature sensor, and heart rate sensor, which monitor a woman's physical well-being.

In case of danger or distress, the device sends an alert message to the woman's family members and the police. Additionally, the device has a GPS module that enables real-time tracking of a woman's location. The paper emphasizes the need for such a device, particularly in light of the escalating crimes against women. The authors contend that conventional security measures like pepper spray or self-defense training may not always be effective, and a smart security device that can discover and respond to perilous situations instantly can offer superior protection.

In conclusion, the paper presents a promising method of addressing the issue of women's safety and security using technology. Nonetheless, it is essential to acknowledge that the device's effectiveness is reliant on various factors, such as its design, usability, and accessibility.

V. PROPOSED SYSTEM

This project aims to overcome the limitations of current systems by experimenting with and implementing new methodologies to solve existing problems. The proposed system offers solutions to few problems, but it requires significant effort to ensure its accuracy. The system works by integrating two existing systems, enhancing their features and providing multiple options. It demonstrates real-time situations and ways to respond to emergencies.

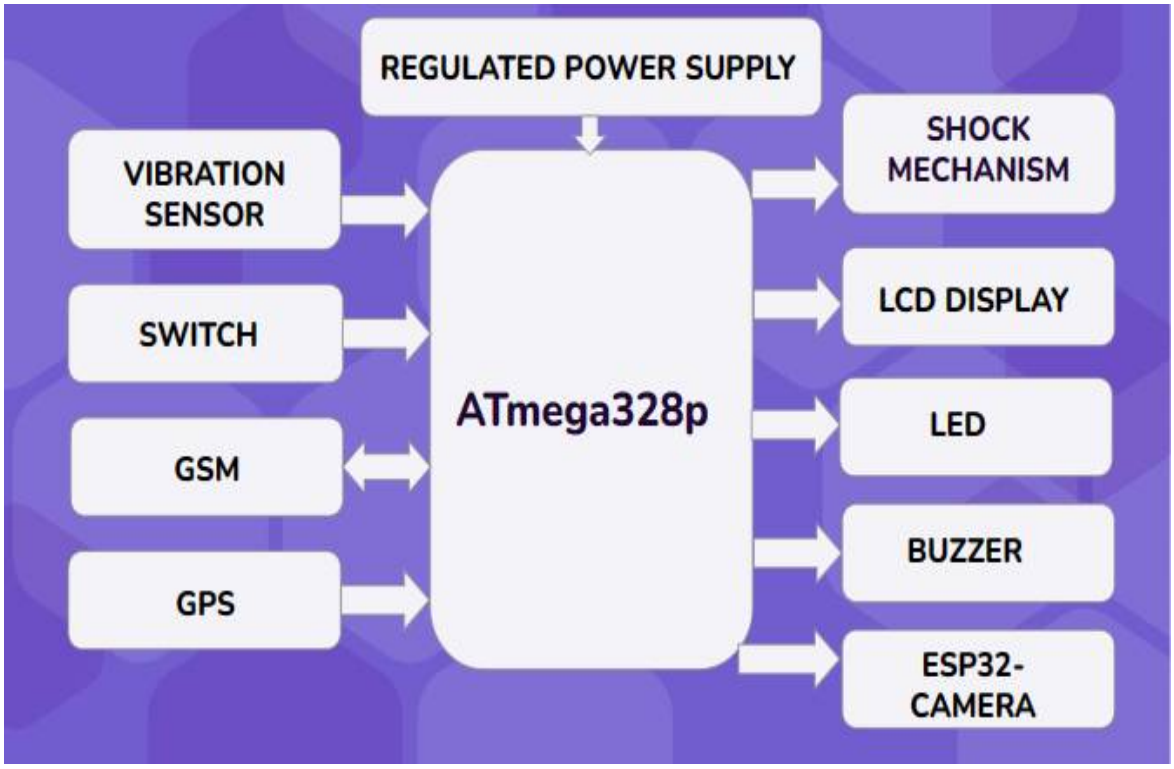
In the first phase, a safety device was developed to send the location of a woman to the relevant authorities or family members along with manual sound and light alerts. The picture of the current surroundings with a defense mechanism. The hardware includes a SOS switch, vibration sensor, GPS, GSM, ESP-32 cam, shock circuit, buzzer, and LED. In the second phase, a patrolling robot was built, equipped with three sound sensors, a Driver module, DC motors, ESP-32 CAM, and a controller to provide automated surveillance.

The uniqueness of this system lies in the fact that the safety mechanism and the monitoring robot are interconnected and can function without any human intervention if necessary. This is achieved by equipping the robot with sound sensors, allowing it to move towards areas with high sound activity while providing a live video feed to display the path.

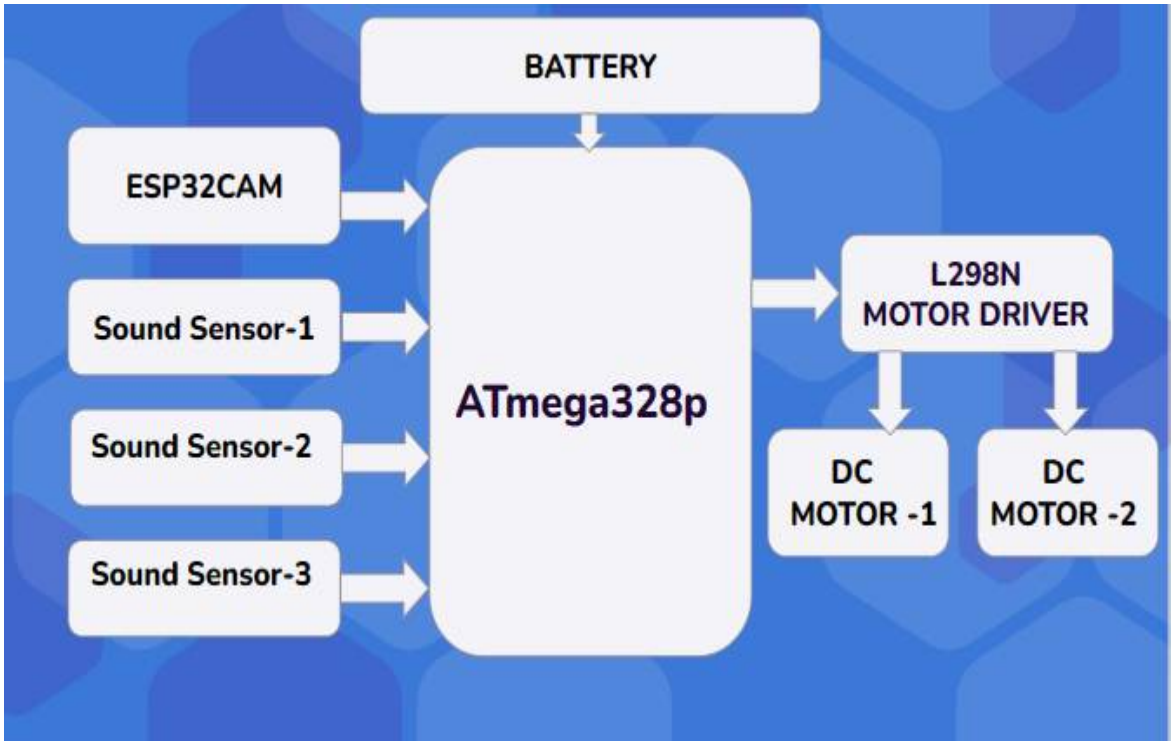
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VI. BLOCK DIAGRAM

1. *Safety Device*



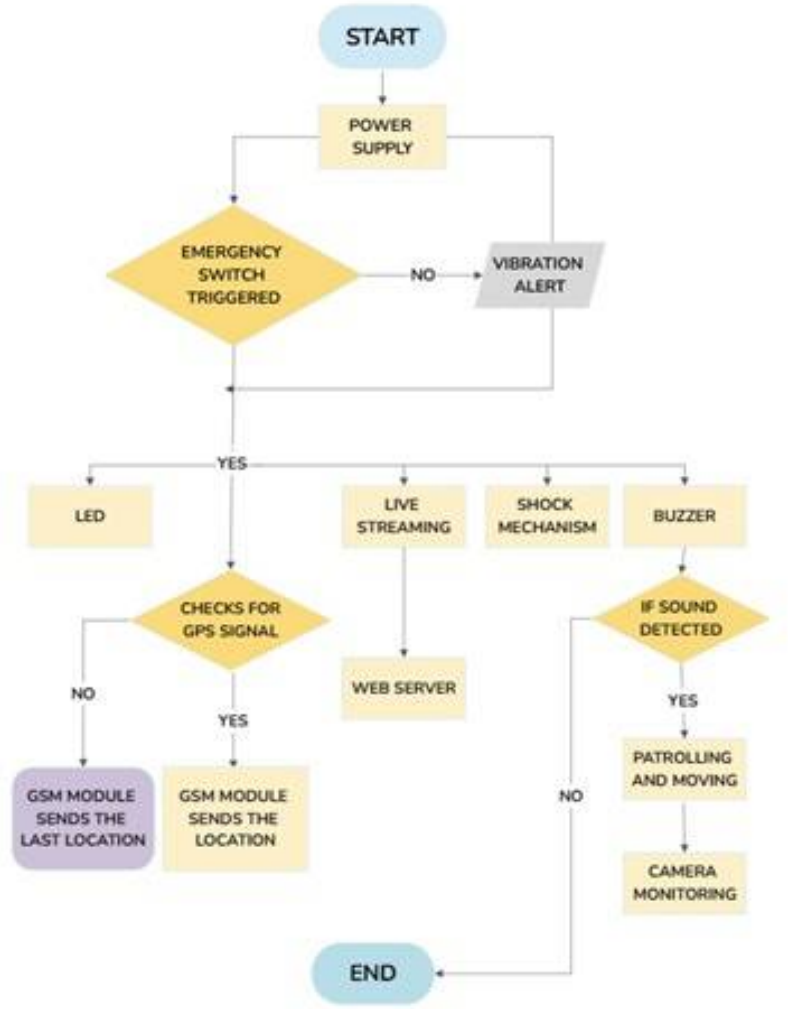
2. *Sound Sensing Patrolling Bot*



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VII. FLOWCHART



The flowchart briefly describes the workflow of the safety device along with responsiveness of the patrolling bot

1. When the power is supplied to the device, the GSM Modem begins to initialize.
2. When a person turns on the emergency switch, simultaneous actions follow the input. Firstly, the GPS module starts searching for the availability of the signal.
3. Simultaneously, a red LED alert indicates the situation's urgency.
4. The installed camera gets activated, and starts live streaming the surrounding area.

5. If the GPS receives the signal, it starts tracking the location, after which the location information is sent to the registered contact number with the help of the GSM Module.
6. If the GPS cannot receive the signal, The last location captured will be sent through the GSM module by short message service.
7. The shocking circuit installed begins the action of self-defense.

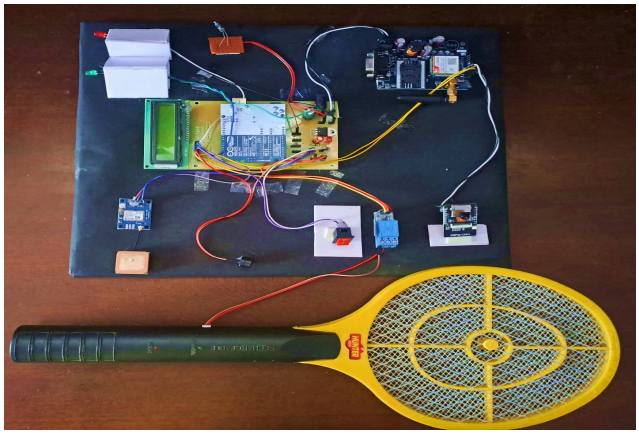
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8. The buzzer is turned on to alert the immediate proximity area.
9. Once the buzzer emits the sound. A patrolling bot equipped with sound sensors receives the input.
10. The patrolling bot movies in the direction of the density of the sound and captures the images with the help of the camera.
11. Suppose the switch isn't triggered. The vibration sensor gets activated.
12. The same series of actions will take place after the activation of the vibration sensor.

VIII. HARDWARE IMPLEMENTATION AND RESULTS

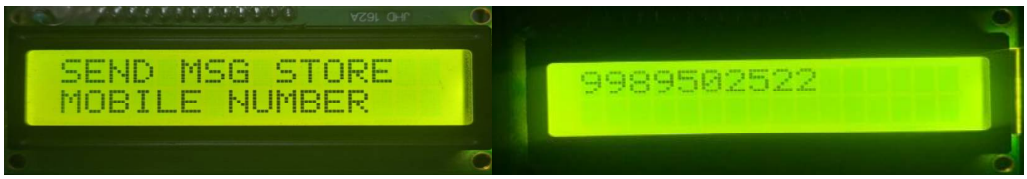
A. Prototype Model of a Safety Device

This is the proposed hardware model of the safety device. This device can be embedded into a bag.



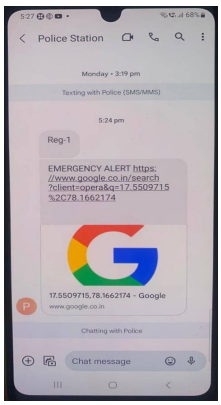
B. Contact Number Registration

The GSM is set to initialize, as indicated by the blinking LEDs installed within the module. During this time, it registers the mobile numbers either pre-written in the code or sent at that instant and sends an acknowledgement to the registered number about the status of the registration.



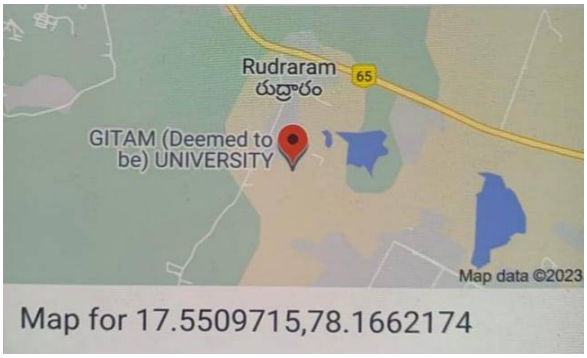
C. Emergency Alert

Emergency alert along with location information is sent to the receiver.



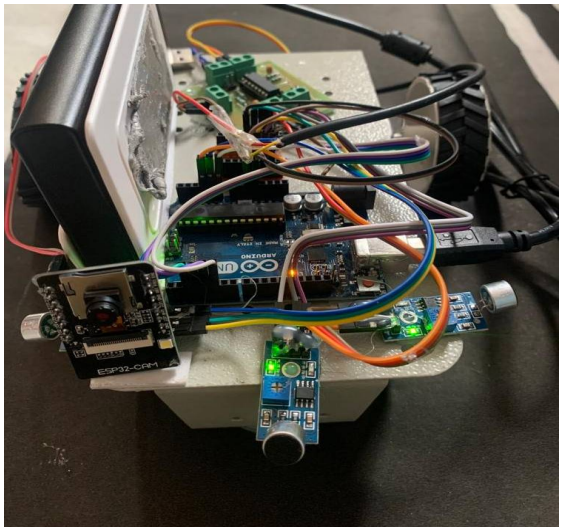
D. Location Information

The corresponding latitude and longitude values indicate the location in the form of maps

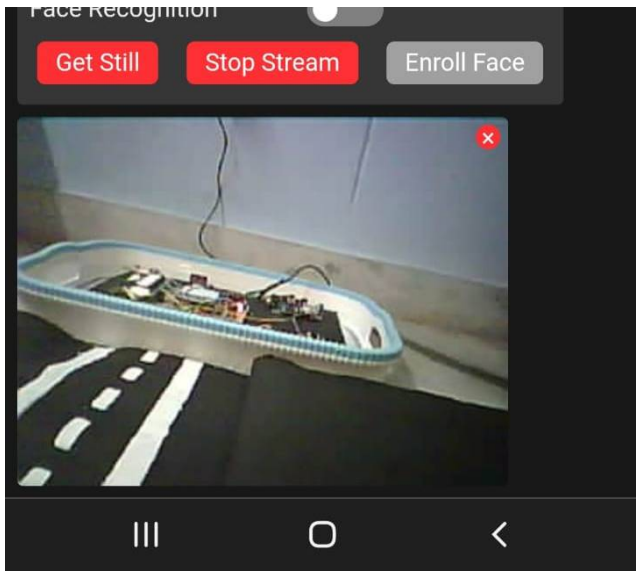


E. Prototype model of a sound sensing robot

The robot is equipped with 3 sound sensors on the front, followed by an atmega328p microcontroller. The motor driver and DC motor are mounted on the rear. Finally, an ESP32 cam for live monitoring.



F. Live Streaming



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G. Complete Setup

The sound sensors fixed on the robot travel in the direction of the sound of the buzzer emitted by the safety device



IX. CONCLUSION

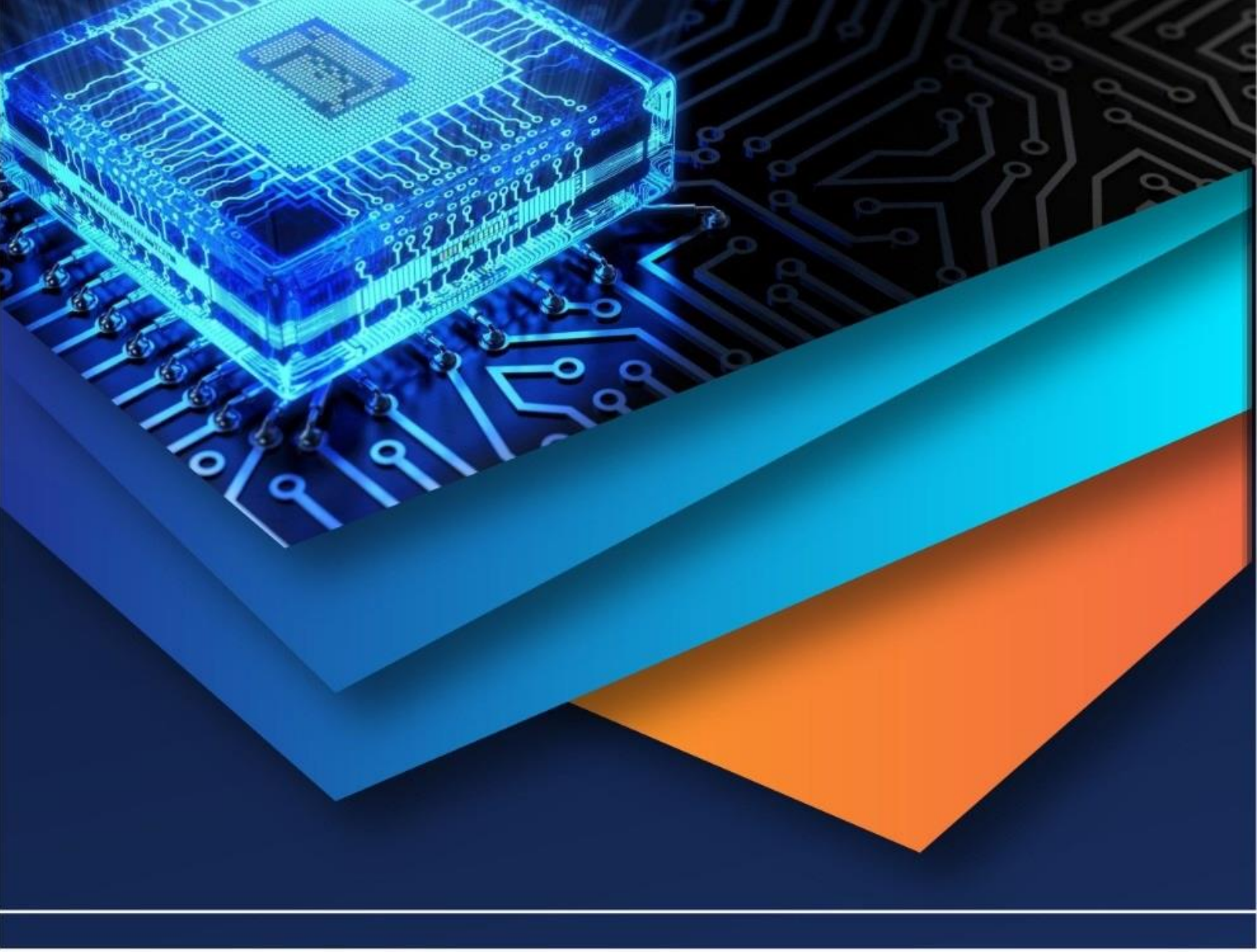
Multiple prototypes have been developed for safety using various technologies, but each has perks and drawbacks. To overcome the drawback a new device has been developed in this project and tried to provide the best possible alternatives and efficiency with minimal components. This way, the models prove affordable, Accessible to everyone and efficient as possible. The circuit can be embedded into a bag, jacket and wearable in the safety kit. This can happen by consuming the technicalities of the project into a card. This card can be installed on mobile and smartwatches. Apart from the individual's point of view, we also focused on providing an ideology to the society and government to fund public projects by constructing a patrolling bot. Overall, this is developed as a well-rounded approach to addressing safety concerns, considering not only the technical aspects but also the social and economic factors.

X. FUTURE SCOPE

This project has a lot of potential as the network is migrating to 5G. There is little or no scope for GSM Module, and they will soon become obsolete. In this scenario, the location information and the sensor readings can be accessed through a URL familiar to everybody, not just a select group of people. This improves the device's response time and ensures quick action for the concerned people. In addition, call alerts and voice recording features can be introduced in the widget to interpret the problem. Live monitoring has been implemented in the current project, but pictures can also be captured and sent to the server for the concerned authorities to access. Different defense mechanisms, such as pepper spray or diffusing smoke, can be replaced. The accuracy can be further improvised by the use of advanced modules.

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