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Design and Implementation of Self Security System for Women using IoT

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ABSTRACT: Today in the current worldwide situation, ladies are dealing with numerous issues like ladies harassment. We propose to have a gadget which is the incorporation of different gadgets, equipment includes a wearable that unendingly speaks with reasonable telephone that approaches the web. This paper covers enlightening insights concerning the plan and execution. The contraption involves a microcontroller(TTGO T-CALL ESP32 SIM800L(GSM and IOT module included)),GPS module(Neo-6M),Shock Generator circuit, Buzzer and Vibrating Sensor. In this endeavor, when a woman recognizes danger she needs to hold tight the trigger of the device. At the point when the contraption is incited, it tracks the current region using GPS(Global Positioning System) and sends emergency message using GSM(Global System for Mobile correspondence) to the enlisted versatile number and nearby police headquarters. IoT module is used to follow the region steadily and update into the site page. Paralyze Generator circuit will convey non-lethal electric daze in emergency conditions to perceive the assailant, signal is used as an alert to caution the nearby people so they may grasp that someone is up the creek without a paddle and vibrating sensor will send the keep going region in case if the device gets abandoned. The essential advantage of this endeavor is that this device can be passed on any place since it is little.

KEYWORDS: TTGO T-CALL ESP32 SIM800L,GPS,Vibration Sensor ,Buzzer .

I. INTRODUCTION

Ladies everywhere on the world are confronting and surprisingly exposed to exploitative actual provocation. Security for ladies is as yet a significant issue as the quantity of violations and provocation over ladies and young ladies is expanding day – by - day. In this time of innovation, cell phone is one of the devices that nearly everybody like and uses to stay in contact with loved ones. All they need is a gadget that can be conveyed wherever without any problem. This proposed project manages a fast reacting, cost assurance framework for an individual and particularly for ladies utilizing which a lady in agony can call for help just with the press of a catch on this savvy device. Self Protection module for ladies wellbeing with area following It can assist ladies with advances that are installed into a smaller gadget. It can possibly assist ladies with innovations that are installed. It is uniquely intended for ladies security and insurance. It has a control button that will be utilized by ladies to educate close by police when they are in trouble. This framework straightforwardly gets associated with the satellite through GPS when actuated. At that point the area is moved through the GSM, it likewise contains a stun system to create nondeadly electric stun in crisis circumstances to prevent the assailant.

seamlessly connect to mobile phones, enabling wearers to send messages and make calls to selected contacts directly from their mobile applications. This innovation not only provides a sense of security but also serves as a proactive solution in the fight against gender-based violence and harassment. Wearable IoT devices tailored to women's safety have gained significant traction due to their versatility, discretion, and ease of use. These accessories can be made in many forms such as pendants, bracelets, and even clothing accessories; This makes them easy to use and adaptable to a variety of interests and lifestyles. One of the best features of this device is its ability to synchronize with the mobile application, which forms the basis for managing security measures and communicating with trusted contacts. The main function of these wearable IoT devices is based on connectivity and communication. Users can pair the device with a

mobile phone via Bluetooth or other wireless technology. Mobile apps are often designed to be as intuitive and functional as consumer dashboards. Users can set their favorite contacts through the app, allowing them to send notifications, messages, and calls in times of stress or emergency.

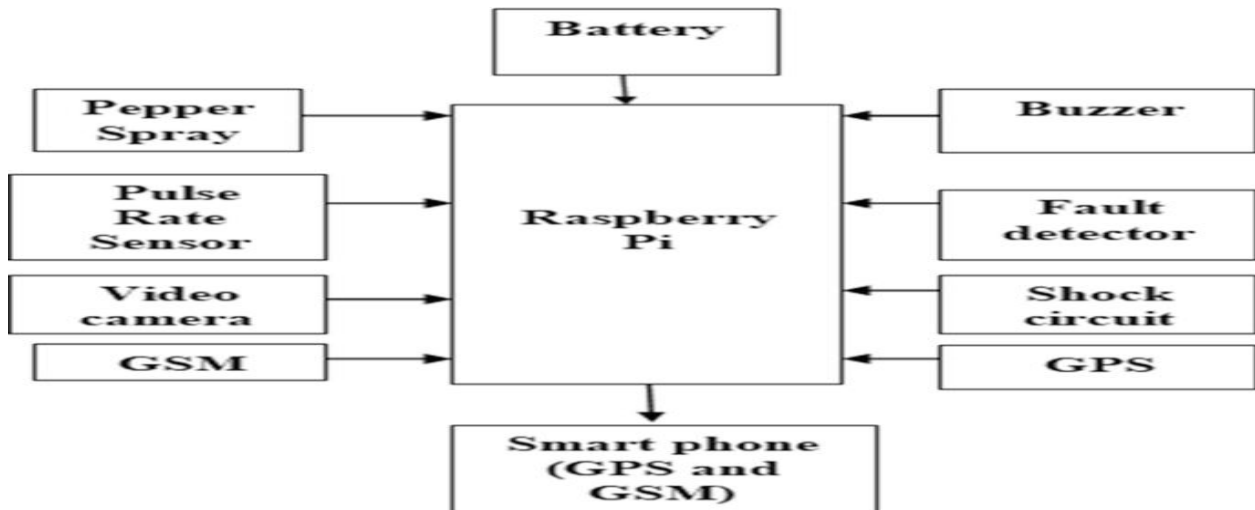


Fig 1: Block Diagram

Wearable IoT devices can do more than emergency communications. Most devices also include a variety of sensors and features to further increase security. For example, they may include GPS functionality to determine the user's location even in remote areas. This will help ensure that officers or elected officials can respond quickly in an emergency. Additionally, many of these devices have quick-release buttons or gestures that allow users to send emergency notifications with little to no effort. This freedom and power allow women to seek help if they feel uncomfortable speaking up or calling. The rise of IoT devices that can be used for women's safety offers a promising solution to the ongoing problem. These tools not only provide effective solutions to crises but can also act as a deterrent against potential attackers. By giving women the tools, they need to stay safe and expand their support networks, IoT wearables are helping create a world where women can live their lives safely and securely every day. As we delve deeper into the world of IoT technology, it is important to discover the many features and capabilities that make this technology an important factor in keeping women safe. In this discussion, we will understand the process of these tools, their integration with mobile applications, the benefits they provide, and their ability to create a safe technology world for women.

II. LITERATURE SURVEY

Ebenezer, Uvaana Falicica J, Rithika Baskaran, Agatha Celesty R, Sejal R Eden [18] The paper discusses the development of a women's safety system based on IoT, which integrates various sensors and devices to create a smart and automated environment for women's protection. It aims to address the rising concerns about women's safety and provide them with the confidence to move freely without fear. This introduces smart devices with multiple functionalities like temperature and vibration sensors. It also connected with GPS which obtained the location of women and protected women. It offers the main advantage of making it wearable and easily movable and it is easy to carry it anywhere. It has hardware components with a large size and make it difficult to move from place to place. In our device, we proposed a device that has a microcontroller called Arduino Nano 33 ble sense with Bluetooth functionality. it is very small in size and makes the device wearable and easily movable. Additionally, these devices are typically connected to a central monitoring system or a smartphone application, which serves as a user interface for accessing features like emergency alerts, location tracking, and communication with predefined contacts or authorities. Researchers have explored different aspects of these systems, including the design of efficient algorithms for real-time threat detection, the usability of the accompanying mobile applications, and the integration of IoT devices with existing infrastructure such as smart city frameworks.

Ayesha Siddika¹, Md. Deluar Hussai, Md. Saddam Hossain, Md. Farhaduzzaman, [2]. This describes the creation of a safety device for women using GPS and GSM technology. The device is aimed at providing women with a sense of security and protection in emergencies. It consists of an ATmega328 microcontroller, a GSM module, and a GPS module. When activated, the device tracks the woman's location using GPS and sends emergency messages and calls to pre-defined numbers, such as family members and the police station, using a GSM. The system does not require a smartphone and ensures accuracy and reliability. This system offers a two-button mechanism that will be used for initiating a buzzer and another one to rescue SMS and call the pre-defined police station, and family member's numbers. This device has some limitations. If the power supply is damaged, the working system of this device will be disabled, and Arduino Uno is the heart of the circuit. If the controller is damaged the whole system will be corrupted. To overcome the limitations of this our device offers functionalities like a single press button to initiate a buzzer as well as rescue SMS and alerting mechanism. We further build a community in the application that ensures the chance of getting help from people who enroll in the applications and may be available to help the person who is in trouble.

G C Harikiran, Karthik Menasinkai, Suhas Shirol [21] The paper addresses the rising crimes against women and the need for safety devices in public places. It proposes a smart wearable device that utilizes pressure, pulse rate, and temperature sensors for automatic atrocity detection and alerts. The device integrates outlier detection techniques to identify potential harm and trigger emergency messages to relatives and nearby police stations. The proposed solution involves the integration of multiple devices, primarily a smart band, and a smartphone, both equipped with various sensors and communication technologies. The smart band continuously monitors vital signs such as pulse rate and body temperature, along with detecting abnormal motion, and communicates this data to the smartphone. The authors critically evaluate existing systems for women's security, highlighting their limitations, particularly the reliance on the victim to trigger the security measures.

Muhammad Shoaib Farooq, Ayesha Masooma, Uzma Omer, Rabia Tehseen, S. A. M. Gilani, And Zabihullah Atal[16] In this paper, IoT-based devices for women's safety. Survey and comparison of existing works on women's safety devices. It proposed a device that uses technologies like IoT and Machine Learning. A device offers functionalities like Image capturing, Audio recording, Alarm system, Shock generator, and Live location tracking. But this device works on pulse rate and heartbeat and this may be triggered by events like running or by doing any work fast. Hence, we tried to avoid such scenarios and make our device work manually by using external hardware components and tried to avoid any unintentional activities.

III. METHODS

The Arduino Nano 33 BLE Sense Rev 2 is a compact and versatile development board designed for embedded electronics projects. It is an upgraded version of the Nano 33 BLE Sense, integrating a variety of sensors and communication capabilities. The board is based on the Nordic Semiconductor nRF52840 chip, offering Bluetooth Low Energy (BLE) connectivity for wireless communication. What sets the Nano 33 BLE Sense Rev 2 apart is its rich sensor suite, making it ideal for projects involving IoT, wearables, and edge computing. It includes a 9-axis IMU (Inertial Measurement Unit) for motion sensing, environmental sensors for temperature, humidity, and pressure, and a microphone for sound detection. These sensors enable developers to create applications that involve motion tracking, environmental monitoring, and audio processing. Additionally, the board features a user-friendly design with a compact form factor, making it suitable for projects with space constraints. It can be programmed using the Arduino IDE, which simplifies the development process for both beginners and experienced users. Overall, the Arduino Nano33 BLE Sense Rev 2 is a powerful and feature-packed development board, combining wireless connectivity and a diverse range of sensors to facilitate the creation of innovative and interactive projects.

The Piezoelectric Buzzer is a versatile and widely used component in electronic circuits, known for its simplicity and effectiveness in generating audible alerts. It operates on the principle of the piezoelectric effect, where a piezoelectric crystal deforms when subjected to an electric field, producing vibrations that result in an audible sound. This type of buzzer is designed for continuous sound output and can produce a steady tone when powered. It is suitable for various applications such as alarms, notifications, and signalling devices. The buzzer operates within a voltage range of 3V to 24V, offering flexibility in different electronic setups. Unlike electromagnetic buzzers, which rely on the movement of a coil within a magnetic field to produce sound, piezoelectric buzzers have no moving parts, making them more durable and energy-efficient. They are also compact and lightweight, making them suitable for space-constrained projects.

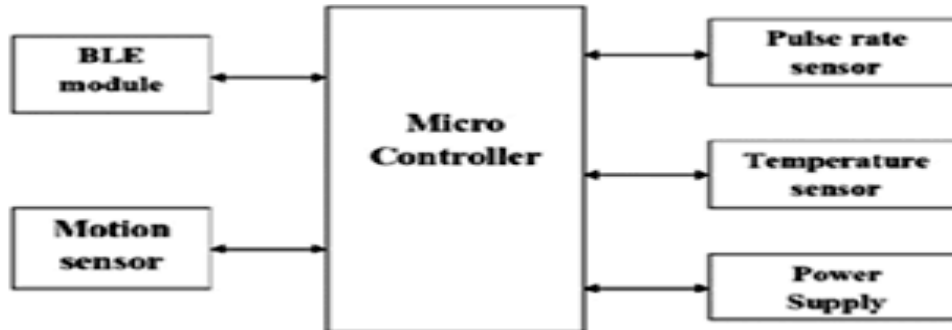


Fig 2: Work Flow

The continuous sound produced by this buzzer makes it particularly useful in scenarios where a persistent and attention-grabbing alert is required. Common applications include security systems, electronic gadgets, and industrial machinery where audible feedback is crucial for user awareness. Integrating the piezoelectric buzzer into a circuit is straightforward, requiring a power source within the specified voltage range. The simplicity and reliability of these buzzers make them a popular choice for hobbyists, engineers, and designers seeking a cost-effective solution for audible alerts in their electronic projects. The ERM (Eccentric Rotating Mass) Coin Vibration Motor with a diameter of 7mm and a thickness of 2mm is a compact and efficient component widely used in various electronic devices to provide haptic feedback. These motors are known for their small size, lightweight design, and ability to generate vibrations, making them suitable for applications such as mobile phones, wearables, game controllers, and other portable electronic devices. The "coin" designation refers to the flat, disc-like shape of the motor, resembling a coin. The ERM technology involves an eccentric mass that rotates within the motor, creating a vibration effect. When an electric current is applied to the motor, the eccentric mass generates vibrations, creating a tactile feedback sensation. The 7mm diameter and 2mm thickness make this ERM motor particularly suitable for devices with limited space, where size constraints are critical. Despite its small dimensions, the motor is capable of producing noticeable vibrations, adding sensory dimension to user interfaces, and improving the user experience. ERM coin vibration motors are commonly used to provide alerts, notifications, and haptic feedback in devices where sound or visual cues may be less effective or inappropriate. For example, they are employed in smartphones to signal incoming calls, and notifications, or to enhance the realism of gaming experiences by providing tactile feedback.

IV. RESULT ANALYSIS

Wearable devices have become increasingly popular in the realm of personal safety and health monitoring. The integration of Arduino Nano 33 Ble Sense Rev 2 into a wearable safety device represents a significant advancement, offering users a comprehensive solution for emergencies. At the heart of this innovative wearable is the Arduino Nano 33 Ble Sense Rev 2, a powerful and compact microcontroller that facilitates seamless communication with a mobile phone through Bluetooth technology. This connectivity serves as a crucial link between the user and their emergency contacts, enabling quick and efficient communication in times of need. The primary functionality of the device revolves around a strategically placed button, easily accessible to the user. When pressed, this button triggers a sequence of actions aimed at ensuring the user's safety. First and foremost, the mobile phone establishes a connection with the selected contacts through Bluetooth. Subsequently, a pre-configured message is sent to these contacts, informing them of the user's situation. Simultaneously, a call is initiated, allowing for real-time communication.



Fig 3: Result analysis

To enhance the urgency and visibility of the distress signal, the device features an activated buzzer. This audible alert serves a dual purpose it not only alerts the user that their distress signal has been sent but also attracts the attention of nearby individuals. This audible cue is instrumental in ensuring that the user receives assistance promptly, especially in crowded or noisy environments. Understanding the importance of feedback, the wearable incorporates a vibration motor to provide tactile confirmation to the user. When the button is pressed, the vibration motor is engaged, creating distinct haptic feedback. This feedback mechanism is crucial in preventing unintentional button presses, as the user can confidently perceive the action they have initiated. This feature is designed to avoid false alarms and enhance the overall reliability of the device.

Furthermore, the device incorporates a location-sharing feature to provide additional information to the user's contacts. When the distress signal is activated, the mobile phone utilizes its location services to send the user's current location to the designated contacts. This feature is particularly valuable in emergencies where the user might be unable to communicate their location verbally. In summary, the Arduino Nano 33 BLE Sense Rev 2-powered wearable safety device seamlessly integrates hardware and software components to create a reliable and efficient emergency communication tool. The combination of Bluetooth connectivity, message sending, phone call initiation, audible alerts, haptic feedback, and location sharing ensures that users can quickly and effectively communicate their distress, garnering assistance when needed the most. This holistic approach to personal safety showcases the potential of technology to positively impact and safeguard individuals in various situations.

V. CONCLUSION

In the pursuit of ensuring the safety and security of women in the current societal landscape, the proposed women's safety device stands as a formidable solution. By incorporating a multifaceted approach to personal security, this device not only addresses immediate threats but also fosters a sense of community through its innovative features. The inclusion of a buzzer in the device design is a critical element aimed at alerting nearby individuals in case of an unfortunate incident. This audible signal not only draws attention to the distress but also acts as a deterrent, potentially preventing further harm. The device recognizes the importance of swift responses from the community and leverages this audible alert system to create a network of support in the vicinity. The integration of text messages plays a pivotal role in escalating the situation to a broader audience. By notifying close relatives, law enforcement, and individuals registered within the application, the device ensures that a web of support is activated instantaneously. Including the victim's current location in these messages is a key feature, providing crucial information for timely assistance. This real-time communication channel serves as a lifeline, significantly enhancing the chances of a rapid response and intervention. Furthermore, the device goes beyond individual safety by incorporating a community-building aspect through its dedicated application. By creating a platform where users can register and join a supportive network, the device fosters a sense of solidarity among community members. This community-driven approach amplifies the

potential for assistance in critical situations. In times of distress, the application not only alerts registered users but also encourages them to respond and aid fellow community members in need.

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