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Microcontroller Based Women Safety Tracker Device

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Abstract:- This paper presents the design and implementation of a microcontroller-based women safety tracker device aimed at enhancing personal safety for women. In recent times, there has been an increasing concern for women's safety, especially in urban areas. To address this issue, our device integrates various sensors and communication modules to provide tracking and alert functionalities. The core of the device is a microcontroller unit that coordinates the operation of different components. It interfaces with sensors such as GPS, Pulse sensor, MEMs sensor to track the user's location and detect any sudden movements or falls. These sensors continuously monitor the user's activities and send data to the microcontroller for processing. In case of an emergency the device alert GSM/GPS communication for sending SMS alerts with the user's location coordinates. The device is designed to be compact, lightweight, and discreet, allowing users to carry it comfortably in various situations.

Overall, the proposed women safety tracker device provides a reliable and efficient solution for enhancing personal safety.

Keywords:- *Microcontroller, Tracker Device, Sensors, GPS.*

I. INTRODUCTION

In recent years, the issue of women's safety, particularly in urban areas, has become increasingly prominent due to rising concerns about personal security. In response this paper presents the design and implementation of a Microcontroller-based Women Safety Tracker Device. This device aims to offer a comprehensive solution by integrating advanced technologies such as microcontrollers, sensors, and communication modules. By leveraging these components, the device provides real-time tracking and alert functionalities, which are essential for ensuring the safety and well-being of women in various environments. At the core of the device lies a microcontroller unit, which serves as the central processing unit responsible for coordinating the operations of different components. . It interfaces with sensors such as GPS, Pulse sensor, MEMs sensor to track the user's location and detect any sudden movements or falls. These sensors continuously monitor the user's activities and send data to the microcontroller for processing. In the event of an emergency or distress situation, the device offers multiple alert mechanisms to notify predefined contacts or emergency services. Through GSM/GPRS communication, it can send SMS alerts containing the user's precise location coordinates, enabling quick response and assistance. Overall, the Microcontroller-based Women Safety Tracker Device represents a significant advancement in personal safety technology. By providing women with a reliable and efficient tool to enhance their safety.

II. EXISTING SYSTEM

In This safety device for women utilizes an Arduino microcontroller interfaced with GSM and GPS modules to send SOS emergency SMS alerts containing current location coordinates. Worn as a band, it enables users to trigger an alarm in distress situations. Additionally, an RF transmitter and receiver facilitate wireless communication between the band and a receiving device held by trusted contacts or authorities. Upon receiving the SOS message, the receiving device extracts the location information and can relay it to the police or concerned individuals, aiding in prompt assistance and potential rescue operations. Overall, this integrated system offers a reliable and efficient means for women to seek help and enhance personal safety.

III. PROPOSED SYSTEM

The proposed system of a Microcontroller-Based Women Safety Tracker Device is designed to provide a robust solution for enhancing personal safety. At its core is a microcontroller unit responsible for managing and coordinating various functionalities. It interfaces with sensors such as GPS, Pulse sensor, MEMs sensor to track the user's location and detect any sudden movements or falls. These sensors continuously monitor the user's activities and send data to the microcontroller for processing. The inclusion of a GSM/GPS communication module enables the device to establish communication with

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predefined contacts or emergency services. In case of emergencies, the device can autonomously send SMS alerts containing the user's precise location coordinates, ensuring quick and accurate assistance. Moreover, the device features a panic button, allowing users to manually trigger emergency alerts when they feel threatened or unsafe. Its compact and wearable design ensures discreet carry. Overall, the proposed system aims to empower women by combining advanced sensing and communication technologies with user-friendly design principles. By offering real-time tracking, emergency alerting capabilities, and discreet wearable functionality, the system strives to enhance personal safety and enable women to navigate their surroundings with confidence and peace of mind.

IV. METHODOLOGY

The key requirements such as real-time tracking, emergency alerting, compact design, and user-friendliness are identified through thorough requirement analysis. Then, suitable components including a microcontroller unit, sensors, GSM/GPS communication module, panic button, and power management system are carefully selected based on the identified requirements. The hardware design and integration phase involve designing the layout and connections between components, followed by their integration onto a PCB or prototyping platform to ensure proper functionality and connectivity. Firmware development includes writing code for the microcontroller to control device operations, implement algorithms for real-time tracking, movement detection, and emergency alert triggering. Communication protocol implementation involves enabling the device to send SMS alerts using GSM/GPS and establishing wireless communication between the wearable device and the receiving device using RF modules. User interface design focuses on creating an intuitive interface with LED indicators, LCD display screens, and tactile feedback for the panic button, ensuring easy operation and clear feedback to users. Testing and validation are critical steps to verify the device's functionality, including sensor accuracy, communication reliability, emergency alert triggering, and battery life. Real-world simulations are conducted to validate the device's performance in emergency situations. Optimization and refinement involve identifying areas for improvement through testing and user feedback, optimizing performance, power consumption, and user interface design based on the results, and refining hardware, firmware, and user interface accordingly. Deployment and user training prepare the device for deployment by providing packaging, user manuals, and training materials, ensuring end-users are equipped to use the device effectively. Continuous improvement involves collecting feedback from users and stakeholders, identifying opportunities for enhancement, and incorporating updates and improvements through iterative development cycles to ensure the device remains effective in addressing women's safety concerns.

V. FLOW CHART

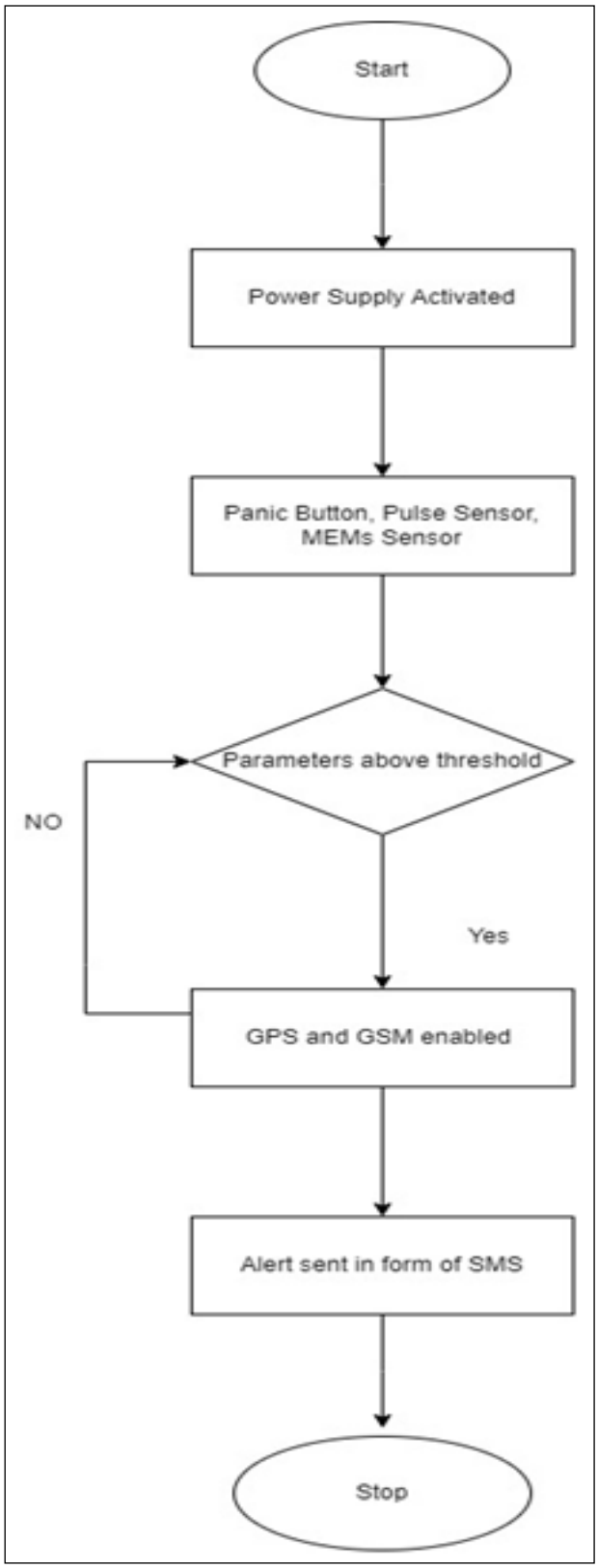

Fig 1. Flowchart of Working

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VI. BLOCK DIAGRAM

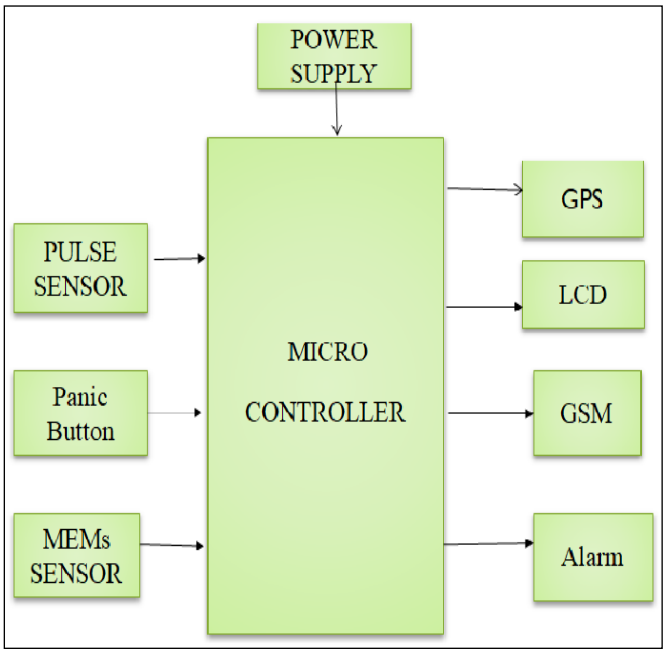

Fig 2. Block Diagram

- Applications
- Personal Safety Enhancement
- Urban Safety
- Domestic Violence Prevention
- Travel Safety
- Campus Safety
- Workplace Safety
- Elderly Care
- Community Safety Initiatives
- Humanitarian Aid
- Empowerment Programs

VII. HARDWARE DETAILS

The hardware configuration of a microcontroller-based women safety tracker device comprises several key components meticulously integrated to ensure its effective functionality. At the core lies the microcontroller unit, such as Arduino or Raspberry Pi, serving as the central processing unit orchestrating the device's operations. This unit manages data processing tasks, interfaces with sensors and communication modules, and controls various functionalities essential for ensuring personal safety. Sensors play a pivotal role in the device's operation, including a GPS module for accurate location tracking, an accelerometer to detect sudden movements or falls, and a gyroscope for measuring orientation and rotation. These sensors continuously monitor the user's activities in real-time, providing crucial data inputs to the microcontroller for processing and decision-making.

Facilitating communication capabilities, the GSM/GPRS module enables the device to establish communication with predefined contacts or emergency services. This module allows the device to send SMS alerts containing the user's location coordinate in case of emergencies, ensuring swift response and assistance when needed. The inclusion of a panic button provides users with a manual means to trigger emergency alerts when they feel threatened or unsafe. This physical button is typically connected to the microcontroller, allowing for immediate activation of the alerting mechanism upon pressing. Wireless communication between the wearable device and a receiving device is facilitated by RF transmitter and receiver modules. These modules enable additional alerting or communication capabilities, enhancing the device's effectiveness in emergency situations. The user interface of the device comprises LED indicators, an LCD display, and tactile feedback mechanisms. LED indicators provide visual feedback on the device's status, while the LCD display presents essential information such as location coordinates or alert confirmation. Tactile feedback ensures users feel the activation of the panic button, further enhancing the device's usability. Antennas, including GPS and GSM antennas, receive signals from GPS satellites and enable communication with cellular networks, respectively. These antennas are crucial for ensuring reliable positioning and communication capabilities of the device. The device's hardware components are housed within a protective enclosure designed to be lightweight, durable, and comfortable for the user to wear. Additionally, the printed circuit board (PCB) provides a platform for interconnecting all components, ensuring compactness, reliability, and ease of manufacturing. In summary, the hardware details of a microcontroller-based women safety tracker device encompass a carefully designed integration of components aimed at enhancing personal safety through real-time tracking, emergency alerting, and reliable communication functionalities.

VIII. DESCRIPTION OF SOFTWARE

In a microcontroller-based women safety tracker device, software development often involves the utilization of various programming languages and frameworks tailored to the specific microcontroller platform. Here's an overview of the software components commonly used with Arduino Uno, which includes Embedded C, Micro Python, and Arduino Sketch:

➢ *Embedded C*

Embedded C is a widely-used programming language for microcontroller firmware development due to its efficiency and direct hardware access. With Arduino Uno, developers write firmware using Embedded C to control the device's operation, interact with sensors, manage communication modules, and handle user input. Embedded C code for Arduino Uno is typically written within the Arduino Integrated Development Environment (IDE) and compiled using the GNU Compiler Collection (GCC).

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➢ *MicroPython*

MicroPython is a lean and efficient implementation of the Python 3 programming language optimized for microcontrollers. While Arduino Uno does not natively support MicroPython, there are alternative microcontroller platforms compatible with MicroPython, such as ESP8266 and ESP32. Developers may opt to use MicroPython for prototyping or developing firmware on compatible microcontroller platforms, leveraging Python's simplicity and readability for rapid development.

➢ *Arduino Sketch*

Arduino Sketch is a simplified programming language based on C/C++ specifically designed for Arduino boards, including Arduino Uno. Arduino Sketch provides higher-level abstractions and pre-built libraries that simplify firmware development for beginners and hobbyists. Developers use the Arduino IDE to write Arduino Sketch code, which is then compiled and uploaded to the Arduino Uno board via USB for execution.

For a women safety tracker device based on Arduino Uno, developers typically write firmware using the Arduino Sketch programming language within the Arduino IDE. They utilize Arduino libraries and functions to interface with sensors (e.g., GPS, accelerometer), GSM/GPRS communication modules, and user interface components (e.g., LED indicators, buttons).It's worth noting that while Embedded C and MicroPython offer flexibility and low-level control, Arduino Sketch simplifies the development process and is well-suited for rapid prototyping and hobbyist projects, making it a popular choice for projects like women safety tracker devices.

IX. SIMULATION RESULT

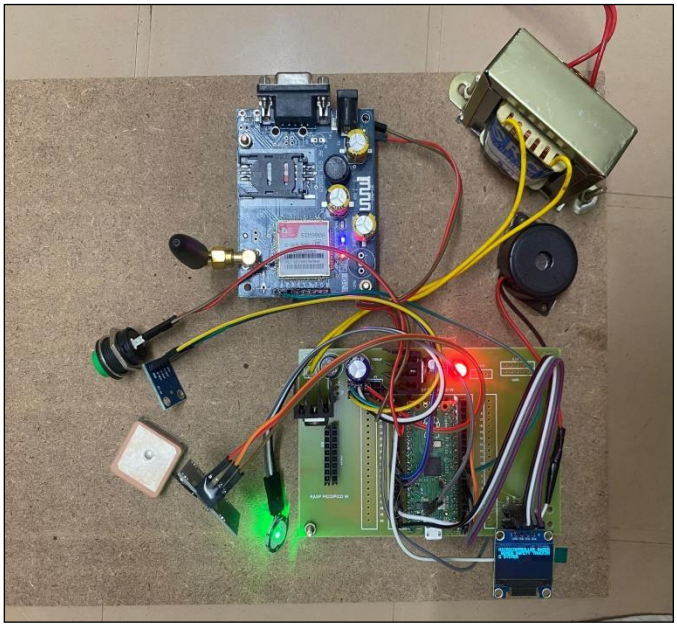

Fig 3 Hardware

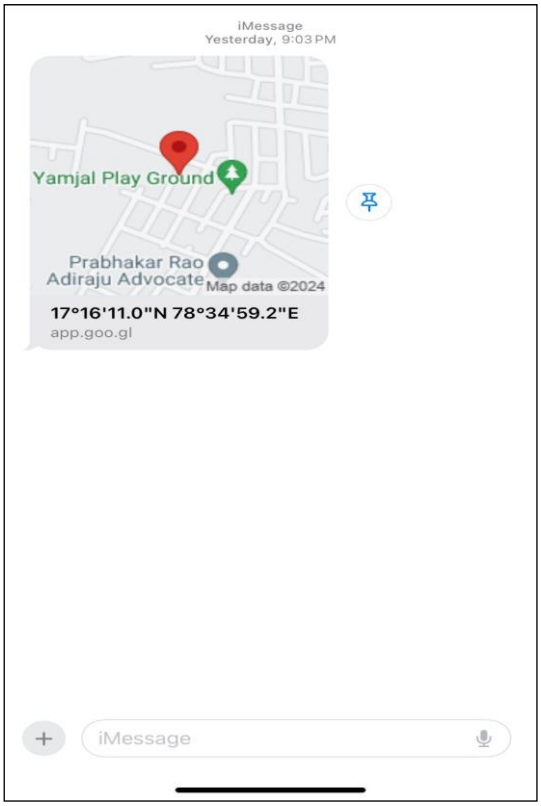

Fig 4 Live Location SMS of Person

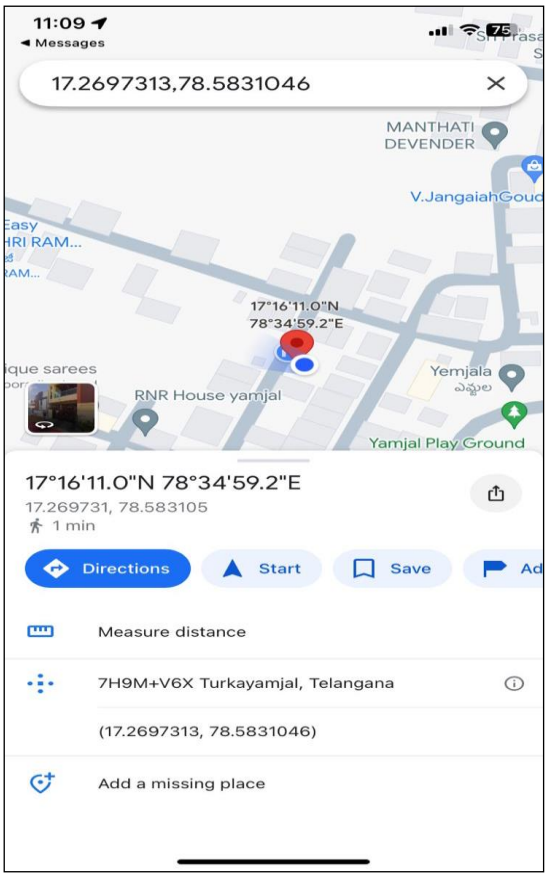

Fig 5 Traced Live Location of Person

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X. CONCLUSION

The development and implementation of a microcontroller-based women safety tracker device offer a significant step forward in addressing the pressing issue of women's safety. Through the integration of advanced sensing technologies, robust communication modules, and user-friendly design principles, this device serves as a reliable and efficient solution for enhancing personal safety in various contexts. The device's ability to continuously monitor the user's location, detect movements, and trigger emergency alerts provides women with a proactive means of safeguarding themselves in potentially threatening situations. Furthermore, the device's real-time tracking and alerting functionalities empower women to navigate their surroundings with peace of mind, knowing that help is readily accessible at the touch of a button. Overall, the microcontroller-based women safety tracker device represents a tangible step towards creating safer and more inclusive communities, where women can thrive without fear of violence or harassment.

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REFERENCES

[1]. Sharma, A., & Kumar, S. (2017). A smart safety device for women security using IoT. International Journal of Engineering and Advanced Technology (IJEAT), 6(4), 18-22.
[2]. Tiwari, R., Patel, A., & Patel, A. (2018). Design and Implementation of Women Safety System Using IoT. International Journal of Advance Research in Computer Science and Management Studies, 6(1), 10-15.
[3]. Raje, P. P., & Kulkarni, A. (2019). Women Safety System Using GSM and GPS Technology. International Journal of Scientific Research in Computer Science, Engineering and Information Technology, 4(2), 68-72.
[4]. Kavya, P., & Madhusudhan, T. (2017). Women Safety System using GSM and GPS. International Research Journal of Engineering and Technology (IRJET), 4(9), 2743-2746.
[5]. Rajput, M., Panchal, V., & Shah, D. (2017). Design and Implementation of Women Safety System. International Journal of Advance Research, Ideas and Innovations in Technology, 3(1), 1-5.
[6]. Jyoti, S., & Goyal, P. (2018). A Review on Women Safety System Using GPS and GSM. International Journal of Engineering Research and Technology, 7(12), 243-247.
[7]. Jain, S., & Goyal, A. (2018). Real Time Women Safety System Using IoT. International Journal of Innovative Research in Computer and Communication Engineering, 6(6), 12340-12344.
[8]. Singh, S., & Kumari, A. (2019). Design and Implementation of Women Safety System using IoT and GSM. International Journal of Scientific Research and Development, 7(6), 24-27.
[9]. Sharma, V., & Malhotra, S. (2018). Women Safety Device Using GPS and GSM Technology. International Journal of Engineering Development and Research, 6(1), 219-222.
[10]. Choudhary, A., & Agarwal, A. (2017). Women Safety System Using GSM and GPS Technology. International Journal of Research in Advent Technology, 5(3), 199-204.