IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

IoT Based Human Safety Device

Anuja Patil[1], Pratiksha Patil[2], Shivam Shah[3] , Vipul Yadav[4], Dr. M. S. Chavan[5]
Students, Electronics & Telecommunication[1 2 3 4]
Assistant Professor, Electronics & Telecommunication[5]
Padmabhooshan Vasantraodada Patil Institute of Technology (PVPIT), Budhgaon, Sangli

Abstract: *In today's world, ensuring personal safety has become a growing concern due to increasing threats from accidents, crimes, and environmental hazards. This project proposes the development of a Human Safety Device designed to provide real time monitoring, emergency alerting, and location tracking capabilities. The device integrates various sensors such as GPS, accelerometers, temperature sensors, and panic buttons to detect abnormal conditions like sudden falls, high body temperature, or distress situations. When triggered, it sends instant alerts via SMS or mobile app notifications to pre-defined contacts and emergency services, along with the user's real-time location. Compact, wearable, and energy-efficient, this device aims to offer a reliable safety solution for children, women, elderly individuals, and workers in hazardous environments. The ultimate goal is to enhance personal security and enable quicker emergency response, potentially saving lives.*

Keywords: Human Safety Device, Real-time Monitoring ,Emergency Alerts , GPS Module, Sensors

I. INTRODUCTION

In today's fast-paced world, ensuring individual safety across various environments like homes, workplaces, and transportation is crucial. Traditional safety systems often fall short due to their lack of flexibility, real-time data monitoring, and automation, which are essential for effective risk mitigation. To address these limitations, Synophsys has introduced an innovative IoT-Based Human Safety Device.

This device seamlessly integrates with the Internet of Things (IoT) infrastructure, providing an advanced, connected safety solution capable of detecting potential hazards and ensuring rapid response. It offers immediate alerts, tracks individuals' health status, and can even predict potential accidents or health emergencies, making it a powerful tool for both personal and industrial safety.Human safety is a primary concern in modern life, particularly in industrial sites, domestic settings, urban spaces, and transportation systems. The increasing capabilities of embedded systems and IoT technologies now allow for the development of intelligent devices that actively monitor, detect, and respond to hazardous situations in real-time. This electronics project focuses on designing a compact, reliable, and efficient safety system that enhances personal protection through the integration of sensors, microcontrollers, and communication modules.

The motivation behind developing this wearable device stems from the growing need for human protection, especially in crowded areas where individuals, particularly children and women, can go missing or feel helpless when traveling in lonely areas. The project aims to provide a highly effective "Human Safety Device" to safeguard individuals, surpassing existing techniques.This advanced system can detect a person's location and health condition, enabling appropriate action. It utilizes electronic gadgets such as GPS receivers, GSM modules, pulse rate sensors, flex sensors, MEMS accelerometers, and body temperature sensors. By using multiple sensors, the system can precisely detect the real-time situation of individuals in critical or abusive situations. For instance, a higher heartbeat in such situations can help identify abnormal human motion when they are victimized.

II. LITERATURE REVIEW

Lahare Nirag,Morade Shubhangi,Shukla Shivam,Tidawke Gayatri and Prof Prasad A. Lahare [1] have designed child safety monitoring device to monitor their children's real-time location, for parents. ensuring safety and peace of mind. In emergencies, the wearable device uses GPS to track the child's location and GSM to send alerts to parents and nearby

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

police stations, helping to quickly reunite lost children with their families.The proposed system concluded that wearable IoT device that tracks a child's real-time location, ensuring safety and quick response in emergencies. It uses modules like GSM, MEMS accelerometer, and GPS to send immediate notifications with the child's location to parents and the nearest police station in case of an incident. E. Prabhakar [2] Has designed "Intelligent Child Safety System" uses IoT devices and machine learning to track children's real-time location and monitor their health. Equipped with sensors, GPS, and GSM modules, it detects distress situations and sends location alerts to registered contacts using a Decision Tree Classifier for autonomous decision-making. This System concluded that GPS-based automatic tracking and alarm systems can enhance security for vulnerable groups like children, women, and individuals with disabilities. These devices help locate victims accurately using an automatic calling system, serving as an effective security measure. M. Jamuna Rani, Andra Mounish, Burri Sriram Praveen [3] have designed a wearable child safety device that combines GPS, GSM, sensors, and an alarm to prevent bullying, violence, and abduction. It provides real-time tracking, emergency alerts, and live streaming, while being compact and easy to use, offering a reliable solution to enhance child safety. This paper resulted with a new security solution for children, utilizing smart technology to enhance safety. The system sends live streaming footage and location alerts to parents' smartphones, especially when a child faces health emergencies or during school hours, providing real-time monitoring via Wi-Fi. DR. Chanda V Reddy, Sabarish I J Samiksha S, Sathvik U M, Swagath Aithal P G5 [4] have proposed women's safety system includes a wearable device with a camera for surveillance, along with an alert system for emergencies. It also features an Android app that acts as a backup, utilizing the phone's built-in capabilities to enhance security.The proposed system concludes that women's safety by providing self-defense, real-time tracking, and evidence recording, helping to deter crimes and reduce violence against women. It supports gender equality by ensuring a safer environment, especially for women working late, while addressing the root causes of harassment and violence. Ankita Balasau kokate , Priyanka Tanaji Jadhav , Aarti Namdev Khopade [5] have designed automatic women's safety device combines real-time monitoring, distress signal generation, and GPS tracking to help women in emergencies. It features an accelerometer, GPS, and panic button, with the ESP8266 module enabling seamless communication for rapid response from authorities or contacts.The paper concluded Women safety devices are essential in empowering women by providing real-time monitoring, distress alerts, and location tracking during emergencies. As technology evolves, it’s crucial to improve these devices to be more user-friendly, reliable, and discreet, ensuring women can live confidently and safely in society.

III. WORKING

The system is designed to act as a crucial safety net by continuously monitoring the user's vital signs and location. This is achieved through the MAX30100 sensor, which constantly measures SpO2 (blood oxygen saturation) and heart rate, transmitting this critical health data to the NodeMCU microcontroller. Simultaneously, a GPS module continuously feeds precise location data to the NodeMCU, ensuring the system always knows the user's whereabouts.All this real-time information, including current health parameters (SpO2, heart rate) and potentially GPS coordinates, is made accessible to the user via an LCD display.

The system is equipped with robust emergency trigger mechanisms. In a direct emergency, the user can manually activate the system by pressing an "Emergency accident button." Additionally, the NodeMCU possesses the capability for automatic triggering. It can be intelligently programmed to detect anomalous health readings from the MAX30100 sensor—such as critically low SpO2 levels or an unusual heart rate—and automatically initiate an emergency response without manual intervention.

Upon an emergency trigger, whether manual or automatic, the NodeMCU immediately swings into action for emergency communication. It retrieves the most current GPS coordinates to pinpoint the user's exact location. Following this, it utilizes a GSM module to send an SMS alert to pre-configured emergency contacts or a designated monitoring center. These SMS alerts can be comprehensive, potentially including both the precise location and relevant health data (SpO2 and heart rate) to provide first responders with vital information. Furthermore, the system has the capability to initiate a direct call, further enhancing rapid communication in urgent situations. In essence, the core aim of this sophisticated system is to provide comprehensive safety by diligently monitoring vital signs, accurately tracking location, and facilitating swift and effective communication when an accident or medical emergency occurs.

DOI: 10.48175/IJARSCT-28149

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

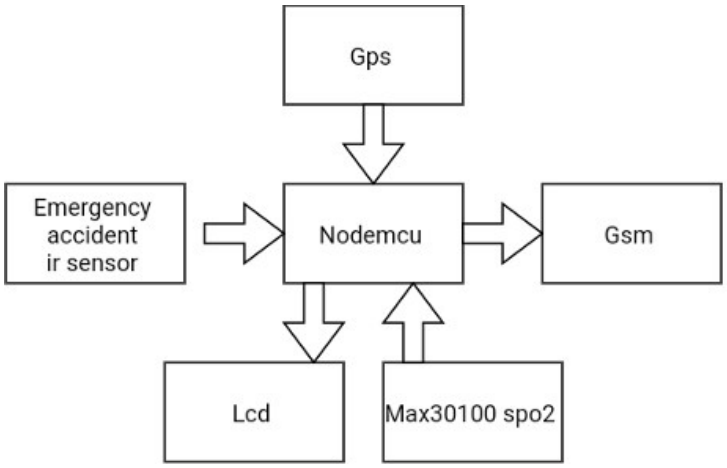

Fig.1. Block Diagram of Human safety device

The block diagram visually connects these components, showing the flow: Sensors/Inputs collect data and triggers, send them to the NodeMCU for processing and decision-making, which then updates the LCD Display and activates the GSM Module for emergency communication when necessary. This integrated system ensures continuous monitoring, immediate feedback, and rapid response in critical situations.

The MAX30100 sensor is responsible for continuous monitoring, diligently measuring the user's SpO2 (blood oxygen saturation) and heart rate, with this crucial health data being constantly transmitted to the NodeMCU. Simultaneously, a GPS module ensures location tracking by continuously providing precise geographical coordinates to the NodeMCU, thereby maintaining real-time awareness of the user's whereabouts. All this vital information, including current health parameters and potentially GPS coordinates, is clearly presented to the user on an LCD display. The system features versatile emergency trigger mechanisms. A manual trigger allows the user to press an "Emergency accident button" if they face an immediate threat. Furthermore, the NodeMCU is capable of automatic triggering; it can be intelligently programmed to detect anomalous health readings—such as critically low SpO2 levels or an unusual heart rate—and automatically initiate an emergency response.

Upon an emergency trigger, whether manual or automatic, the system activates its emergency communication protocols. The NodeMCU first retrieves the most current GPS coordinates to pinpoint the user's exact location. Following this, it utilizes a GSM module to send an SMS alert to pre-configured emergency contacts or a designated monitoring center. These alerts can be comprehensive, often including both the precise location and relevant health data (SpO2 and heart rate) to provide essential context. Additionally, the system possesses the capability to initiate a phone call through the GSM module, further enhancing the speed and directness of communication in critical situations.

This circuit, for an IoT-based human safety device, is powered by a 7805 voltage regulator, providing a stable 5V to components like the NodeMCU ESP8266 and the LCD. The NodeMCU, serving as the central controller, interfaces with an IR sensor (likely for presence detection), a MAX30100 for continuous SpO2 and heart rate monitoring, a GPS module for location tracking, and a GSM module for emergency communication via SMS or calls. An LCD displays real-time health parameters and GPS coordinates, while the NodeMCU processes all sensor data, enabling robust health monitoring, location tracking, and alert capabilities.

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

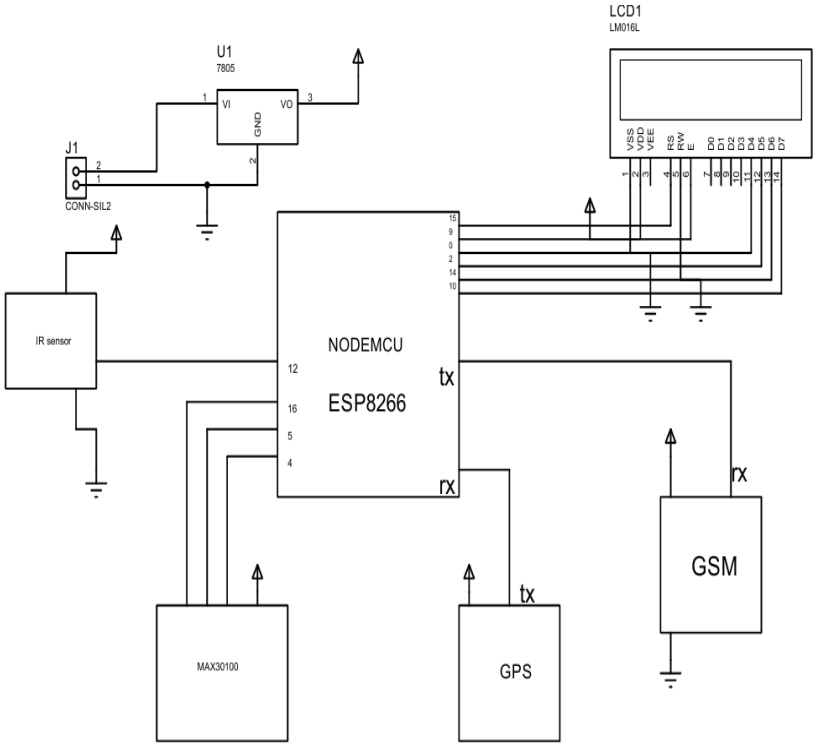

Fig.2 Circuit Diagram of Human safety Device

III. HARDWARE REQUIREMENT

The MAX30100 sensor is responsible for continuous monitoring, diligently measuring the user's SpO2 (blood oxygen saturation) and heart rate, with this crucial health data being constantly transmitted to the NodeMCU. Simultaneously, a GPS module ensures location tracking by continuously providing precise geographical coordinates to the NodeMCU, thereby maintaining real-time awareness of the user's whereabouts. All this vital information, including current health parameters and potentially GPS coordinates, is clearly presented to the user on an LCD display.

The system features versatile emergency trigger mechanisms. A manual trigger allows the user to press an "Emergency accident button" if they face an immediate threat. Furthermore, the NodeMCU is capable of automatic triggering; it can be intelligently programmed to detect anomalous health readings—such as critically low SpO2 levels or an unusual heart rate—and automatically initiate an emergency response.

TABLE 1

Sr.No.	Component Name
1.	NodeMCU ESP8266
2.	MAX30100 Sensor
3.	GPS Module
4.	GSM Module
5.	IR Sensor
6.	Register

DOI: 10.48175/IJARSCT-28149

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

SOFTWARE REQUIREMENT

Here are the software requirements for your IoT-Based Human Safety Device, specifically noting the inclusion of MIT App Inventor:

Microcontroller Programming Environment: An Integrated Development Environment (IDE) suitable for programming the NodeMCU ESP8266, such as the Arduino IDE.

Programming Language: C++ (typically used with the Arduino IDE for ESP8266 development).

Mobile Application Development Platform: MIT App Inventor, which is used to create the mobile application interface for real-time remote monitoring and control of the device.

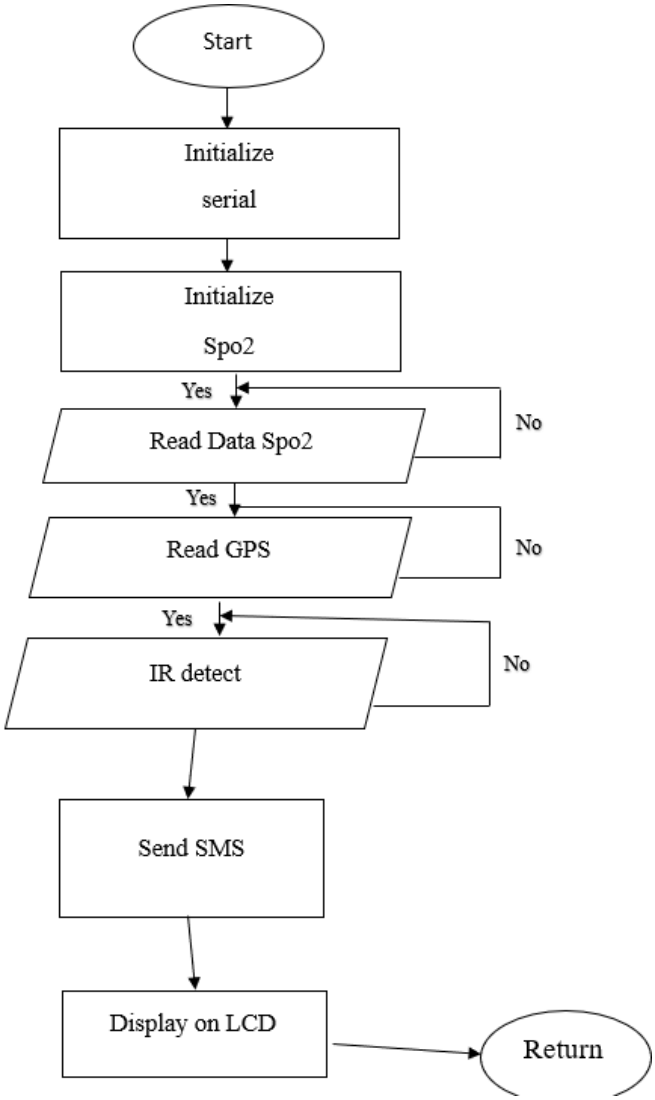

Fig 3. Flowchart

The flowchart begins by starting the process. The first operational step is to initialize the serial communication, followed by initializing the SPO2 sensor. After these initializations, the system enters a loop to continuously attempt to read SPO2 data; if the data cannot be read, it keeps retrying until successful. Once SPO2 data is obtained, the system moves to another loop to read GPS data, similarly retrying if it fails, until GPS data is successfully acquired. With both SPO2 and GPS data in hand, the system then enters a waiting state, continuously checking if a button is pressed. When the button is finally pressed, the system proceeds to send an SMS message. Immediately after sending the SMS,

IJARSCT
International Journal of Advanced Research in Science, Communication and Technology
International Open-Access, Double-Blind, Peer-Reviewed, Refereed, Multidisciplinary Online Journal
ISSN: 2581-9429
Volume 5, Issue 8, June 2025
Impact Factor: 7.67

information is displayed on an LCD screen. Finally, the process concludes by returning, indicating the completion of this specific operational sequence.

IV. CONCLUSION

.The development of the Human Safety Device represents a significant advancement in the integration of embedded systems, sensor technology, and wireless communication for the purpose of enhancing personal and occupational safety. By combining critical components such as the MAX30102 pulse oximeter, GPS module, GSM module, and other environmental or motion sensors, the device is capable of real-time monitoring of vital health parameters and environmental conditions. In emergency situations—such as a sudden health crisis, gas leak, fall, or personal threat—the system can automatically detect anomalies and immediately transmit alerts along with the user's location information to predefined emergency contacts.

This project successfully demonstrates how low-cost, portable, and intelligent safety solutions can be designed using accessible microcontroller platforms ESP32 and open-source tools such as MIT App Inventor. The mobile application interface further adds usability and interactivity, allowing remote monitoring and control in real time.

V. ACKNOWLEDGMENT

The authors would like to express their heartfelt gratitude to the faculty members of the Electronics & Telecommunication Engineering, PVPIT College Budhgaon, for their invaluable guidance and academic support throughout the course of this research. We are especially thankful to our project supervisor for their expert advice, timely feedback, and encouragement, which played a crucial role in shaping the direction and outcome of this work. We also acknowledge the contributions of the technical staff and laboratory team for providing the resources and environment necessary for successful experimentation and implementation. This research would not have been possible without the support and infrastructure offered by our institution.

.

REFERENCES

[1]. Lahare Nirag,Morade Shubhangi,Shukla Shivam,Tidawke Gayatri and Prof Prasad A. Lahare . " IoT based child safety monitoring device " Published in IJIRMPS (E-ISSN: 2349-7300), Volume 11, Issue 3, May-June 2023

[2]. E. Prabhakar."Intelligent child safety system using machine learning in iot devices"Published in 2023 IJNRD | Volume 8, Issue 4 April 2023

[3]. M. Jamuna Rani, Andra Mounish, Burri Sriram Praveen."Child safety device with gps tracking and alert messaging" Published in 2023 JETIR November 2023

[4]. DR. Chanda V Reddy, Sabarish I J Samiksha S, Sathvik U M, Swagath Aithal P G5 "Literature survey on women safety device" International Advanced Research Journal in Science, Engineering and Technology Impact Factor 7.12. Vol. 10, Issue 1, January 2023

[5]. Ankita Balasau kokate , Priyanka Tanaji Jadhav , Aarti Namdev Khopade . "Automatic women safety device" Journal of emerging technologies and innovative research May 2023