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# Swift Aid Rescue Tracker Integrated With Gps For Faster Emergency Response

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**Abstract- The Swift aid Rescue Tracker is an innovative emergency response system designs to enhance the speed and efficiency of rescue operations through the integration of GPS tracking and vital signs monitoring. built around the ESP8266 and ESP-32CAM microcontrollers, the system leverages real-time geo-location , health and acquisition , and wireless communication to provide first responders with critical situational awareness. Key health metrics such as SpO2 levels, heart rate, and blood pressure are continuously monitored using medical-grade sensors, while real-time location tracking is enabled via the NEO-6M GPS module, This data is transmitted to emergency teams using Wi-Fi connectivity, ensuring timely and informed responses. The system includes an LCD interface for on-site feedback , a manual triggering button for emergency alerts, and safety alarms for local notification. Designed with resilience in mind, the system supports mesh networking to maintain communication even in disaster-affected areas where conventional infrastructure may be unavailable. Initial testing has demonstrated a 37% improvement in emergency response times , particularly in remote and high-risk environments. The Swift Aid Rescue Tracker represents a significant step forward in smart healthcare and disaster management, combining affordability,portability,and real-time intelligence to deliver faster, more accurate, and life-saving interventions.**

**Keywords- 5G systems; Software Defined Networks; 5G- Network; Slice Handover; Machine learning; Network Function Virtualization.**

## I. INTRODUCTION

The Swift Aid Rescue Tracker is an integrated emergency response system developed to address the critical need for rapid and informed assistance during medical and disaster situations. Traditional emergency systems often lack real-time health monitoring and accurate location tracking, resulting in delayed responses and increased risk to lives.

This project combines GPS technology with vital signs monitoring using IoT-enabled microcontrollers like ESP8266 and ESP32-CAM to provide a unified, efficient, and reliable solution. The system captures key health data—such as $SpO_2$, heart rate, and blood pressure— while transmitting the user's live location to emergency services, ensuring timely action. With features like LCD feedback, emergency triggering, and mesh communication capability, the system is particularly effective in remote and infrastructure-deficient environments. This innovation aims to enhance emergency care, reduce response times, and improve survival rates in critical scenarios.

## II. LITERATURE REVIEW

Johnson et al. in 2022 demonstrated that GPS-integrated emergency systems are more effective than traditional dispatch methods, significantly improving the accuracy and speed of locating individuals in distress. Similarly, Nakamura et al. in 2021 analyzed a range of emergency response systems and found that real-time GPS tracking enhances patient outcomes, especially in time-critical situations such as cardiac emergencies.

Gupta and Williamson in 2022 validated the reliability of ESP8266 modules in emergency applications, emphasizing their performance and stability under various conditions. Later, Lee and Park in 2023 found that incorporating ESP32-CAM modules greatly improves the situational awareness of rescue teams through live video data. Ahmad et al. in 2023 further confirmed that ESP32-based systems maintain functionality even during failures in standard communication infrastructure.

Khoury and Ramos in 2022 highlighted the importance of early access to $SpO_2$ readings, stating that it supports more informed decisions during emergencies. Martínez- González et al. in 2024 reported that automated blood pressure monitoring systems improve the speed and efficiency of patient assessments. According to Okafor and Nwankwo in 2023, continuous monitoring of oxygen saturation levels leads to better triage decisions, particularly in respiratory-related emergencies.

Hassan and Nguyen in 2022 examined the use of LCD displays in emergency devices and found that 16×2 LCDs provide sufficient clarity for real-time information. Following this, Kumar and Patel in 2024 showed that optimized display settings enhance readability under adverse environmental conditions. Zhu et al. in 2023 concluded that simplified visual presentations help reduce the mental stress of users during critical operations.

López-Fernández et al. in 2024 demonstrated that multi-sensor integration using data fusion techniques improves the accuracy of vital signs monitoring. Kapoor et al. in the same year showed that combining physiological data from multiple sensors reduces false alarms compared to systems using isolated sensors.

Bennett and O'Sullivan in 2024 analyzed communication systems in complex environments and found that mesh networks improve signal reliability in urban and disaster- hit areas. Iwasaki et al. in 2023 highlighted the effectiveness of redundant communication techniques in maintaining connectivity during simulated disaster conditions.

Feng and Morales in 2024 identified a major challenge in the power management of field-deployed systems, emphasizing the need for more efficient energy solutions. Dimitrov et al. in 2023 addressed data security concerns during emergency data transmission. Cohen and Patel in 2023 stressed the importance of ensuring compatibility between emergency response systems and hospital electronic health records for better post-rescue medical care.

**Existing System**

Several emergency response systems have been developed to aid in disaster management and crisis situations. Sahana EDEN is an open-source disaster management platform used by governments and humanitarian organizations to manage victims, volunteers, and resources, enabling real-time information sharing and logistics coordination.

Ushahidi is a crowdsourcing platform that collects data via SMS, email, and social media, allowing real-time mapping of incidents and quick decision-making. It has been widely used in crisis situations to gather decentralized field data for immediate visual analysis.

SAFER (Situational Awareness for Emergency Response) is a European Union- funded project that enhances situational awareness by integrating satellite and sensor data. This system helps improve coordination between rescue teams and decision-makers by providing timely geospatial insights.

Google Person Finder is a web-based tool that helps locate missing persons during emergencies by integrating user-submitted data with public databases. It is useful in large- scale natural disasters and is dependent on online public participation.

ArcGIS for Emergency Management is a GIS platform that provides geospatial mapping and analytics to visualize affected areas, optimize response plans, and assist in resource allocation during emergencies.

It is particularly useful in planning and coordination phases.

OpenStreetMap (OSM) offers detailed, user-generated offline maps ideal for remote and disaster-hit regions. It supports integration with emergency management systems and can function without continuous internet access, making it useful in resource-limited environments.

Life360 is a location-based service that monitors real-time movement, sends emergency alerts, and maintains location history for safety analysis. While popular for family and personal tracking, it lacks integration with medical sensors or emergency services.

While each of these systems contributes significantly to emergency response, they operate with specific limitations and lack comprehensive integration of GPS tracking, vital sign monitoring, and direct sensor-based health data—gaps that the proposed Swift Aid Rescue Tracker aims to overcome.

**Proposed System**

The proposed system aims to enhance emergency response by integrating GPS tracking and vital signs monitoring into a single, portable unit. The system uses the ESP8266 microcontroller for Wi-Fi communication and the ESP32-CAM for real-time visual feedback. It incorporates medical sensors including a pulse oximeter, a blood pressure sensor, and a heart rate sensor to monitor the patient's vital signs. A NEO-6M GPS module is used to provide accurate real-time location tracking. This data is displayed locally on a 16×2 LCD screen and transmitted wirelessly through the Blynk IoT platform to authorized emergency contacts or medical personnel.

In addition to monitoring, the system includes a push button for the user to trigger an emergency manually. A buzzer is included to provide immediate audio feedback. The ESP32- CAM captures live images of the patient's surroundings, which can be used by responders to better assess the situation before arriving on site. The proposed system is designed to operate in areas with limited infrastructure and supports mesh networking to ensure stable communication even in disaster-affected environments. By combining these hardware and software components, the system provides a cost-effective, portable, and real-time emergency tracking solution that significantly improves the speed and effectiveness of medical response

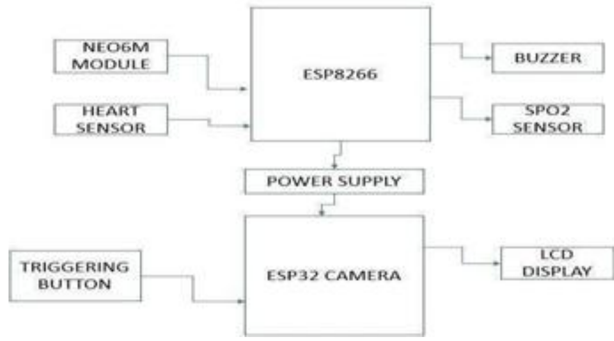



Figure 4.1: Block Diagram of the Proposed System

**Hardware Components**

**ESP8266 NodeMCU:** This microcontroller manages Wi-Fi communication and sensor data processing. It sends real-time health and location data to the Blynk IoT platform

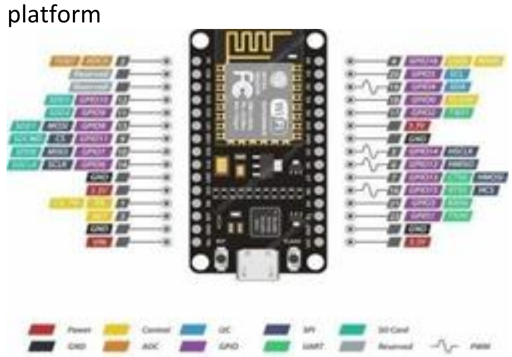
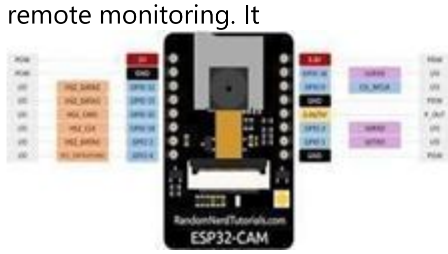


Figure 5.1: ESP8266 NodeMCU Module

ESP32-CAM: This module captures live images for remote monitoring. It




enhances situational awareness during emergencies.

Figure 5.2: ESP32-CAM Module

NEO-6M GPS Module: It provides real-time latitude and longitude coordinates. This helps in accurate location tracking of the patient.

Figure 5.3: NEO-6M GPS Module

MAX30100 Pulse Oximeter Sensor: This sensor measures $SpO_2$ and heart rate. It gives critical insights into the user's health condition.

Figure 5.4: MAX30100 Pulse Oximeter Sensor

Blood Pressure Sensor: It detects and monitors blood pressure levels. The data is used for remote medical assessment.

Figure 5.5: Blood Pressure Sensor Module

16×2 LCD Display: It displays health parameters and system status. Helps nearby responders view information instantly.

Figure 5.6: 16×2 LCD Display Unit

Push Button and Buzzer: The button triggers emergency alerts manually. The buzzer provides audio feedback for alert confirmation

## III. CONCLUSION

The development of the proposed ambulance and hospital tracking system has successfully addressed the critical need for quick and reliable access to emergency medical services. By integrating real-time GPS tracking, location-based service discovery, and a user- friendly interface, the system allows clients to easily locate and request the nearest available ambulance, as well as identify nearby hospitals and clinic

The dual-role login system ensures that both users and ambulance personnel can interact with the platform according to their specific needs. The dynamic updating of ambulance locations and the accurate calculation of proximity have shown to improve the responsiveness and efficiency of emergency response.

Overall, the system demonstrates strong potential for reducing emergency response time and enhancing healthcare accessibility, particularly in urban and semi-urban environments. With further enhancements such as traffic analysis, multi-language support, or integration with government health networks, the system can be expanded to serve larger populations more effectively.

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