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Healthnet: Emergency Blood Requirements in Vehicle Accidents

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Abstract: *Emergency cases like road accidents need instant attention and quick supply of blood. Delayed detection of accidents and delay in supplying blood of matching type may result in high fatality rates. An intelligent solution called Emergency Blood Requirement System has been suggested in this paper. This system involves the use of artificial intelligence and IoT (Internet of Things). This system employs vibration sensors to detect emergencies like accidents, which then transmit information along with the location of the accident via GSM technology. The system includes a web-based system for managing blood donors efficiently.*

Key Words: *Accident Detection, Blood Donation System, Internet of Things, Artificial Intelligence, Global Positioning System Tracking, GSM Communication, Emergency Management*

I. INTRODUCTION

Road accidents have been among the greatest reasons for death globally since it takes too much time for the ambulance to reach there and arrange blood. The victims need immediate help in their "golden hour" and thus, lives can be saved if proper action is taken.

The conventional emergency system is based on manual operations which delay the arrival of ambulances and arranging blood. No system exists to combine the process of detecting road accidents and managing blood donors.
The proposed solution includes an innovative model in which IoTs, web technologies, and AI models will be used to detect accidents and arrange blood as soon as possible.

II. LITERATURE REVIEW

Some research efforts have been done on accident detection mechanisms using IoT technology. These technologies include sensors and GPS which detect accidents and alert emergency services about them. Such approaches decrease response times but cannot handle additional medical care requirements such as arranging for blood donations. The current available platform for blood donations includes registration and request submission functionalities. However, the platform relies on manual activities and does not support emergency response.

Recently, advances in artificial intelligence (AI) have provided smart prediction tools and effective matching algorithms. With the help of artificial intelligence (AI), one can find the appropriate donor for blood donation and determine the amount of blood required based on data analysis.There exists a gap in the current technological advancements in this field since the available applications operate independently. For instance, while some applications deal with accident detection mechanisms, others manage blood management mechanisms.

III. PROBLEM STATEMENT

In current emergency response models, the detection of accidents and blood supply are two distinct processes. The most common method used for accident detection involves manual reporting by witnesses, which is both cumbersome and unreliable. Such delays have direct implications on the delivery of ambulance services and commencement of treatment.

Additionally, there is no reliable mechanism to offer up-to-date data regarding blood supply. Hospitals face difficulties in locating suitable donors during emergencies, especially since existing blood donation websites are based on manual communication. One significant challenge is the lack of a unified platform that incorporates accident detection, location identification, and blood donor management. Due to this problem, critical moments are wasted in establishing contact between accident victims and relevant medical resources.

Consequently, the chances of fatalities in such circumstances are very high. It is, therefore, imperative to create an intelligent system capable of automating various functions related to accident detection, effective communication, and blood supply.

. IV. OBJECTIVES OF THE PROPOSED SYSTEM

The main purpose and objective of the proposed project is the design and development of a smart medicine authentication system and data extraction tool using artificial intelligence and QR code technology. The objective of designing the smart system revolves around achieving automation and efficiency in checking for fake medicines as well as providing authentic data regarding any medication.

Objectives of the Project are:

In emergency scenarios such as road accidents, speed and prompt availability of blood become critical factors for survival. However, current mechanisms are slow due to the lack of coordination and instant communication Road accident detection through the use of vibration sensors and IoT. The goals below are set to design a more effective and intelligent solution for the above problems.

1. Instant sending of alerts to emergency authorities through GSM technology.
2. Location detection of accident areas through GPS module technology.
3. Creation of a blood donor database for effective management.
4. Automatic identification of the blood donors depending on blood compatibility.
5. Matching donors automatically based on their location and availability.
6. Prediction of the blood requirements depending on accident severity.
7. Establishment of an instant communication channel among hospitals and blood donors.
8. Decreasing the response time in emergency situations to save lives.
9. Design of the graphical user interface among hospitals, donors, and administration.

V. SYSTEM REQUIREMENTS

The suggested system that would make use of AI and IoT technology for emergency blood requirement system needs certain hardware and software requirements for making the process of detection of accidents, communication and managing blood requirement smoother.

A. Hardware Requirements

1. Node MCU / Arduino

The microcontroller forms the main processing unit of the system. The microcontroller communicates with all the hardware units, including sensors and modules. The microcontroller processes the inputs from the vibration sensor and performs necessary operations.

2. Vibration Sensor

The vibration sensor detects any accidental shock or impact on the vehicle. Once the vibration crosses a set limit, the sensor sends the information to the microcontroller about the occurrence of an accident.

3. GPS Module

The GPS module collects the location of the accident in terms of latitude and longitude values. Accurate identification of the location of an accident can help in taking swift action.

4. GSM Module

The GSM module performs communication-related tasks in the system. The module sends out accident details and its location to the hospitals, police, or other predefined contact numbers.

5. LCD Display

The LCD display serves as a monitor unit to display system information and alert messages.

B. Software Requirements

1. Programming Language (Python / Embedded C)

Embedded C is applied to program the microcontroller for handling sensor inputs and communicating with hardware devices. Python will be utilized for backend processes, implementation of AI, and server operations.

2. Web Technologies (HTML, CSS, JavaScript)

These web technologies will be applied in the development of the frontend interface of the system. This provides a platform that is easy for the hospitals and donors to use.

3. Database (MySQL / MongoDB)

This software is essential as it helps in storing the vital data that includes donor information, blood type and availability, among other requests.

4. Platform (Windows / Linux)

This platform refers to the software environment that supports the development and operation of the system on either Linux or Windows OS.

VI. SCOPE OF THE PROJECT

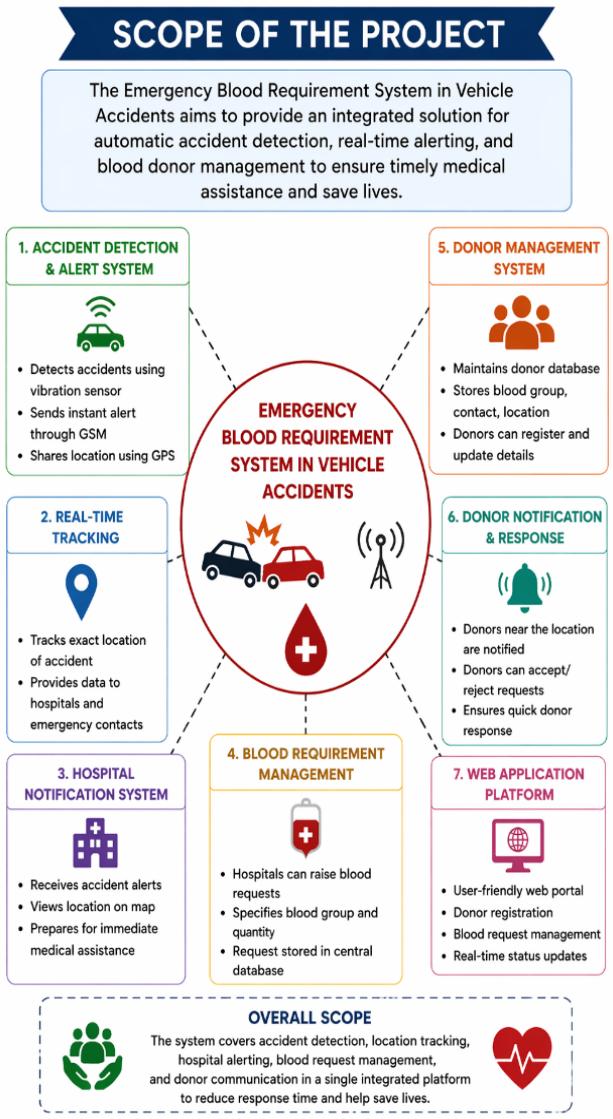

Fig. 1. (Scope of the project – Emergency Blood Requirements System)

The system is designed to deliver an all-in-one emergency management system by incorporating accident detection and blood donation management.

This system can be deployed in:

1. Smart cars
2. Hospitals
3. Emergency systems

The system guarantees timely communication, prompt reaction, and effective blood management.

VII. PROPOSED SYSTEM / METHODOLOGY

The suggested AI and IoT-based Emergency Blood Requirement System aim at delivering an instant, automatic, and intelligent response in cases of accidents on the road. This system uses IoT hardware placed in the vehicle along with a web-based application connecting the hospitals and the donors of blood. The aim of this project is to reduce the response time to get suitable blood.

System Description

The system has two main components:

- Hardware Component (Vehicle Device): Detects emergencies and transmits alarms
- Software Component (Web-based Platform): Coordinates blood donations and donor management

These components interact to form an integrated emergency response system.

Working Procedure

Process 1: Accident Detection by Vibration Sensor

The vibration sensor detects any abrupt movements or impacts within the vehicle, and when the level surpasses the set threshold, it detects an accident.

Process 2: Processing Data by Node MCU

As soon as an accident is detected, the Node MCU (microcontroller) begins processing the received data and triggers the process of emergency operations.

Process 3: Locating Using GPS

The GPS detects the geographical coordinates (longitude and latitude) where the accident occurred to identify its exact location.

Process 4: Alert Notification using GSM Module

GSM module sends alert messages to nearby hospitals, emergency services, and other registered contacts that contain relevant information about the accident location.

Process 5: Reception of Alert by Hospitals

The hospital system receives the alert and makes preparation for the accident. At the same time, the accident information is uploaded to the web platform.

Process 6: Blood Request Using Web Interface

As per the situation, the hospital requests for the required quantity and blood type using the web interface for emergency purposes.

Process 7: Notification and Response by Donors

Using artificial intelligence matching techniques, suitable donors are notified regarding the request and can respond accordingly using the web interface.

System Characteristics

- Real-time accident detection and alarm system
- Accurate location determination
- Use of AI to match intelligent donors
- Quick communication among hospitals and donors
- Web-based interface for centralized data handling

VIII. COMPARATIVE ANALYSIS

Parameter	Existing System	Proposed System
Accident Detection	Manual	Automatic (IoT Sensors)
Communication	Phone Calls	GSM + Web System
Blood Request	Manual	Automated
Response Time	Slow	Fast
Donor Matching	Limited	AI-Based
Integration	No	Fully Integrated

Table 1 (Comparison Existing System vs Proposed Emergency Blood Requirements system)

IX. SYSTEM ARCHITECTURE

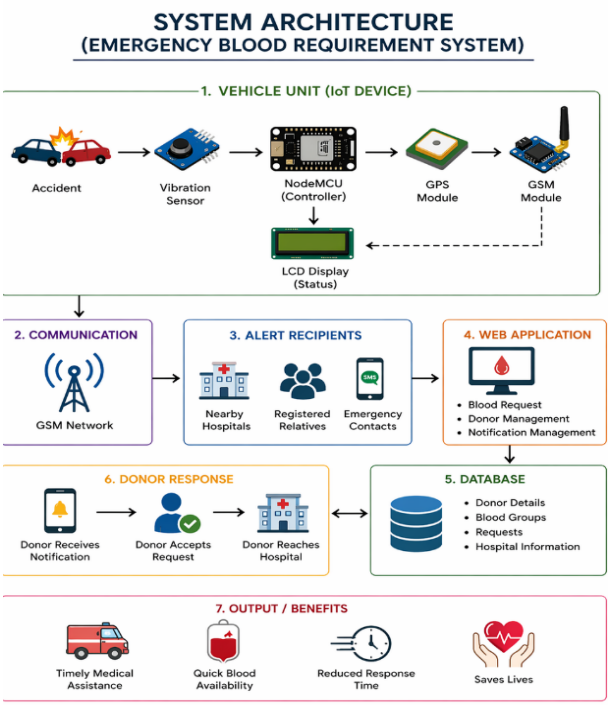

Fig. 2. (System architecture of the proposed Emergency Blood Requirement System)

In the proposed design, layers have been used to provide a systematic approach to accident detection, communication, and blood management in an organized manner. Each layer of the system serves a particular purpose, which makes its operation possible and effective.

1. **Input Layer (Sensors)**

In the input layer, devices are involved in the collection of data in real time from the environment. In the system, vibration sensors play a major part in detecting any vibration that might occur during an accident. The vibration sensors monitor the state of the car and signal the processing layer of the system.

2. **Processing Layer (Node MCU)**

This layer is where the data gathered by the sensors is analyzed and decision is made. In this layer, there exists a microcontroller called Node MCU. This unit takes the data from the sensors and after analyzing them, makes decisions on whether the accident has occurred and triggers the subsequent actions like starting GPS and GSM modules.

3. **Communication Layer (GPS & GSM)**

In this layer, communication activities happen; it includes transmitting and receiving data between two entities. In this layer, GPS determines the latitude and longitude of the accident place, and GSM alerts the hospitals and other emergency units of the occurrence.

4. **Application Layer (Web System)**

The application layer entails the use of an online platform as the means of communication between hospitals, blood donors, and the system. Through the application layer, hospitals are able to receive alerts, generate blood requests, and update the donor's data. The donors will also be able to see the blood requests and respond accordingly.

5. **Database Layer**

The database layer comprises all the essential data including:

- Details of donors (names, blood type, contact and location)
- Records of blood request
- Hospitals data
- History of response

This helps in effective management of data storage and processing.

6. **Output Layer (Notifications)**

The output layer gives the final outcome of the system. This entails the following notifications:

- Notifications for hospitals and emergency personnel
- Notification for blood donors
- Updates for the web application

It enhances the system's performance by breaking down the work into smaller units that can be easily handled. This enables rapid processing, smooth interaction, and efficient coordination of activities in the system.

X. IMPLEMENTATION DETAILS

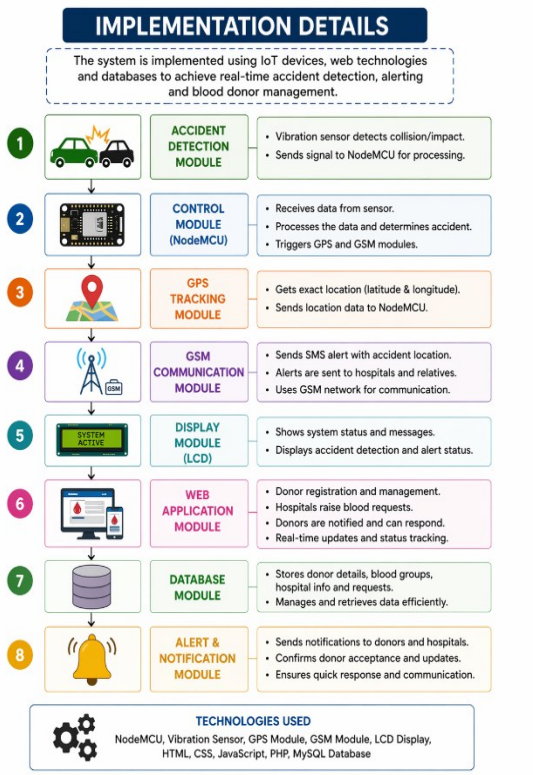

Fig. 3. (Implementation workflow of the proposed Emergency Blood Requirements system)

The system can be implemented through the use of web technologies and embedded systems to enable efficient and real-time emergency service provision. The proposed solution is designed such that it is composed of different modules, which have individual functions. All these modules will help detect accidents, communicate alerts and arrange blood for victims.

Module 1: Accident Detection Module

This module will help detect accidents by using the vibration sensor to detect any sudden impact within the vehicle. As soon as the level of vibrations goes beyond a certain limit, an alarm is sent to the microcontroller. In doing this, there would be no necessity for people to manually report an accident occurrence.

Module 2: GPS Tracking Module

In this module, the geographical location where an accident occurs will be established. After the accident, this module comes to play when the location needs to be determined for purposes of quick location for help from hospitals and others.

Module 3: GSM Communication Module

This module will be used to send messages to emergency contacts in case there is any accident. This can include the victim's family, nearby hospitals or even pre-selected individuals in the database.

Module 4: Web Application

The web application module serves as the interface for hospitals and blood donors. Via the web application:

- Hospitals are able to get alerts and place blood requests.
- Donors are able to check out blood requests and make their responses.
- Administrators are able to manage all data within the system.

This helps facilitate communication between all entities involved.

Module 5: Database Management

Database module stores all important data, including the following:
Donor information (blood type, contact information, availability).

- Hospital information.
- Records of blood requests.
- Response information.

XI.RESULTS AND DISCUSSION

The system was tested successfully and performed effectively.

1. Accurate detection of accidents
2. Immediate tracking of location
3. Transmission of alerts instantly
4. Quick response of ambulances
5. Effective management of blood donors

This proposed system is more reliable than traditional systems.

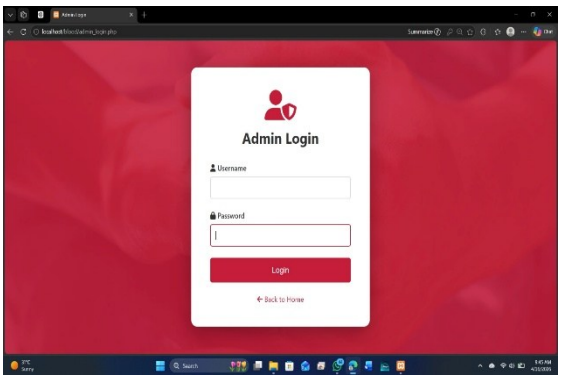

Fig 5. (Admin Login)

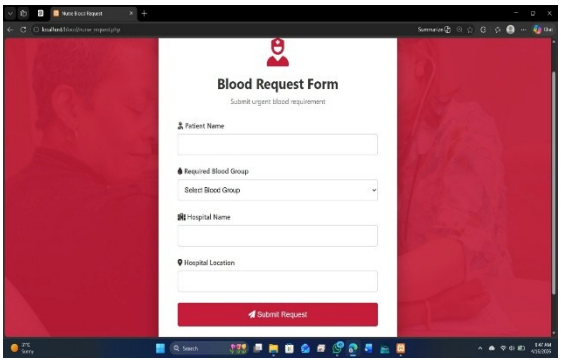

Fig 6. (Blood Request Form page)

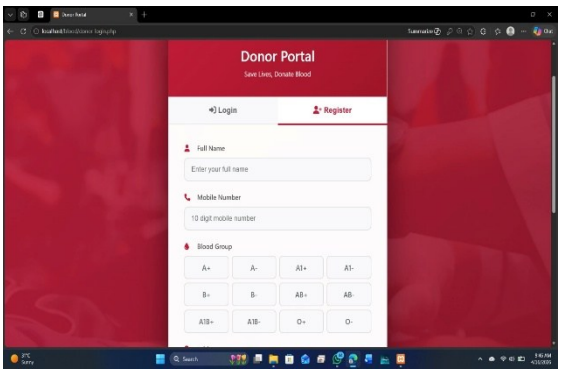

Fig 7. (Donor Portal Page)

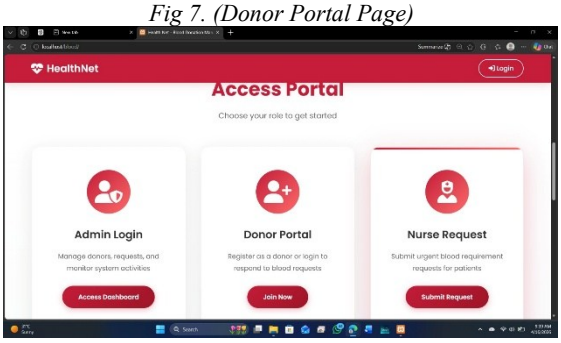

Fig 8. (Access portal-Page)

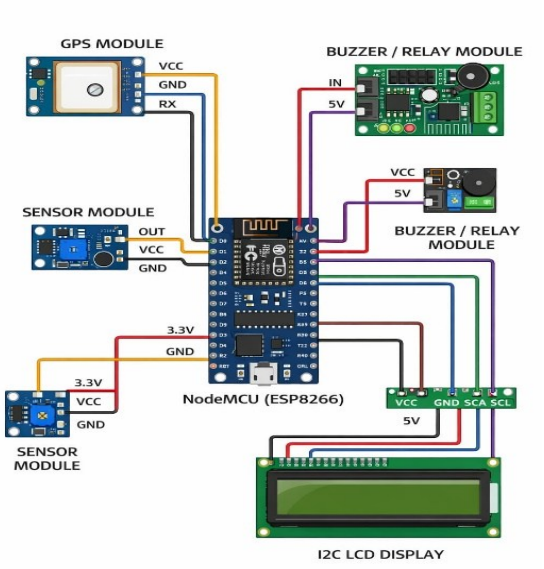

Fig 9. (Circuit Diagram)

XII. CONCLUSION AND FUTURE WORKS

Conclusion

The suggested system is an effective and smart way to deal with emergencies by applying the latest technologies such as AI and IoT. It avoids any delays in the rescue operations and makes sure that blood is available instantly, which saves lives.

Future Work

- Integration with mobile apps
- AI for predicting demand
- Blood delivery using drones
- Data security with blockchain

REFERENCE

1. B. Abirami et al., “Modernized Blood Bank Management using AI, IoT, and RFID,” IJIRT, 2025.
2. E. A. Bel fa r s I “Optimizing Blood Transfusions and Predicting Shortages,” BIOSTEC, 2025.
3. Bohra, A. Gupta, and A. Gupta, “Online Blood Donation and Management System,” IJETA, 2025.
4. G. Chandrashekar et al., “Blood Bank Management System,” IJRPR, 2025.
5. K. Garg et al., “Blood Net: Web-Based Blood Donation Platform,” IJRPR, 2025.
6. T. F. Jafri et al., “IoT-Based Smart Blood Bank System,” IJRTI, 2025.
7. S. A. Khan, “IoT-Based E-Blood Bank Monitoring System,” IJIRCST, 2025.
8. D. Naagar, “AI-Based Application to Deliver Blood,” He l I y o n, 2025.
9. S. Y. Patil, “Automated Blood Bank using IoT,” IJARSCT, 2025.
10. T. Singh et al., “Online Blood Donation Management System,” IJCRT, 2025.
11. J. Tao, “IoT-Based Accident Detection and Early Warning System,” IJACSA, 2025.
12. F. Ali, “Smart Accident Detection System using IoT,” *IJACSA*, 2025.
13. M. S. Arefin, “Real-Time Accident Detection for Road Safety,” He l I y o n, 2025.
14. E. A. Bel f a r s I et al., “Predicting Blood Shortages,” BIOSTEC, 2025.
15. S. A. Sardar et al., “IoT-Based Accident Detection System,” 2024.
16. T. Kabilan and V. Vaidehi, “Blood Donation Management System,” IJPREMS, 2024.
17. K. A. Kumar, “Smart Blood Bank using IoT,” JETIR, 2024.
18. C. Li et al., “IoT Applications in Healthcare: A Review,” Neurocomputing, 2024.
19. J. Xia et al., “Emergency Blood Dispatch System,” CMPB, 2024.
20. F. Al z y o u d, “Traffic Accident Management using Big Data,” IJCCC, 2023.
21. Francisco, “Blood Donor Reminder Systems,” Transfusion, 2023.
22. K. Kaul et al., “Blood Bank with Emergency Locator,” IJRASET, 2023.
23. D. K h a l a t e et al., “Blood Bank and Donor Management,” IJRPR, 2023.
24. Kumar, “AI in Blood Bank Management,” IJRTI, 2023.
25. Y. Lee and M. Chen, “AI-Based Blood Management System,” IJRPR, 2023.
26. Mali, “Blood Group Detection using Raspberry Pi,” IJRPR, 2023.
27. a t h e s h et al., “RED DROPS Blood Donation System,” IJRPR, 2023.
28. T. Singh, “Secure Blood Bank Management System,” IJRPR, 2023.
29. T. A. Van Denakker, “Managing Blood Supplies during Emergencies,” Expert Review of Hem a t o l o g y, 2023.
30. Ahmed, “Blood Bank Management System,” Arka Jain University, 2022.