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# Accident Detection and Cloud Based Biometric Database System Using IOT

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**Abstract:** Now-a-days number of deaths due to road accidents is increasing across the world. Using the wireless technology (GPS), it is possible to provide medical facility to accident victim within short period of time. Monitoring of ambulance location and status of patient during the critical hours of patient transportation helps to improve medical care. When the accident happens in highways, by using G-force sensor the accident is detected and sends the current location to the control room. While transferring the patient to the hospitals, major problem is to identify the patient's detail. Proposed work stores the patient's details in the cloud and retrieved using biometric device whenever it is needed and it will help to get better treatment. The biometric device will be available in ambulance. The system connected with the biometric device sends the personal detail and health status of the patient to the nearby hospital using IOT. After receiving the notification, the doctor in the hospital will be alerted .Thus the proposed system will reduce the number of deaths due to late treatment.
**Keywords:** Biometric, cloud, health-monitoring, IOT (Internet of Things), GPS (Global Positioning System)

## I. INTRODUCTION

In today's world there is a drastic increase in the use of vehicles. Heavy usage of vehicles has increased traffic and thus resulting in a rise in road accidents. This takes a toll on the property as well as causes human life loss because of unavailability of immediate safety facilities. Complete accident prevention is unavoidable but atleast consequence can be reduced. Proposed system makes an effort to provide the emergency facilities to the victims in the shortest time possible. The system incorporates a single board embedded system that contains GPS connected with a microcontroller. The entire set-up is installed in the vehicle. A G-force sensor is used to measures the vibration of the vehicle, the vibrated value is then compared with the standard values which confer the accident of the vehicle, unnecessary shock or vibration produced by machines, tilt of the car with respect to the earth's axis can be identified with the level of acceleration. Global Positioning System (GPS) is used to identify the location of the vehicle and it sends the exact vehicular location such as longitude and latitude values to the control room. From these values location of accident can be determined.

In Worldwide, there is a scarcity in patient identification. The use of biometrics in healthcare has massive potential. In healthcare, it is important for the patient to receive the right treatment at right time. Maximum patient details are identified through fingerprints. This eliminates all risk of forgotten ID codes or mixed-up identity cards. Fingerprint scanners matches the patient's fingerprint which is already stored in the server and retrieve the personal information and the health record from the cloud. Thus, the treatment is provided for patient at right time.

## II. EXISTING WORK

### A. Overview

Nowadays, low-cost radio frequency identification (RFID) has been attracting more and more interest from both industry and academic institutes. It has gained wide range adaptation for low-cost and ubiquitous computing applications, such as location tracking, access control and environmental conditions monitoring. Recent technological developments have opened the door to many new applications of RFID technology, and this work proposes its use in the identification of hospital patients within the hospital environment. This work details a solution which will homogenize hospital records, by merging RFID and web-based database technologies. The solution will standardize the recorded data, and provide a centralized database for hospital records.

It proposes a system whereby each patient is uniquely identified by an RFID transponder. This unique identifier can be used to retrieve all the patient's records from a centralized database. Traditional RFID systems store patient details on the transponder itself, severely limiting the amount of data which can be stored. It uses the RFID tag to identify the patient, before retrieving the data from a centralized server.

An RFID reader contains a radio frequency transceiver module, a signal processor with controller unit and a coupling element. The reader's overall function is to provide the means of communicating with the tags and facilitating data transfer. The paper proposed system whereby each patient is uniquely identified by an RFID transponder.

This identifier is used to retrieve all the patient's records from a centralized database.

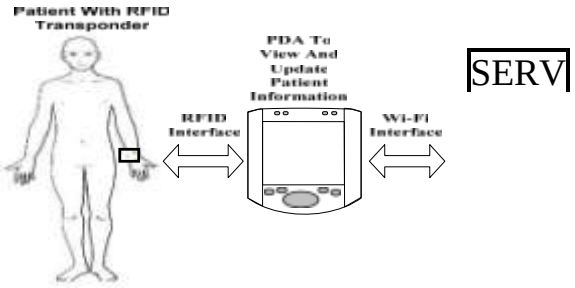


**Figure 1.** Overall System Structure

Traditional RFID systems store patient details on the transponder itself, severely limiting the amount of data which can be stored. This system uses the RFID tag used to identify the patient, before retrieving the data from a server as shown in figure.1.

### B. Technologies Employed In The System

*1.Radio Frequency Identification*

The function of the RFID technology is to hold a identifier, which will be used to refer the patient's records within the centralized database. The object of any RFID system is to carry data in suitable transponders, generally known as tags and to retrieve data at a suitable time and place to satisfy a particular application needs. Data within a tag may provide identification for an item in manufacture, goods in transit, object location information, the identity of a vehicle, or animal identification. In addition to tags, the system requires a means of reading or interrogating the tag and some means of communicating the data to a host computer Communication of data between tags and a reader is achieved wirelessly. Two coupling methods distinguish and categorize RFID systems; one based upon close proximity electromagnetic or inductive coupling and one based upon propagating electromagnetic waves.

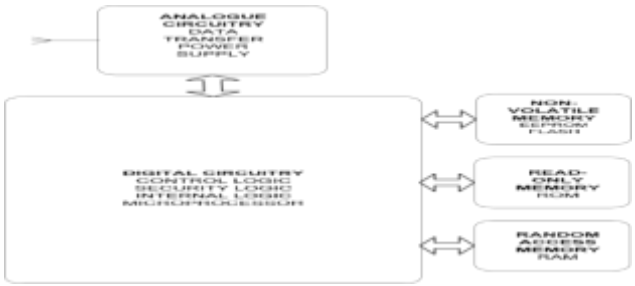


**Figure 2.** Basic Structure of an RFID transponder

The communication between the reader and the tag is wireless, across the space or air interface between the two devices. The transponder memory may comprise Read Only Memory (ROM), Random Access Memory (RAM) and nonvolatile programmable memory for data storage depending upon the type and sophistication of the device. It is used to store the transponder data and must be nonvolatile to ensure that the data is retained when the device is in its quiescent or power saving sleep state as shown in figure 2.

Tags can be either passive or active, the designation being determined entirely by the manner in which the device derives its power. Active transponders have an internal battery. In general terms, active transponders allow greater communication range than can be expected for passive devices, better noise immunity and higher data transmissions rates when used to power a higher frequency response mode. Passive tags operate without an internal battery, deriving the power to operate from the magnetic field generated by the reader. Passive transponders have shorter read ranges than active tags and require higher-powered reader. However passive tags offer advantages in terms of cost and longevity. They have much greater lifetime and are generally lower in price than active transponders.

*2. MYSQL*

On the web-server side of the system, My Structured Query Language (MySQL) is the language chosen to create and communicate with the relational database. MYSQL is a fast, easy-to-use Relational Database Management System (RDBMS). Its speed and small size makes it ideal for web-development. MYSQL is the de-facto language used to create and communicate with a relational database. A relational database is a database divided into logical units called tables, where tables are related to one another within the database. A relational database allows large complex data to be broken down into logical, smaller, manageable units.

*3. PHP*

PHP Hypertext Pre-processor (PHP) is a scripting language used to interact with the database. PHP invokes SQL commands and dynamically generates webpages to display the results. PHP is an embedded scripting language, which means that PHP code is embedded in HTML code. PHP is used to move data into and out of the MYSQL database. PHP is also suitable for more complicated tasks such as parsing and verifying data that the user has entered into a HTML form.

### C. Client-Side Application

The primary function of the client side application is to communicate with the RFID tag. The client application generates a command for the RFID reader. Once the command has been sent, the application waits for a response.


**Figure 3.**RFID Patient Database System

The application checks for errors, when the response arrives. If no errors are found, the application extracts the tag number from the response string and stores it. The application generates the Uniform Resource Locator (URL) from the tag

number and sends this URL to the server over a wireless LAN network. The system incorporates a web-browser in which the results of the query can be viewed as shown in figure3.

*1. Structure of Database*

The basic structure of the database is to have a patient defined by their personal details and their stays in hospital as shown in figure 4. A stay is defined as all the medical and personal information collected between the times when the patient enters the hospital and leaves the hospital .A single patient may have multiple hospital stays associated with them. A stay object encompassed all text and multimedia data associated with the patient's time in hospital.

In this application, PHP is used to dynamically create Web pages containing patient information, and to update medical records.

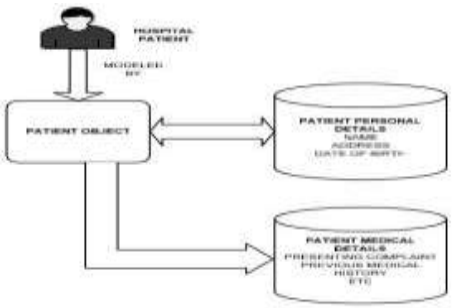


**Figure 4.**Structure of SQL database

*2. Viewing Patient Medical Details*

The procedure for viewing patient information is the following

- The Patient's tag is read by the client application.
- The tag number is then passed to the server embedded in a URL.
- The PHP page will then extract the tag number from the URL.
- The PHP page connects to the database, builds a SQL query based on the tag number and sends it to the MYSQL database.
- PHP receives the response from the database and immediately begins building a page detailing the response. This web page is sent back to the client's Web browser for viewing as shown in figure 5.

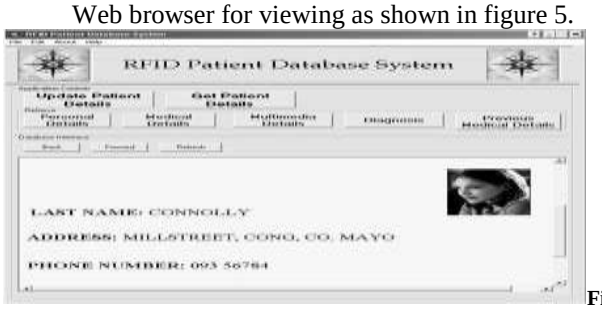


**Figure 5.** Interface for viewing patient details

*3. Updating Patient Medical Details*

- Updating of patient details is a similar procedure:
- The tag number is sent to the server via the URL.
- The Doctor/Nurse is presented with an HTML (Hyper-Text Mark-up Language) form where they can fill in the new patient records


**Figure.6** Interface for uploading patient details

- Once the details are submitted, a PHP script parses, verifies and stores the details entered.
- It then builds a query for the database. The details are added to the database and can be viewed later as shown in figure.6.

**D.SECURITY**

An important concern of an RFID system in a hospital environment is the security and integrity of the patients' information. There is always the danger that the transponders may be monitored using unauthorized readers. One of the advantages of this particular system is the transponders simply contain a unique identifier and no other patient information. Without access to the network, the information contained on the transponder is essentially useless. The security of the network is guaranteed by Wi-Fi Protected Access (WPA). WPA is a system to secure wireless networks, through a process of authentication and encryption. Since the network is secure, the integrity of the data is guaranteed.

**E. RESULTS**

Results are presented to demonstrate the applications and its benefits. The client application was developed using Visual Basic 6. The web-server was implemented on a Linux machine, running the apache web-server. The RFID reader chosen for this project was the S4100 Multi-Function Reader Module, and the RFID transponders used were ISO 15693 Inlay transponders from Texas Instrument.

*1. User-type defined login system*

Personalized logins provide a unique interface for Doctor and Nurses, giving greater privileges to doctors to update patient information as shown in figure.7


**Figure.7** User-type defined login system

*2. FACILITY TO UPLOAD TEXT AND MULTIMEDIA DATA*

The system allows the doctor to update a patient's details through a HTML form, which also leads to conformity to standardized record keeping.

The system allows the user to upload multimedia data relating to the patient, such as x-rays, or a text file containing blood test results. These files can then be viewed at the user's discretion as shown in figure.8

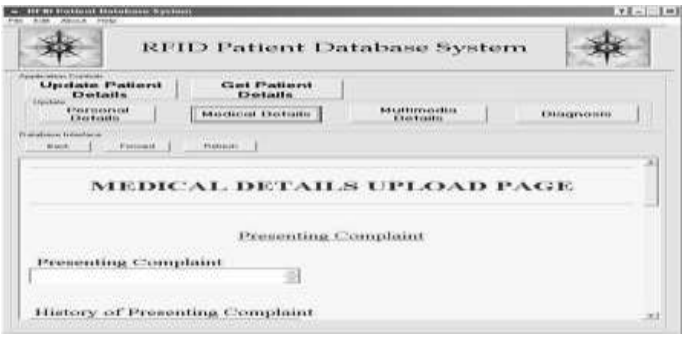


**Figure.8** HTML form for updating patient's medical details

## III. PROPOSED SYSTEM

### A. Introduction

The proposed work is mainly to reduce the number of deaths due to the late treatment. Whenever the accident occurs in highways or in any unknown areas, the G-force sensor detects the accident and sends the current location to the nearby ambulance service. After the arrival of ambulance to the accident spot, it is possible to provide medical facility to accident victim within short period of time. Monitoring of ambulance location and status of patient during the critical hour of patient transportation helps to improve medical care. While transferring the patient to the hospitals, major problem is to identify the patient's detail. The proposed project stores the patient's historical information in the cloud and retrieved using biometric device whenever it is needed, thus helps to provide immediate treatment. The biometric device will be available in ambulance. The system connected with the biometric device will display the location of the ambulance and health status of the patient to nearby hospital using IOT. After receiving the notification, the doctors in hospital will be alerted**.**

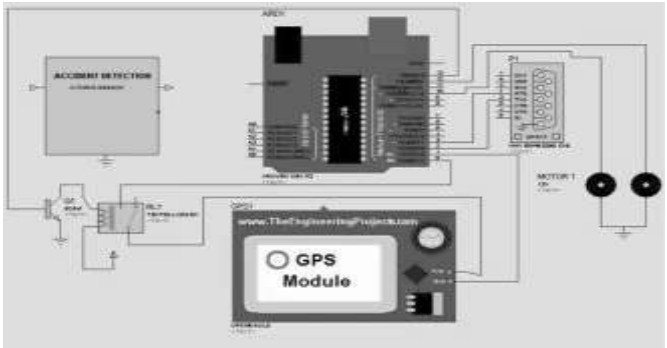


**Figure.9**Circuit diagram of Accident detection system in vehicle

The regulated power supply supplies the power to the G-force sensor and it detects the accident. The signal from the G-force sensor passes to the relay module, it operate as a switch of the main voltage where it can be turned on /off and connected to the Arduino Uno board. The Arduino Uno board gives the instruction to GPS to search the current location of the accident spot and transfer the message back to the Arduino. Then the message is send to the control room by using Wi-Fi module as shown in figure 9.

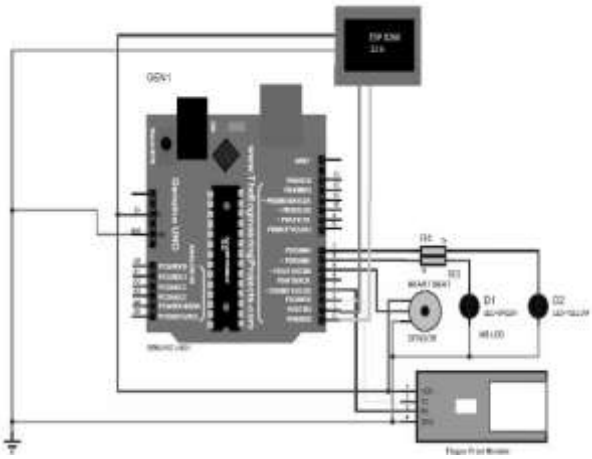

**Figure. 10** Circuit diagram of Health data transmission to the hospital

The Arduino Uno board is connected to the fingerprint scanner, heart beat sensor and Wi-Fi module .The patient fingerprint is scanned to get the patient details and along with the heart beat rate. This information is send to the nearby hospital by using Wi-Fi module as shown in figure 10.

### B. Block Diagram

The block diagram of the Accident Detection and Health data transmission is shown in figure 11 and 12.

GPS is a satellite navigation system used to determine the ground position of an object. GPS technology was first used by the United States military in the 1960s and expanded into civilian use over the next few decades. Today, GPS receivers are included in many commercial products, such as automobiles, smartphones, exercise watches, and GISdevices.

Each GPS satellite broadcasts a message that includes the satellite's current position, orbit, and exact time. A GPS receiver combines the broadcasts from multiple satellites to calculate its exact position using a process called triangulation. Three satellites are required in order to determine a receiver's location, though a connection to four satellites is ideal since it provides greater accuracy. In order for a GPS device to work correctly, it must first establish a connection to the required number of satellites. This process can take anywhere from a few seconds to a few minutes, depending on the strength of the receiver.

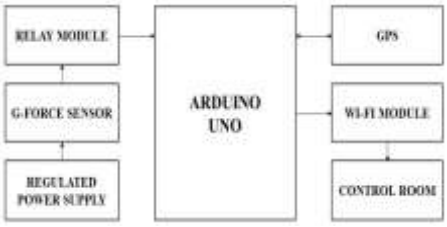


**Figure 11.** Accident detection system in vehicle


**Figure 12. Health data transmission to the hospital**

G-force sensor is used to detect lateral acceleration (side forces that occur while cornering) or deceleration forces when braking or during a collision (like a crash sensor). They are typically used in certain Bosch antilock brake system applications. Input from the sensor is used by the ABS control module to modify the conditions under which ABS will engage and become active. The interfacing of Arduino with G-force sensor is shown in figure 13.

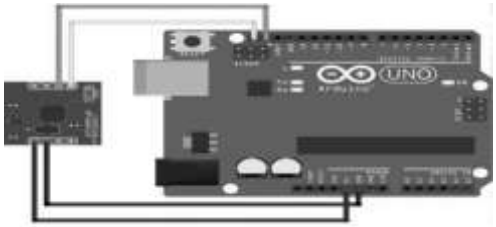

**Figure 13.** Interfacing Arduino with G-force sensor

## IV. RESULT AND ANALYSIS

The accident detection and indication uses Arduino Uno board along with the G-force sensor, GPS receiver, GPS antenna and Wi-Fi module as shown in figure 14. Whenever an accident is detected using G-force sensor, the information along with the latitude and longitude send to the nearby control station. An emergency service is provided at the right time.

**Figure 14.** Accident detection system in vehicle

The Arduino Uno board is connected with the fingerprint scanner, heart beat sensor and Wi-Fi module as shown in figure 15. The patient's fingerprint is accessed using biometric fingerprint scanner which retrieves the patient's detail from cloud along with it the current heart beat rate is added and sends to the hospital.

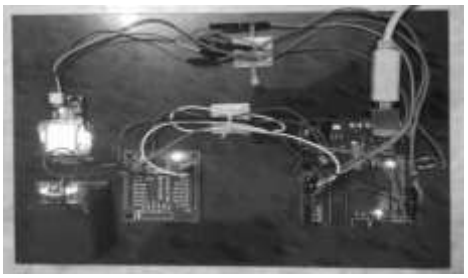

**Figure 15.Health data transmission to the hospital**

A.

B.

C. **ACCIDENT DETECTION OUTPUT**

The G-force sensor senses the vibration. When the two vehicles collide with each other and if the vibration exceeds the threshold value of 50%, the accident is detected and the wifi module sends the current latitude and longitude position of the accident spot to the control room.

HEALTH DATA TRANSMISSION DATA TO THE HOSPITAL

The patient's detail is retrieved from the cloud using biometric fingerprint scanner and along with, the heart beat rate is measured using heart beat sensor. The patient details are stored in the cloud and it is accessed through the fingerprint scanner. The hospital get all necessary details of the patient's in prior. Thus this proposed system reduces the time consumption as shown figure 16.


**Figure.16** Patient's detail to the hospital

## V. CONCLUSION

Accident detection Cloud Based Biometric Database system using IOT is proposed and implemented. From the result it is concluded that the proposed system is efficient than the existing system. The proposed system is designed in such a way that it saves the life of the person in emergency. When the accident occurs in highways, through the G- force sensor the accident is detected and then the message is transferred to the ambulance service through GPS. By using fingerprint, the

medical or patient details are extracted from cloud. Proposed system has more advantages than the existing system. It provides early treatment to the patient thus minimize the wastage of time taken in the hospital to identify the patient personal and medical details. Thus it saves more money and no need to take the same test repeatedly.

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