An Efficient Application Model of Smart Ambulance Support (108) Services

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Abstract— Health care has become a huge issue nowadays due to lack of availability of quick health services. This paper is concerned with smart (108) ambulance support. The patient or person requesting the service registers himself in the app. Ambulance picks up the patient from his location. Then the sensors monitor the condition of the patient. The patient's data will be transferred to the database that can be accessed by the hospital staffs for quick arrangement. This is done in order to prepare the services before the patient arrives at the hospital.

Index Terms— Android, Healthcare, Public safety, Sensors, Smart ambulance

I. INTRODUCTION

Health care in our time is a big dilemma, due to the complexity of services, poor quality of health services, and slow delivery of services to patients. Therefore, researchers and those interested in the health side seek to find alternative ways to provide prompt services and preventive health care. Where one solution to solving health care problems is to health monitoring, especially in clinical medicine specialties, nursing, pharmacy, nutrition, therapies such as respiratory, physical, and occupational, and others. Although the previously mentioned disciplines are almost overlapping, each one of them has a specific interest focused on it and providing different care methods. The complexity of each specialty is a challenge for researchers to find techniques that help to ensure excellent health care services and interdisciplinary cooperation adds another level of complexity. In all specialties, the quality of clinical decisions depends on the quality of information available to the decision maker.This paper is concerned with ambulance support (108) services that provide information to the decision maker to make an accurate decision. The mechanism of working the system using this model is to transfer the patient's data to the database, which can be accessed by the staff in the hospital for quick order before the patient arrives at the hospital. An admin adds/deletes the patients, edits or deletes ambulances and monitors patient. The patient or the person requesting for the ambulance uses the application to do so.The ambulance reaches the location of the patient and picks him up. Then the sensors are attached to the patient and readings are sent to the database from the app. The person in the hospital from the website can access this. The person at the hospital verifies if the facility that patient needs is available or not and send reply accordingly. This is done in order to prepare the services before the patient arrives at the hospital.

II. RELATED WORKS

There are Google Maps, which make everyone's life easier. Google Maps gives information about nearby hospitals, with its rating, reviews, and distance from user's current location. The drawback of Google Maps is that it only provides the hospitals, but does not give their detailed information about the hospital to the patient. Therefore, user may need to access information about the hospital by going to particular hospital's website or by going to that particular hospital. There are smart ambulance systems, which try to overcome the traffic congestion in case of emergencies, but this system does not send the patients' health parameters to the hospital and hospital information regarding patient's emergencies to the patient.

The proposed system overcomes this drawback and gives hospital information related to user's medical emergency to the patient and also the information regarding patient's health such as body temperature and pulse to the hospital so that the hospital can take necessary arrangements before the patient arrives the hospital.With the congestion of roads especially in large cities due to a large number of vehicles and traffic, it is necessary to find alternatives for ambulances, which play an essential role in the event of an accident on the road network and need arises to save valuable human life. If we take one of the big cities like Hyderabad in India as an example of traffic jams, the size of the town with its many limbs, the number of vehicles on the roads and the lack of traffic signals and unpaved roads. This leads us to prepare a passenger such as information system based on modern technologies Advanced Traveler Information System (ATIS) by (Kumar .P et al. 2003). ATIS is developed using ArcView3.1, Network Analyst 1.1b, and Avenue programming language. It can be re-designed using more advanced GIS technologies and programming languages. One of the good things about developing systems for immediate assistance has been forming a method by National Center of Immediate Assistance (EKAB) [Derekenaris .G 2000] for ambulance management. G3 system has been used to track low flying aircraft and vehicles by a digital map in the real-time. This G3 system was a combination of GPS, GIS, and GPRS (which is based on GSM technology) [Lin et al. 2003]. Of modern technologies used in the development of these systems, such as ArcGIS9.1 (Network Analyst extension), real-time positioning techniques (GPS/GSM) and VBA.

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III. PROPOSED ARCHITECTURE OF THE SYSTEM

A. User characteristics

- Admin: Is a super user of this app who is responsible for editing or deleting the ambulance and adding or editing hospital. They monitor the overall system.
- Hospital: Is the person who uses the website to receive data from the ambulance through the app. As per the data from the operator in the ambulance, the response from the hospital is sent back.
- Ambulance: Picks up the patient and takes the patient's readings from the sensors.
- Patient: Is the person who needs the ambulance services.

B. External Interface Requirements

- User Interfaces: The application interface will work optimally on any android platform above android version 4.1 Operating System. As a test server, we can use WAMP server with MySQL Database and HTML 5(Bootstrap), CSS, JS, PHP.
- Hardware Interfaces: A touch screen mobile phone with minimum RAM of about 2GB and decent processing power to execute and run the application smoothly. We also require a computer with minimum 2GB RAM.
- Software Interfaces: Android studio 2.3.3 or higher, WAMP Server, Arduino ID.

C. General constraints

- Delay in data transfer maybe one of the issues.
- There needs to be a constant internet connection for this system to work.
- Ambulance may not have a particular service required.
- GPS may not be able to track the exact location.

D. Design

Modular Design Diagram: Modular design diagram subdivides the system into modules, which can be independently created and used to derive functionalities. Some complex systems can be broken down into simpler subsystems, which work when combined. Components of modular design can be created separately and then added together to increase functionality.

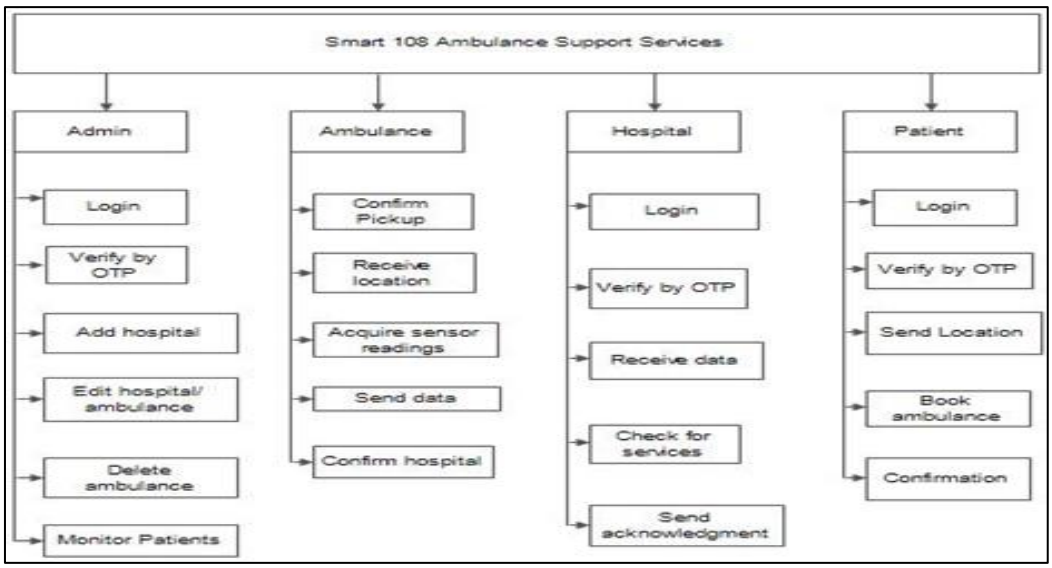

Figure 1: The architecture of proposed model

IV. EXPERIMENTATION AND RESULT ANALYSIS

System testing of software or hardware is testing conducted on a computer, integrated system to evaluate the system's compliance with its specified requirements.

Table 1: Test case for Ambulance App

Sl. No.	Test cases	Expected Output	Observed Output	Result
1	If normal case	Enter name and age proceed	Enter name and age proceed	Pass
2	If emergency case	Send sensor readings directly	Send sensor readings directly	Pass

The testing phase is performed after the coding to detect all the errors, provide quality assurance, and ensure reliability of the software. Testing is vital to the success of the system. During testing, the software to be tested is executed with the set of test cases, and the behavior of the system for the test cases is evaluated to determine if the system is performing as expected. Clearly, the success of testing is revealing errors that depend critically on the test cases.

This application consists of the following four modules:

A. Admin module

Admin of the system maintains the overall system and is responsible for adding or deleting hospitals and ambulance. Admin coordinates the actions of the entire system. He can view the patient details.

Figure 2: Book the ambulance

B. Hospital module

Hospital operator can monitor the facilities and reply to the ambulance operator about its status. If the facility is available, then the necessary arrangements are made as soon as possible. If facilities are not available then inform the person in the ambulance.

C. Ambulance module

Picks up the patient from the location and attaches the sensors to the patient. The sensor readings are read automatically.Then sent to the hospital through an app.

D. Patient module

The patient is the one who needs the ambulance services, but anybody can book the ambulance. The patient can update the health details like name, age, blood group, etc., if awake. Otherwise, the patient's family can give the patient details at the hospital

Figure 3: Enter Username and Password

The patient registers himself in the app and requests the ambulance service. He books the ambulance and gets the confirmation. The sensors examine his health condition. The sensors are connected to the app via Bluetooth to collect the sensor readings, and this information is sent to hospitals. Hospital admin can check whether the services required by the patient are available in the hospital and if the services are available, then this is informed to the patient, and necessary arrangements can be made at the hospital. If the services are not available in the hospital, this is notified to the patient so that he can search for another hospital.

Figure 4: Connect the device through Bluetooth

V. CONCLUSION

The original spark for this paper was conceived from the facts and figures from the daily newspaper and media depicting the number of deaths, due to accidents in the highways which is shocking and alarming nowadays. Statistics show that approximately one dies in every 30 hours in a fast lane road of the densely populated highway. This work proposes and focuses on the pulse rate and body temperature monitoring system that is able to monitor the condition of the patient. The data is stored in the database. Thus, the personals at the hospital can monitor and diagnose the patient's condition continuously and could suggest earlier precaution for the patients themselves. This system is effective and user friendly and thus its usage is not restricted or limited to any class of users. This can be implemented for various other sensors as well as for other applications. Good health care facility is a necessity for every individual. Hence, this helps to provide proper assistance even in the rural areas.

For this project to work, internet is compulsorily needed at both server and client side. The person at the hospital should be available at all times to monitor and respond to the patient.

VI. FUTURE SCOPE

Other sensors can be implemented such as blood sugar monitoring, ECG monitoring, blood group detection can be implemented. Additional Ambulance services can be included. By using capacitive touch screen the system can be implemented in hospitals to maintain patient's data.

Providing the facilities of payment can be included in the application. Voice alerts can be used to initiate the various controlling of devices and their status of operation.

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