

A review paper on monitoring of an E- Ambulance location with Patient Health care system using different communication technology

Prof. Ashwini A. Dhavale¹, Prof. Archana S. Metkari²

¹M.E. Electronics, Solapur University, Assistant Professor, Electrical Department, VVPIET Solapur, Maharashtra

²M.E. Power System, Shivaji University, Kolhapur, Assistant Professor², Electrical Department, VVPIET Solapur, Maharashtra

Abstract: Now a days looking towards coronavirus pandemic situations and Road Accident cases everywhere in the world. It became primary necessary to develop emergency services in hospitals. The main role which plays in the emergency services Ambulances attached with that particular Hospital. So in emergency the ambulance location can be provided to hospital and the patient travelling in the hospital also can get emergency services in the Ambulance while travelling towards hospital. So the system also built in such way it provides all database related to patients parameters (like its Heart beat, temperature etc..) to the expertise in the Hospital attached with that particular ambulance. The paper provides a review of different technologies used for communication between hospital and Ambulance.

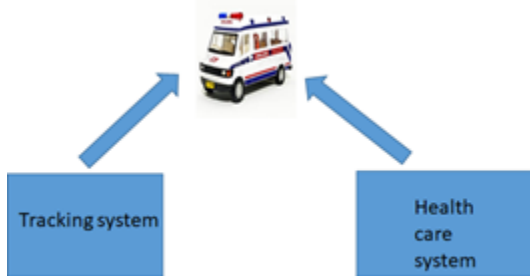


Fig.a. Two different systems of ambulance

I. INTRODUCTION

Providing emergency services to the patients travelling in ambulance towards hospital become first priority to save life of patients. A patient health care system attached with hospitals will help a lot in this case. The expertise get parameters reading from system and they can judge patient's condition. That helps a lot to guide ambulance paramedical staff for treating victim during travelling. For sending data of victim condition there are lots of communication

systems can be used. The paper belongs to review of all papers related to different wireless systems for communication between hospitals and ambulance.

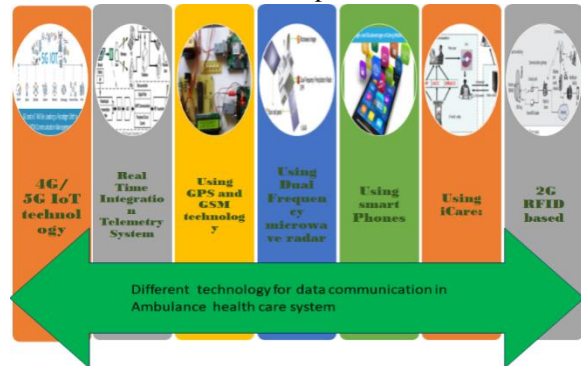


Fig. b. Different communication technology

II. DIFFERENT WIRELESS TECHNOLOGY USED FOR COMMUNICATION BETWEEN E-AMBULANCE AND HOSPITALS

II.1. Using GPS and GSM technology:

Method uses GPS modem along with microcontroller hardware circuit. GPS will track location of ambulance along with Latitude and longitude coordinates. The GPS receives coordinates from satellite and microcontroller uses serial communication to receive data. The data can be processed by microcontroller circuit. The coordinates will be sent towards hospitals using GSM modem in the form of text SMS. The exact location of ambulance can be informed to the hospital expertise. These readings sent to hospital continuously so continuous monitoring of ambulance location can be achieved. GSM also includes all parameters like heartbeat, temperature etc...of victim travelling towards hospital. The parameters provide exact condition of victim. Accordingly emergency treatments can be

provided to patients by paramedic staff in ambulance. The continuous monitoring through SMS is possible.

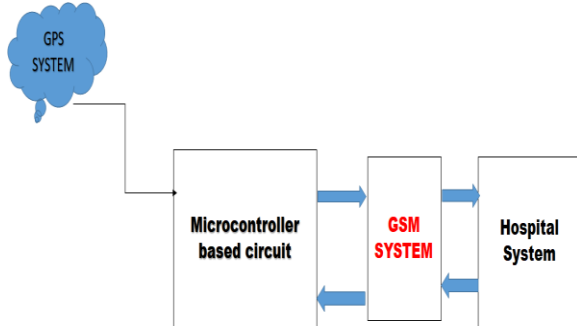


Fig. c. GPS and GSM based system

II.2. IoT technology:

Internet of things (IoT) is a fast growing, a user-friendly technology. It allows everything to connect and also allows effective communication between the connected things. The term Internet of Things has come to describe some technologies and research disciplines that enable the Internet to reach out into the real world of physical objects. IoT has top five applications are Traffic monitoring, Healthcare, Security, Transport and logistics, and Daily life. The Data obtained through sensors are uploaded to the cloud and shared with others. Data obtained through sensors are processed and accessed through a smart phone. It includes Situational awareness sensors, Communication networks, Medical data processing servers, Clinic terminals. It is apportioned into three layers to be respective device layer, Gateway layer, and Service Platform layer.

II.2.1. IoT Device Layer: IoT layer comprises of individual sensors; It includes different counting sensors and actuators supporting different correspondence measures, for example, Zigbee Wi-Fi.

II.2.2. IoT Gateway Layer: This layer utilizing entryways that can give a more uniform interface to IoT administration stage layer. It is additionally execute both IoT gadget and entryway layer into an individual physical element and interfaces with the IoT administration stage layer through the center system.

II.2.3. IoT Service Platform Layer: for different application layer gives perfect IoT administration reflections.

II.2.4. IoT Core Network: The physical elements included in the above three layers need suitable correspondence framework for data trade.

II.3. Real Time Integration Telemetry System:

Heterogeneous telemetry system providing alerts and information to paramedic staff in ambulance improve probability of saving life of victim travelling through ambulance. Data distribution service used to provide software layer over networking stake. It is model of communication of basic Application Programming Interface (API) model of communication to work on complicated network layers. DDS responsible for uninterrupted network management and data flow. However, another application interference will not occurred. Specification over Real-Time Publish-Subscribe (RTPS) Protocol¹³ are used in RTI DDS. Another unit is Sensors Network unit consist of biosensor for real time flow of biofeedback. The parameters like heart rate, temperature, blood pressure measured continuously and this data in serial form processed by system at the side of unit. The wireless technology such as Wi-Fi, Bluetooth and Zig Bee to transmit data. The data can be communicated to medical center and error occurred handled by DDS. Decision maker unit responsible for taking decisions about alert and treatment of patient travelling through ambulance. The parameters information coming from Sensor Network Unit helps for taking decisions about the treatment. An ambulance driver normally needs particular guides while transporting patients from the place of origin to a medical center. Tracking and routing techniques can be used to ease an ambulance driver's job. Global Positioning Systems (GPS) provide location information with timestamps of E-Ambulance movements during its journey. These location updates can be sent to medical centers and remote traffic management units for tracking issues. A traffic control unit can handle all issues related to mapping of Ambulance and even traffic signals can also be handled for traffic clearance.

II.4. Using iCare:

Health analyzer called as iCare used as life assistant include regular reminder, quick alarm, location tracking. Reminder provide alarm for time to have medicine. At the time of emergency when found unconscious to find location tracking system is used. Quick access to alarm to indicate relatives and hospital for medical emergency. System has application in smart phones. The application includes nine modules include data receiving, data processing, data sending, basic information setting, configuration, inquiry, quick alarm, location tracking and reminder. Data receiving is used to receive data from sensors and the server, and Data sending is the interface to send

messages to the server, the emergency Centre and preset persons. Inquiry module allows the person to check alert records and advices sent by expertise at healthcare center. Quick alarm provides a quick button to alert to health care center. The location of the subject can be got and monitored through location tracking module that is also essential in the alarm function. Reminder will be used to reminder for person to know about old reports surgery or treatment and old diseases.

II.5. Using Dual Frequency microwave radar:

In case of biomedical hazards it is first priority to prevent victim from external infections that can be achieved using Radar system. The system consists of two microwave radars: The 24-GHz cardiac-monitoring radar and a 10-GHz respiratory-monitoring radar. The cardiac-monitoring radar positioned below the stretcher under the isolator. The respiratory-monitoring radar is positioned 20 cm away from the surface of the isolator. The victim was placed inside the isolator on a stretcher in the simulated ambulance. When the ambulance speed of approximately 10 km/h, the heart rate and respiratory rates can be measured. Each radar has normal output power of 7 mW (maximum 10 mW), antenna gain of 10 dBi and diffusion angle of approximately 40 degree. The system is controlled by a personal computer with custom sampling and display programs written in Lab VIEW (Version 8, National Instruments Co., USA).

The analog outputs of the two microwave radars are transferred to a personal computer through an A/D converter and analyzed in real time. The respiratory and heart rates are measured so that proper decisions can be taken in case of emergency.

II.6. Using smart Phones:

A personalized heart monitoring developed application on Microsoft's Windows of smartphones and wireless (bio) sensors. The system contains easy access to lower level APIs which are needed for the sensor manager modules. It requires the operating system allows easier access to other applications running on the mobile device such as the calendar application, WiFi and obtaining the GSM cellid. The data is stored in an SQL CE Server which is a compact database for mobile devices. A Bluetooth ECG/Accelerometer sensor to detect life threatening arrhythmias and to detect falls. The ECG sensor and developed a heartbeat detector and classifier complemented attached for heart rate monitoring. A Bluetooth enabled Blood Pressure Monitor and Scale

from A&D Medical to be used with the Blood Pressure Monitor and Weight Monitor. The healthcare Centre application is based on Microsoft .Net technology using IIS and SQL Database. The system uses ASP.net to create dynamic web applications.

The application is capable of monitoring the health of high risk cardiac patients. The smart phone application analyses in real-time sensor and environmental data and can automatically alert the ambulance and paramedic staff when a heart patient is in danger. It also transmits sensor data to a medical center. The system can be personalized and special programs can monitor the progress of a patient. The special programs can be used to give advice to the patient.

II.7. 2G RFID based:

Traffic clearance is one of the biggest issues facing all ambulance attached with health care systems. A traffic control system using microcontroller and RFID tags, RFID sensors developed. When emergency cases occurred traffic clearance done by changing signals from red to green at side of road from which ambulance is travelling. This can help to prevent time of reach of ambulance at its destination health care center. A RFID tag provided with its particular ID number to detect particular ambulance. System at traffic signal verify ID number with the help of sensor. After verification of ID process data and traffic signal made from Red to green at the side of ambulance so that valuable time can be utilized to save life of causality travelling through ambulance.

III. CONCLUSIONS

All ambulance monitoring and health care technologies are transforming healthcare industry by increasing efficiency, lowering costs and put the focus back on better patient care. The proposed E ambulance Healthcare systems technologies are heterogeneous computing, wirelessly communicating system of apps and devices that connects patients and medical centers to diagnose, monitor, track and store medical information. Ambulance traffic clearance also reduces valuable time of travel towards destination. All systems work to save valuable life of human life.

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