

LoRa Network for Smart Presence of Ambulance Locating System

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Abstract— The rapid development of innovation and foundation has made our lives simpler. The appearance of innovation has additionally expanded the traffic dangers and street mishaps occur regularly which causes enormous death toll and property due to the poor crisis offices. Our task will give an ideal answer for this downside. Inclusion incorporates emergency rescue vehicle transportations (counting hold up time treatment at the scene) by an authorised emergency vehicle administration from the area of the unexpected ailment or damage, to the closest hospital where emergency wellbeing administration can be performed. For this reason we have actualized a viable emergency vehicle frame work by utilizing GPS, GSM, and alongside the Lora gadget innovation. Alongside this the traffic is additionally cleared in the course that the emergency vehicle is voyaging, for this to happen the GPS area of the mishap vehicle is sent to the closest medical hospital then they will advise the traffic cell to clear the route. In this proposed venture the best possible encouraged hospital are coordinated to the emergency vehicle. Treatment at the scene (paramedic administration) without rescue vehicle transportation. Hold up related with secured emergency vehicle transportation. To an emergency hospital that gives a required larger amount of consideration that was not accessible at the first medical hospital.

Keywords: Accident Detection, Emergency Ambulance Transportation, LoRa Device, Traffic Maintenance

I. INTRODUCTION

Statistics show that the leading cause of death by injury is road traffic accidents. There are number of causes for which an accident can occur, some of them are; lack of training institutes, use of mobile phone while driving, unskilled drivers, driving while intoxicated, bad road condition, overloading, and poor traffic management. However, most of the time it has been observed that the deaths occurred in the road accident is due to the late arrival of the ambulance to the accident spot. Although in most cases the injury is not severe and we could save the affected lives, however, due to late arrival of the rescue team, the injuries turn fatal. In this survey paper, we briefly review selected road accident detection techniques and propose a solution. In these techniques, a system is used that can automatically detect an accident in appreciably less amount of time and sends the basic information about the accident to the emergency center. These techniques use LoRa, GSM and GPS, Vibration Sensor and MEMS Sensor.

Along with the advent in the medical field, admission of the patient to the hospital at the right time is required to save one's life. Many systems can be used to implement the smart ambulance transportation, we have developed a cost effective system with the LoRa Technology, Global system for mobile communication (GSM) modules, GPS modules and latest high speed micro controllers to achieve the desired results. The primary objective is to identify the accident, for this we implement a vibration sensor and a Tilt sensors in the vehicle, the accident is detected and

using the Lora technology it sends the location of accident to the control unit and the control unit send this information to the nearest hospitals in the 10Km boundary around the accident location. From the hospital an indication is sent to the other hospitals that an ambulance has been sent for the assistance so that multiple ambulances dispatching from different hospitals are avoided. One ambulance dispatches at the same time the GPS location of the accident is sent to the traffic control cell and hence the traffic is cleared in the route between the ambulance and the location until the ambulance reaches the destination and reaches back to the hospital.

II. METHODOLOGY

Embedded C is a set of language extension for the C programming language by the C standards committee to address commonality issues that exists between C extensions for different embedded systems. Historically, Embedded C programming requires nonstandard extension to the C language in order to support exotic features such as fixed point arithmetic, multiple distinct memory banks and basic IO operations. In 2008, the C standards committee extended the C language to address these issues by providing a common standard for all implementation adhere to. It includes a number of features not available in common C, such as fixed point arithmetic, named address space and basic IO hardware addressing. Embedded C users most of the syntax and schematics of standard C example main () function, variable definition, data type declaration, conditional statements (if, switch, case), loops(while, for), functions, arrays and strings, structures and union, bit operations, macros, etc.

Looking around, we find ourselves to be surrounded by various types of embedded system. Be it a digital camera or a mobile phone or a washing machine, all of them has some kind of processor functioning inside it. Associated with each processor is the embedded software if hardware forms the body of an embedded system, embedded processor acts as a brain and embedded software forms its soul. It is the embedded software which primarily governs the functioning of embedded system. During infancy years of microprocessor based systems, programs were developed using assemblers and fused into the EPROM's. There used to be no mechanism to find what the program was doing. LEDs, switches, etc., were used to check correct execution of the program. Some 'very fortunate' developers had In-Circuit Simulators (ICES), but they were too costly and were not quite reliable.

A. Block Diagram:

1) Vehicle Side:

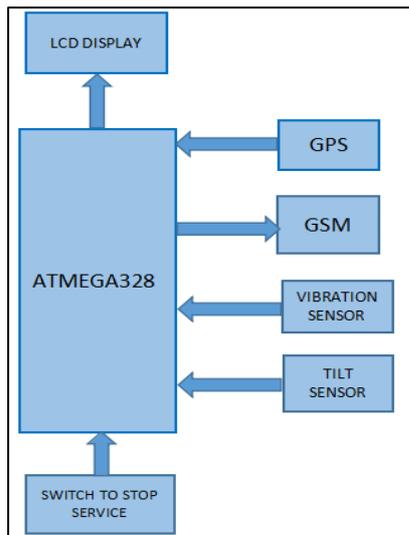


Fig. 1: Functional blocks inside the vehicle

The framework includes the Lora transmitter, Lora transmitters are implanted inside the dashboard of the vehicle amid the assembling of the vehicle. Alongside this a Vibration sensor, a Tilt sensor, GPS and GSM modules are additionally implanted in the plane of vehicle. At the sensor of mishap, the vehicle displays anomalous vibration and furthermore it get tilted (the situation of the vehicle gets changed both on the level plane and vertically) these vibrations from the norm are detected and sent to the ARM7 microcontroller. The vibration sensor detects the vibrations and the Tilt sensor detects the tilting of the vehicle and identifies the event of the mishap, when the mishap distinguished utilizing the GPS module the present are of the vehicle is recorded. Send this recorded mishap is to medical Hospitals in the SMS design. Lora which means “Long range” is utilized for separation correspondence, with inclusion of 10kms this way the area of the mishap through SMS is sent to the close-by Hospitals inside the territory.

2) Hospital side:

a) Hospital-1:

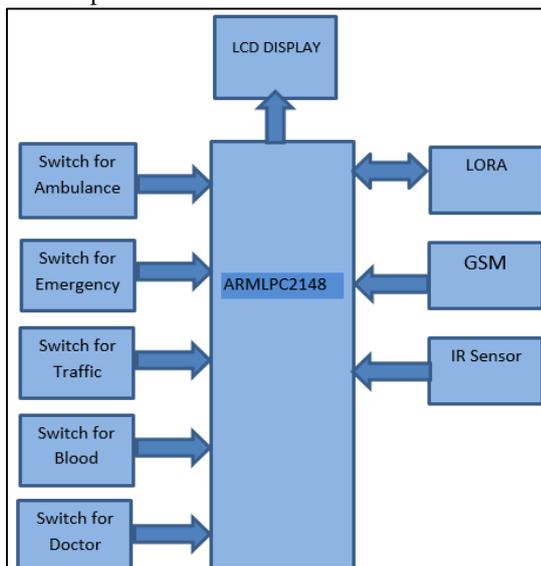


Fig. 2: Functional blocks inside hospital-1

b) Hospital 2:

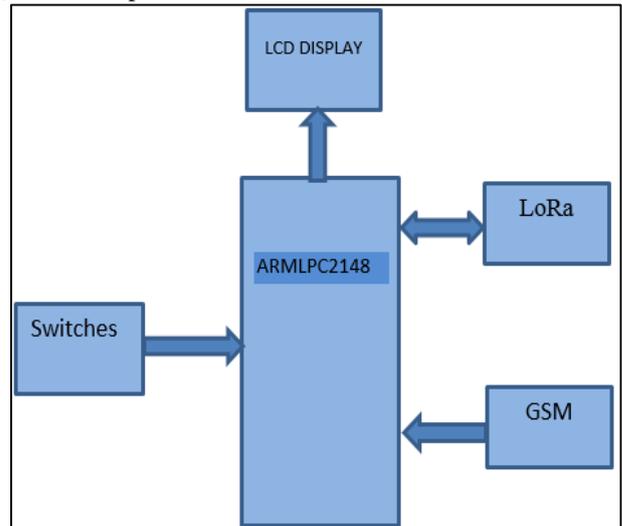


Fig. 3: Functional blocks inside the hospitals-2.

At the hospital side the Lora transceiver is implemented. It receives the location information sent by the LoRa transmitter placed on the vehicle and checks if the ambulance is available at the hospital, if present the ambulance will dispatch and travels to the obtained location of accident, to avoid multiple ambulances at the accident site the sending hospital use switch and sends a code to the other hospitals that the ambulance is being sent from this hospital. Before the ambulance could dispatch at the hospital from the hospital an alert is sent to the nearby traffic control cell using the switch for clearing the traffic in the route between the ambulance and the accident location. In addition, we might have seen many cases where patients arrive at the hospital in a very emergency state, but due to lack of facilities of handling such cases or due to any other reason they will be told to move to another hospital which consists of better facilities, in such cases, anything might happen to the patient while travelling from one hospital to another. To avoid this, by using the same hardware which is implemented at the hospital side a code is sent to another hospital to which the patient was prescribed to go, all the details of the patients like the health conditions are sent even before the patient arrives there, and once they arrive immediate treatment can be provided without any delay in time.

The aim of the project is to send the ambulance to accident zone with the help of the LORA communicating in between hospitals. When the hospital get the GPS location of the accident zone respective hospital check the availability of the ambulance and sends the signal to nearby hospitals that sending the ambulance to respective position from our hospital.

The prototype model of automatic vehicle accident detection and messaging using GSM and GPS modem using ARM7 working will be made in the following steps:

Complete layout of the whole set up will be drawn in form of a block diagram.

- A sensor will first sense the occurrence of an accident and give its output to the microcontroller.
- The GPS detects the latitude and longitudinal position of a vehicle.

- The latitudes and longitude position of the vehicle is sent as message through the GSM.
- Whenever an accident has occurred the position is detected and a message has been sent to the pre-saved number3.

III. RESULT AND DISCUSSION

The prototype model of automatic vehicle accident detection and messaging using GSM and GPS modem using ARM7 working will be made in the following steps:

Vehicle side system is constructed by using GSM,GPS modules and along with Vibration and Tilt sensor are also used. Whenever accident accure in the vehicle which effects two things of the vehicle that causes either vibration in the vehicle or Tilt(Change in normal angle of the vehicle) sometime both can be happen. Here the accidental information can be determined by using Vibration and Tilt sensor, Vibration sensor is used to determine the vibration caused during accident and Tilt sensor used to determine position of the vehicle. Whenever any one of these sensors will activate, the output of these sensors will act as a interrupt for the ATmega microcontroller in order to call farther functions.

When these interrupt occurred the microcontroller will extract current accidental location of the vehicle. The current location information (Longitude & Latitude) is converted into SMS. And these SMS is broadcast to nearest hospital within 10km range via the GPS module. Along with these it can also send the same copy of SMS to patient relation in order to improve the patient concern. If the patient s in conscious level(no hard injury) and he don't want any emergency medical service he can avoid it by sending some positive information like "No need to worry". This message also reaches to both Hospital as well as the relation.

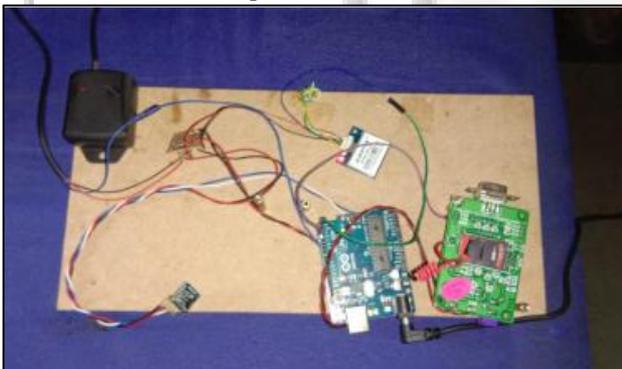


Fig. 4: Vehicle side module.



Fig. 5: Accident location to Hospitals.

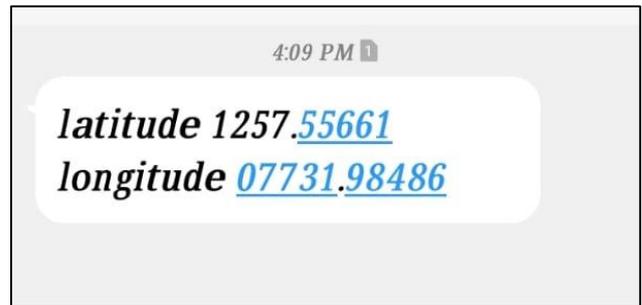


Fig. 6: Accident location to relatives.

Hospital's systems are mainly constructed by using LoRa and GSM modules and these are interconnected with LPC2148 microcontroller. The system wills always waiting for the SMS, which is broadcasted by the vehicle as a medical requires for the travellers. For this purpose the location information is placed in SMS. When the SMS reaches the Hospitals it can alert the operator (Concerned people) by sounding through buzzer. The operator first checks whether the ambulance is currently available in their Hospital or not. Which is displayed on the LCD display in the system? The availability of ambulance can be determined by placing the IR sensor at the ambulance parking site. If the ambulance is present IR sensor will provide logical high output to the microcontroller. If it is not it provide logical low output. If the ambulance is present operator will dispatch the ambulance by providing copy of location information to the ambulance consequently he can also send the information about dispatching to nearest hospitals within 10Km surroundings. This will intern avoid dispatching of more than one ambulance to the same accident location.

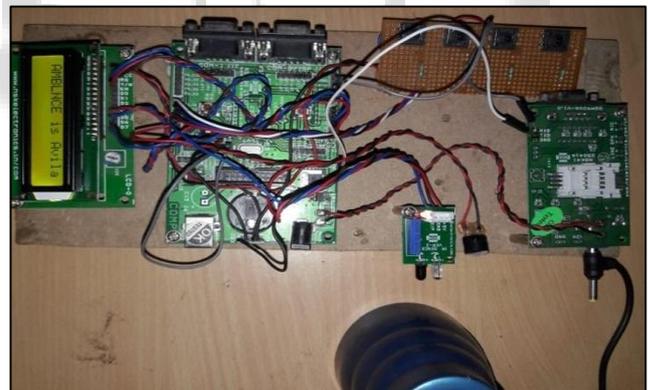


Fig. 7: Hospitals side module.

The operator can send request message as "Clear Traffic" to traffic cell in urban areas in order to clear between the Hospital and accident location.

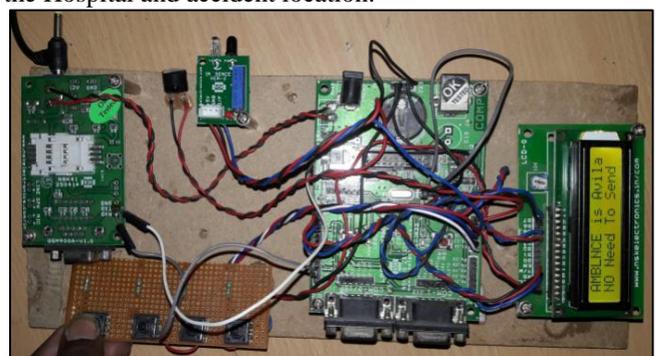


Fig. 8: Informing dispatching of ambulance.

Sometimes might have seen many cases so where patient arrive at hospital in a very emergency state but due to lack of facilities of handling such case or due to any other reason they will be tell to move other hospital which consisting of batter facility. During such case the operator will alert next hospital by sending "Emergency" message.

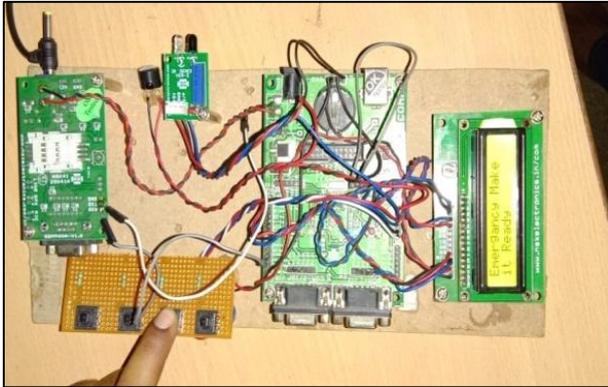


Fig. 9: Alerting neighbour hotspots.

In handling cases we need some emergency requirements like specialist doctors or non-frequently available blood. During this cases operator will send request to other hospitals as "Doctor needed" and "Blood needed".

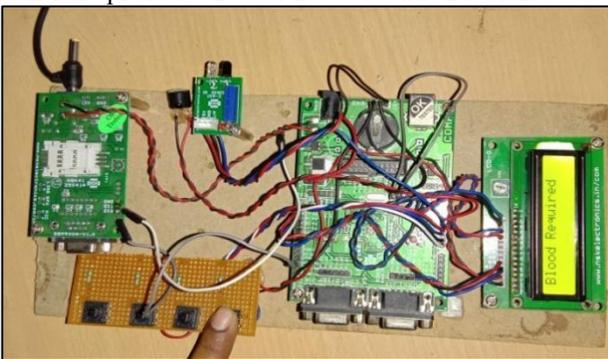


Fig. 10: Switch for blood request.

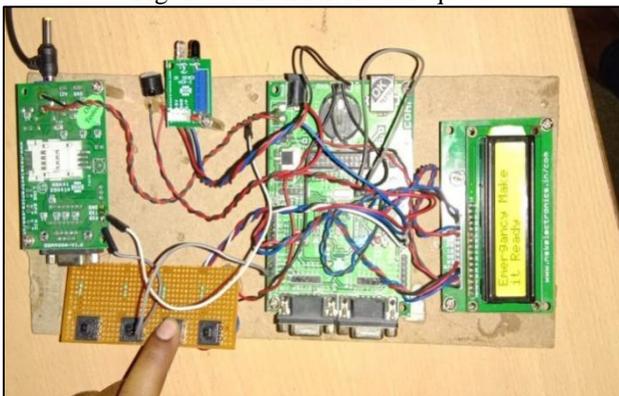


Fig. 11: Switch to request Doctor.

IV. CONCLUSION

The main objective is to save life by providing communication from the site of accident to the hospitals without human interference. From the study and work done in this regard the system serves to be very helpful in saving lives. The current system also makes use of the latest technology.

From the experiments carried and observations done, system is considered to be reliable and accurate. The

results obtained are consistent and works under different conditions. This project serves as a base for further developments.

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