

Intelligent accident identification system using GPS, GSM modem

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Abstract: Recently technological and population development, the usage of vehicles are rapidly increasing and at the same time the occurrence accident is also increased. Hence, the value of human life is ignored. No one can prevent the accident, but can save their life by expediting the ambulance to the hospital in time. A new vivid scheme called Intelligent Transportation System (ITS) is introduced. The objective of this scheme is to minimize the delay caused by traffic congestion and to provide the smooth flow of emergency vehicles. The concept of this scheme is to green the traffic signal in the path of ambulance automatically with the help of RF module. So that the ambulance can reach the spot in time and human life can be saved and the accident location is identified sends the accident location immediately to the main server. The main server finds the nearest ambulance to the accident zone and sends the exact accident location to the emergency vehicle. The control unit monitors the ambulance and provides the shortest path to the ambulance at the same time it controls the traffic light according to the ambulance location and thus arriving at the hospital safely. This scheme is fully automated, thus it locates the accident spot accurately, controls the traffic lights, provide the shortest path to reach the location and to the hospital in time.

Key words: Intelligent Transport System, GPS, GSM, RF Module

I. INTRODUCTION

Automatic accident detection system is used to recognize the location of the accident and easily to reach the location. Every second is valuable for the ambulance vehicle. There is loss of life due to the delay in the arrival of the ambulance to the hospital in the golden hours. This delay is mainly caused by the waiting of ambulance in the traffic signals. So time places an important role in this task. The traffic signals are also controlled automatically by using a Radio Frequency module (RF module). An ambulance will reach the nearest hospital at the exact time to save the human life. This paper is fully automated and thus it locates the accident spot exactly.

II.RELATED WORK

This paper describes about a solution to block a vehicle by sending a SMS, and only a authorized person unlock using security code, and helps the injured person. They used GSM and GPS modem [2] the use of microcontroller based GSM communication helps to recognize the missing vehicles. GSM modem had the authorized user registered details.

The intelligent traffic light controller that was introduced saves the waiting time and avoids the traffic load. With an embedded sensor network technology, the congestion road is detected and managed accordingly with controllers [3]. Alarm device predict the accident vehicle using the algorithm developed. The acceleration sensors and angle sensors module provide the necessary data to the controller. The area of accident is detected using detection algorithm built in the controller [4]. Nowadays Wireless Sensor Networks (WSN) has been applied in various domains like weather monitoring, military, home automation, health care monitoring, security and safety etc [1]. The vehicle system is placed inside the vehicle which detects the accident location by means of sending a message. With the help of GPS and GSM module anywhere in the vehicle is traced. GSM modem used to send an exact location of the vehicle [6].

III.INTRODUCTION TO GPS

Satellite based navigation uses Global Positioning System (GPS) to send and receive the radio signals that serves the user with the required information. GPS posse's twenty four satellites that revolve orbit of earth in twelve hours, the ground stations and the receivers. The GPS receiver in the ground station determines the location and distance accurately in all sough's weather without distortions are made easy with the satellite in orbit as a reference. GPS is used in laptop, mobile, airplane etc.

The receiver uses the messages it receives to determine the transit time of each message and computes the distance to each satellite using the speed of light. Each of these distances and satellites' locations defines a sphere. The receiver is on the surface of each of these spheres when the distances and the satellites' locations are correct. These distances and satellites' locations are used to compute the location of the receiver using the navigation equations. This location is then displayed, perhaps with a moving map display or latitude and longitude [5].

IV.PROPOSED SYSTEM

Our system consists of five main units which coordinates with each other and makes sure that ambulance reaches the hospital without any delay. This system is divided into following units,

- Vehicle Unit
- Main Server
- Ambulance Unit
- Traffic Unit
- Hospital Unit

In the proposed system, vehicle unit installed in the vehicle that sense the accident. If vehicle met an accident, immediately send the location of the accident to the main server. From the control unit, a message is sent to the nearby ambulance. Control unit finds the shortest route to the accident spot, ambulance, hospital. Also send this path

to the ambulance and it transmitted the information to the traffic unit through RF communication. Also, using this information the control unit controls all the nodes in the path of the ambulance and make it ON, which ensures that the ambulance reaches the hospital in time.

V. BLOCK DIAGRAM

A. Vehicle Unit

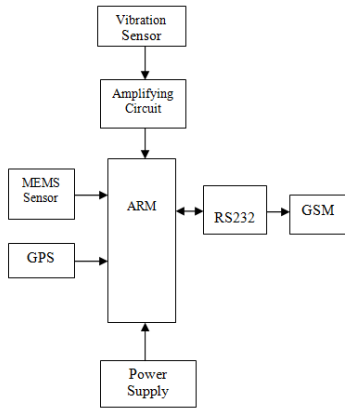


Fig 1. Block Diagram of vehicle Unit

Every vehicle should have vehicle unit. The vehicle unit consists of a vibration, controller, MEMS sensor, GPS system, GSM module. The vehicle unit installed in the vehicle every vehicle should have a vehicle unit. The vehicle unit consists of a vibration sensor, controller, MEMS sensor, GPS system and a GSM module. The vehicle unit installed in the vehicle senses the accident and sends the location of the accident the main server. The vibration sensor used in the vehicle will continuously sense for any large scale vibration in the vehicle. The sensed data is given to the controller. GPS module finds out the current position of the vehicle which is the location of the accident and gives that data to the GSM module. The GSM module sends this data to the control unit whose GSM number is already there in the module as an emergency number.

B. Ambulance Unit

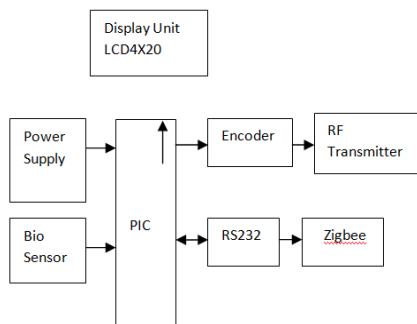


Fig 2. Block Diagram of ambulance unit

The main server discovers the nearest ambulance to the accident place and also the shortest route between the accident spot, ambulance and the nearby hospital. Then the server sends this path to the emergency vehicle. Ambulance unit also using this information the controller controls all the traffic signals in the path of emergency vehicles and makes it ready to provide a free path to the ambulance, which ensures that the ambulance reaches the hospital without delay. At the same time, the ambulance

section turns ON the RF transmitter. This is used to communicate with the traffic department.

C. Traffic Unit

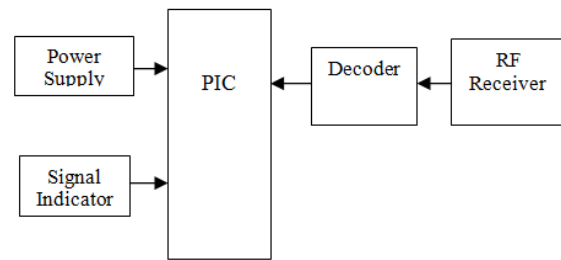


Fig 3. Block Diagram of traffic unit

Whenever a traffic signal section receives the information about the accident, the RF receiver in this section is turned ON to search for ambulance nearing the traffic signal. Control the traffic signal automatically with the help of RF module. Whenever the emergency vehicle reaches near to the traffic signal (approximately 100m), the traffic signal will be made of green via RF communication. Thereby the ambulance is recommended to attain the hospital without delay.

D. Hospital Unit

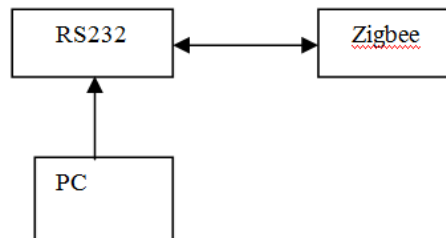


Fig 4. Block diagram of hospital unit

The bio sensor LM35 is used to determine the current condition of the patient like temperature, pressure, and heart beat and that information's send to the hospital via Zigbee.

VI. SIMULATION RESULTS

Automatic accident detection and ambulance rescue system are simulated using NS2 (Network Simulator Version 2) software and presented their results here.

E. Node Creation

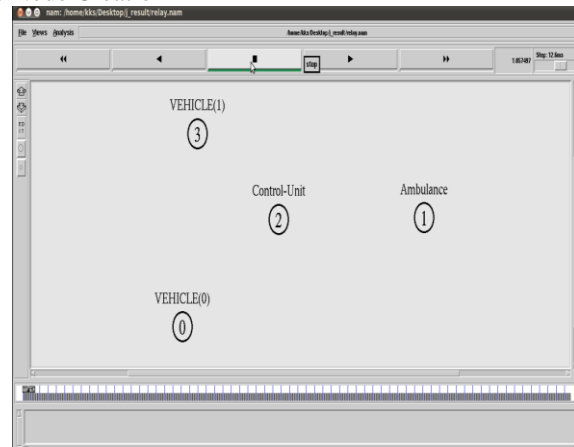


Fig 5. Node Creation

Fig 5 shows creation of four nodes. The nodes 0, 3 are representing the vehicles, node 2 represents main server and node 1 is an ambulance.

F. Nodes in accidental condition

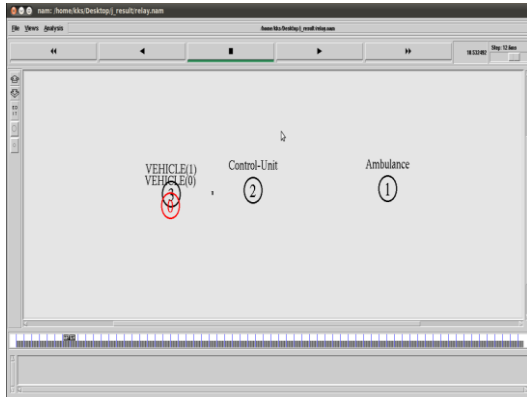


Fig 6. Nodes in Accidental Condition

The accidental situation in that two vehicle nodes collides each other. Colliding of two vehicle nodes is shown in above fig 4.3. The vehicle having an intelligent system sends the accidental location to the main server.

G. Intimation About Accident From Main Server To Ambulance

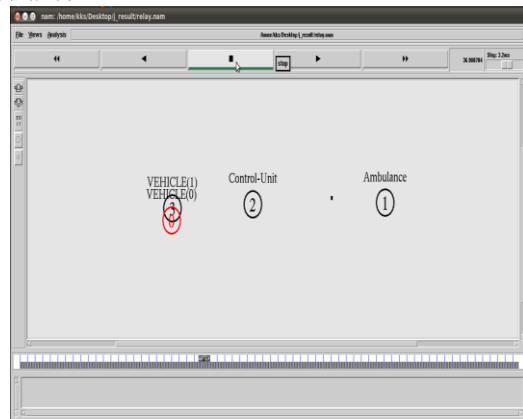


Fig 7. Intimation about the accident from main server to ambulance

Fig 7 shows the information is transferred from the main server to ambulance to intimate about the accident. Main server sent accident location to the ambulance. It will go and rescue the patient.

Shortest Path

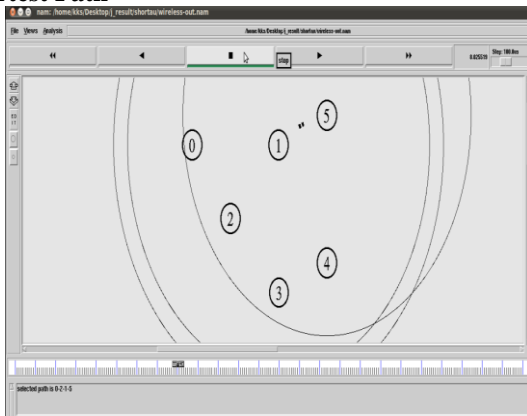


Fig 8. Finding shortest path

Node 0 is considered as source node and nodes 1, 2, 3, 4, 5 are considered as destination node. If node 1 is selected shortest path is 0-2-1. If node 2 is selected shortest path is 0-2. If node3 is selected shortest path is 0-2-3. If node 4 is selected shortest path is 0-2-3-4. If node 5 is selected shortest path is 0-2-1-5.

VII.CONCLUSION

The proposal of the paper is to find the shortest path by controlling traffic signals in favor of ambulance. By this new system the time lag is reduced by applying the RF technologies that controls the traffic signals. The priority of service to the ambulance follows the queuing methodologies through server communication. This ensures the reduced time lag between the accident spot and hospital.

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