GPS AND GSM BASED ACCIDENT LOCATION INDICATOR AND RESCUE SYSTEM

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Abstract: -

Traffic congestion and tidal flow management were recognized as major problems in modern urban areas, which have caused much crossing for the ambulance. Morethan road accidents in the city have been incessant and to bar the loss of life due to the accidents is even more crucial. To implement this, we introduce a scheme called AARS (Automatic ambulance rescuable system). The main theme after this scheme is to provide a smooth flow for the ambulance to reach the hospitals in time and thus minifying the expiration. The idea after this scheme is too implementable an IT's which would control mechanically the traffic lights in the path of the ambulance. The ambulance is controlled by the central unit which furnishes the most scant route to the ambulance and also controls the traffic light according to the ambulance location and thus reaching the hospital safely. The server also decides the location of the accident spot through the sensor systems in the vehicle which encountered the accident and thus the server walks through the ambulance to the spot. This scheme is fully automated hence it finds the accident spot, controls the traffic lights, serving to reach the hospital in time.

Keyword: *GSM and GPS, ARM 7 PROCESSOR, SENSOR, LCD, MAX232,*

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1. INTRODUCTION

When auto crash occurs suddenly the reaction of the emergency services now become a race between race and life and death today, wireless innovation has tilted the odds in favor of success like never before this paper details about accident of automobile emergency alert situation. In this we are trying to program a GPS/GSM module incorporating an accelerometer to report occurrences of accident automatically via GSM communication platform (using SMS messaging) to the nearest agencies such as hospitals police stations fire services and so on giving exact position of the point. where the crash had occurred, this can provide early response and rescue of accident victims saving properties and lives the whole paper is based on arm controller this component details ARM 7(LPC2148) Bump sensor GPS module, GSM module. A vehicular accidents locator system is provided including a plurality of sensor assemblies. The sensors are mounted throughout the body of the vehicle. The major accident occurs in school zone and college zone because of high speed of vehicle. The main objective of the system is to provide security for the vehicle user and also detects the accident if occurred and informs the respective authority through wireless technology if any accident occurs in highway. The accident information system will get activated and message will be transmitted to respective authority. It gives the security system for our vehicle; other system prevents from unwanted and give information to the nearer or recorded security system give late information while GSM based car security system give information at a time. This system also informs the nearer people this is GSM based security system so it is sending the SMS and also generate the alarm when this security system is break so we can save our car and thief is failed. We can also fix the travelling length of vehicle via SMS. If we fix the length is 30 km in city.

1.1 Vehicle Tracking System

A vehicle tracking system combines the installation of an electronic device in a fomite, or flees of vehicles, with purpose designed computer software at least at one operational base to enable the owner or a third party to track the vehicle's location, segregating data in the process from the field and deliver it to the base of operation. Advanced vehicle tracking systems commonly use GPS technology for locating the vehicle, but other types of reflexive vehicle location technology can also be used. Vehicle information can be viewed on electronic maps via the Internet or specialized software. Vehicle tracking systems are also popular in consumer vehicles as a theft prevention and retrieval device. Police can simply follow the signal released by the tracking system and locate the theft vehicle. When used as a security system, a Vehicle Tracking System may provide as either an addition to or replacement for a tradition vehicle alarm. Some vehicle tracking systems make it possible to control vehicle automation, including lock doors or engine in case of emergency. The existence of vehicle tracking material then can be used to reduce the insurance cost.

1.2 GSM Overview

Global System for Mobile Communications or GSM, is the world's most popular method for mobile telephone systems. The GSM Association estimates that 80% of the global mobile market uses the standard. GSM is used by over 2 billion people across more than 212 countries and cities. This ubiquity means that subscribers can use their phones throughout the world, enabled by global roaming arrangements between mobile network operators. GSM differs from its existing technologies in that both signaling and speech channels are digital, and thus GSM is added a second generation (2G) mobile phone system. The GSM standard has been an advantage to both users, who may advantage from the ability to roam and switch carriers without replacing mobiles, and also to network operators, who can choose resource from many GSM equipment vendors.

1.3 GPS Overview

The Global Positioning System (GPS) is a space-based global navigation satellite system (GNSS) that provides reliable location and time information in all weather and at all times and anywhere on or near the Earth when and where there is an unobstructed line of sight to four or more GPS satellites. It is controlled by the United States government and is freely accessible by anyone with a GPS receiver. The GPS project was started in 1973 to overcome the limitations of previous navigation systems, combining ideas from several predecessors, joints a number of classified engineering design studies from the 1960s. GPS was created and reviled by the U.S. Department of Defense (USDOD) and was originally run with 24 satellites. It became fully operation in 1994.

1.4 ARM-7 PROCESSOR LPC-2148

ARM PROCESSOR: In Vehicle terminal, as a central processing unit of the system, ARM embedded system has critical influence on overall performance. So introduced by Philips, the 16/32-bit ARM7 LPC2148 processor with simulation and tracking support is used. It has 16K bytes of static RAM and 128kbytes of embedded high speed Flash memory. In the 64-pin package, 46 GPIO can be used. The Conversion Time of 4 10-bit A / D converter can be as few as 2.44us. It has Real-time clock and watchdog. A high operating frequency of 60MHz of the CPU can be achieved through the on-chip PLL, and the rich on-chip resources can join the needs of general industrial control. LPC2148 not only works stably and faster, but also has dual serial, so is accessed to the plan.

2. AUTOMATIC AMBULANCE DETECTION SYSTEM

Our system consists of four rescue units, which coordinates with each other and makes sure that ambulance reaches the hospital without any time delay. Thus, our system is divided into following four units,

- The Vehicle Unit
- The node Server

- The rescue Unit
- The junction Circuit (Traffic Junction Unit).

The vehicle unit installed in the vehicle senses the accident and sends the location of the accident to the main server. The main server finds the nearest rescue vehicle to the accident spot and also the shortest path between the ambulance, accident spot and the next hospital. The server then sends this track to the ambulance. Also using this information, the server manages all the nodes in the path of ambulance and make it ON, which checks that the ambulance reaches the hospital without delay.

2.1 VEHICLE UNIT

According to our system, every vehicle should have a vehicle unit. The vehicle unit consists of a motion sensor, controller, siren, a user interface, GPS system and a GSM module. The motion sensor used in the vehicle will continuously sense for any large-scale shakes in the vehicle. The sensed data is given to the processor fig.1.

Fig.1 Vehicle unit

The processor compares it with a threshold value which is an empirical value (for an accident) and if it equals or exceeds that, then the controller automatically switches on a siren inside the vehicle.

A programmed timer is also triggered. In case of a minor accident, the passenger probably would not need the service of the ambulance, and can therefore switch off the siren before the timer counts to zero, by resetting the entire vehicle unit through the user interface, which is connected to the processor. Or else, if he is unconscious or fatally wounded and needs an ambulance, then the siren is left ON and when the timer counts to zero, it would trigger both the GSM MODULE and the GPS SYSTEM inside the vehicle. The GPS SYSTEM finds out the exact position of the vehicle (latitude and the longitude) which is the location of the accident spot and gives that data to the GSM MODULE. The GSM MODULE sends this data to the MAIN SERVER whose GSM number is already there in the module as an emergency number.

2.2 MAIN SERVER

The main server is the central brain. It communicates as well as execute every part of the system fig.2 . The server objectives can be mainly classified into:

- Sending co-ordinates to the rescue vehicle
- Controlling the nodes in the nearest path.

Fig. 2 Traffic signal section

2.3 FINDING THE NEAREST AMBULANCE TO THE ACCIDENT SPOT

When a vehicle meets with accident, it suddenly sends its GPS location to the Main server. The server controls a database of the ambulances available. The server selects the next ambulance to the accident spot using the database containing the details of free and busy ambulances at that point of time. Then the server searches the locations of the free ambulances in the database. It calculates the length between the accident spot and each ambulance. Then it compares all the distances measured and selects the nearest ambulance. Therefore, for performing the above functions, the server must have the required databases:

- An Ambulance database - contains list of free and busy ambulances at that time.
- A NODE database – The Main Server allocates a unique ID for each node and has a database to containing all the nodes' IDs, GSM numbers and their GPS coordinates.
- A Hospital database - containing their locations (GPS coordinates) with their GSM numbers.

2.4 FINDING SHORTEN PATH

As the nodes in the given area are fixed points and the distance between the nodes are predetermined, the shortest path between the nodes can be selected. Look at a case when the ambulance travels from accident spot to the hospital. The information in the server as said earlier contains the node and the distance between the adjacent nodes to which it is connected. The accident spot is carried as the source and the hospital is taken as the destination. The node next to the accident spot and the node in the path to hospital must be followed. So that accident node is taken as source and the hospital node is taken as destination and for these nodes. There may be various paths between these nodes and finds the shorten path. There may be one-way roads along this path, hence this must be a vector quantity unit. The server finds nearest node from source and marks it as visited. Then that node is regarded as source and the procedure is continued till the destination. Initiatively, the source doesn't know the distance to destination, so it will be countless and after complete computation the shortest path along with the distance will be known.

2.5 SENDING CO-ORDINATES TO THE AMBULANCE

The server will also find the nearest hospital and calculates the shortest path connecting the ambulance's current position, the accident spot and the nearest hospital. The shorten path will contain nodes in the path. The server takes the GPS coordinates of all the nodes in the shortest path from the NODES database and along with GPS coordinates of the accident spot and the hospital, it transmits it to the ambulance unit in a format defined below. The nodes' coordinates alone are sent to the ambulance. The format for sending the nodes coordinates is: The last two coordinates (X_{n-1} , Y_{n-1}) and (X_n , Y_n) will indicate the accident location and the hospital location respectively.

X_1, X_2	X_2, Y_2			X_{n-1}, Y_{n-1}	X_n, Y_n
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2.6 CONTROLLING THE NODES

A node can possibly operate in two modes name are normal mode and the ambulance mode. Normal mode is common traffic control by a processor in a junction. In normal mode, traffic flow in each way of the mode will be given equal importance. In the ambulance mode, the direction in which the ambulance heads is given importance and is kept in the ON state, till the ambulance leaves the junction (node). This is done by

- The node will receive a beginning signal from the main server as an control message which contains the direction that must be kept in ON state so that the ambulance can pass through the junction without waiting.
- The direction retriever from the control message is given to the processor.
- That peculiar direction is kept in the ON state as long as another message (STOP SIGNAL) is received from the main server.
- The end signal is generated when the GPS co-ordinates of the ambulance and the node matches i.e., when the ambulance crosses then node. The node then will bring back to its normal mode of operation.

2.7 INTERRUPT SERVICE ROUTINE ALGORITHM

- Wait for the reception of ait for the reception of start message along with the data
- Retriever the data about the signal to be made green
- Make the representing signal to be green
- Wait for the response of next message or stop signal
- If the message is obtained return to normal mode By this direction each node in the path to the hospital is controlled by the server. This function can be split into two phases:

2.8 NODE ACCESS AND CONTROL

The nodes in the shorten path are accessed and controlled only when the ambulance reaches a distance of around say 1km from the node. These locations are stacked away 1km markings. Since the signal should not be held in ON state for a lifetime, the node access control is done in the following steps:

- The server first diagrams a map with the nodes needed for the shortest path and makes 1km markings for each node.
- The positions of 1km markings' (latitude and longitude) are taken from the map and stored in the NODES database.
- When the ambulance's GPS position and location of any one of the 1km markings matches, the corresponding GSM ID with the signal direction from the map is taken by the server and is compared with the shortest path nodes' GSM IDs.

- If that node is present in the route, the START SIGNAL is sent to that GSM ID.
- Now, the node is kept in ON state till the ambulance crossings the node. Once it crosses the node, the server sends a STOP SIGNAL to the node which brings the node to normal mode of operation
- The resolution of the GPS coordinates is that 1 second acts a 101.2ft in latitude and 61.6ft in longitude. Thus, in every comparison with observe to ambulance unit, it is adequate to note the GPS co- ordinate till the accuracy of seconds. Consider a simple case where there is intersection of three junctions as shown in the figure. The two junctions are marked as GS and GN. The distance between these two junctions is less than 1km. Due to this both the junctions are prone to be considered. Thus, for instance if the ambulance is travelling towards the node GS, there would be three 1km markings as the path in the direction 1 contains a four-way junction. Also as said earlier one of the 1km markings of GN comes in the same path to be travelled. When the ambulance approaches the node GS, it also crosses GN's 1km marking. Thus, this situation is rectified as follows. The node GN's ID is taken by the server from the database, but in actual case this node doesn't need to be controlled. Therefore, to eliminate this, the server first compares each node ID taken from the database with the list of nodes' IDs in the shortest path. If the node's ID is present in the list, only then the representing node is controlled. So, when the GS 1km marking is reached, the green light is made ON in the direction 1 and the GN node is not disturbed. Thus, always every node ID is compared with the database containing the nodes ID in shortest path and hence only when the particular ID is matched the node is considered and the traffic light is adjusted according to the need. The code below is used for implementing the node control. The ambulance musical mode is started when an input is got in the C.0 pin of the ARM processor from the GSM modem. Look at a signal, similar to message alert in a mobile phone, is given to a JK flip flop with its inputs high, so that the output toggles if a message is received. when the first message is received, the processor enters into ambulance musical mode. The data is collected through port D and the corresponding way is put ON. When the next message is received the processor returns back to the normal mode Fig.3.

Fig. 3 Case-node selection

3. WORKING PRINCIPLE

Our paper describes about the GPS AND GSM BASED ACCIDENT LOCATION INDICATOR AND RESCUE SYSTEM using GPS and GSM technologies. We are using AT89C52 microcontroller and LPC2148 ARM7 PROCESSOR in our project. When the system is switched on, LED will be ON pointing that power is supplied to the circuit. When the vibration sensors we are using in our project sense any obstacle, they send interrupt to processor. The GPS receives the location of the vehicle that met with an accident and gives the information back. This data will be sent to a mobile number through a message. This message will be getting GSM modem present in the circuit. The message will give the information of longitude and latitude values. Using these values, the location of the vehicle can be estimated. GSM modem is similar to mobile phone without any display, keypad, and speakers. It can send and receive messages and calls. The data will be sent to MAX232 IC through RS232 cable.

MAX232 synchronizes the baud rates of modem and processor. It also converts RS232 voltage levels to TTL voltage levels and vice versa. In RS232, Logic 0 is represented in between +3 volts to +25 volts, Logic 1 is represented in between -3 to -25 volts. In TTL logic 0 is represented as zero volts logic 1 is represented as +5 volts. Processor supports TTL voltage levels rather than RS232 voltage levels. The received data is given to the processor. Correspondingly it gives an acknowledgement in the form of an SMS to the mobile phone. LCD used in the circuit displays the reception of messages. The processor is interfaced to GPS and GSM module via a multiplexer, where these devices are activated using select lines internally built in the multiplexer. Multiplexer is interfaced to processor via transmit and receive pin. LCD is interfaced to any ports of processor, it is used to display the current status of the GPS and GSM modules, whether data is being read from GPS or writing to GSM. Most digital logic circuits and processors need a 5-volt power supply. To use these parts, we need to build a modulated 5-volt source. Usually, you start with a demodulated power to make a 5-volt power supply, we use a LM7805 voltage regulator IC (Integrated Circuit).

4. OPERATIONAL CIRCUIT

RESULT

A RESEARCH EXPERIMENT PICTURE OF INTERFACE LCD, GSM, GPS

CONCLUSION

A working model of GPS AND GSM BASED ACCIDENT LOCATION INDICATOR AND RESCUE system using a GPS and GSM modems has been implemented successfully. The biggest advantage of our research is, whenever the sensor is activated, we will be immediately getting the acknowledgement from GSM modem to our mobile numbers which are stored in EEPROM, without any delay. This system locates the accident spot accurately, making the automation of accident detection and messaging system. Consequently, it will save the precious time required to save the accident victims. Further this system can be implemented using the vibration sensors as well as the sound sensors, in order to make it more accurate and efficient to detect an accident.

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