ARM Based Real Time Accident Prevent and Automatic Rescue System

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Abstract— *This paper deals with designing of good show and management (SDC) that is ready to observe the zone where the vehicle travels and maintains the specified speed at intervals the zone levels (near hospital and colleges), to boot it provides information regarding vehicle Identity and position on real time basis to afford the protection from the accident, supported the transport observance and chase system exploitation advanced processor ARM nine with the support of GSM and GPS with fully totally different modules. In bound cases, the vehicle has encountered the accident this technique will afford a cost-effective planned car salvage system for crucial the location of the accident spot through the detector systems at intervals the vehicle to supply a sleek flow for the car from the accident spot to the nighest hospitals in time by implementing ITS which could management mechanically the traffic lights at intervals the trail of the car, so the car will reach the hospital safely. As this technique is totally computerised, it will sense the speed and position of the vehicle, simply just in case of flaky deeds it's going to provides the planned car salvage system for saving the humans. This vogue provides information in real time usingμc/OS-III.*

Keywords— *SDC, ARM 9, GSM, GPS, salvage system, ITS, μc/OS-III.*

1. INTRODUCTION

In today's world, the population can increase day by day the numbers of vehicles to boot can increase on the roads and highways. This finish in an exceedingly heap of accident that interns leads to the traffic jams and public can't get facilitate instantly. Since, the foremost objective of the system is to supply security for the vehicle and its user and to boot detects if any accident happens. If any accident happens in route or the opposite place. The accident system will get activated and message square measure reaching to be transmitted to individual authority. This automatic accident detection system will overcome many problems. this method to boot contains alcohol detector and eye detector that the person should not be sottish and to boot that person need to wear the security harness whereas that person uses his vehicle and to boot includes the info regarding Vehicle speed, position, identity, temperature. the info given to observance station is in continuous manner.

We have an inclination to face live meant to make this observance wireless exploitation ARM9 hardware platform ported with real time package μc/OS. Therefore we've got an inclination to afford an innovative vogue for automatically dominant the traffic signals thus the car would be ready to cross all the traffic junctions whereas not waiting. every traffic junction will have a controller dominant the traffic flow. The traffic junction's unit of measurement spoken as nodes and each node will have a GSM equipment connected to the controller. The nodes square measure managementled by a main server by feat the control messages to their GSM modems. for easy access the server maintains associate degree data for each node, and thence each node will have a novel id for addressing it and its GPS co- ordinates are keep at intervals the information. thus exploitation these data the car is guided to the hospital by the server through the shortest route. This theme confirms the life security.

II. SYSTEM STRATEGY

In this style method 3 building block were used,

1) Conveyance unit module
2) Main Server module
3) Ambulance unit with node module

The conveyance system [VS] includes hardware that consists of associate degree ARM9TDMI core processor, measuring system, GPS module, GSM module, SD memory card, l6x2 LCD, and temperature device, automatic speed management module, accident detection module and security facultative module. Then the system will activate the GPS to assemble the situation detail and sends the situation of the vehicle through GSM to the management station. Security facultative module includes eye detector and restraint detector that is ready to create certain the protection condition of the motive force. It informs the standing of the motive force to the bottom station at the aspect of the vehicle ID. The server then sends this path to the car. to boot exploitation this information the server controls all the nodes at intervals the trail of car and build it ON, that ensures that the car reaches the hospital directlywithout delay.

1. VEHICULAR UNIT MODULE:

the whole VS works on a 5V or 9V dc regulated power offer. The message will contain the most points of automobile variety, place of accident that was gathered

exploitation GPS. The operate of world Positioning System (GPS) is that the foremost promising technology to accumulate the position information in outside environments. The GPS receiver module interfaced with UART1 of ARM processor provides speed and site data. The identity of a vehicle is mounted that is saved in associate degree extremely storage of a processor

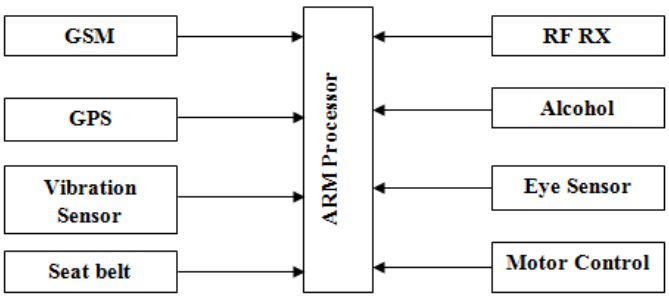

Fig 1 Block Diagram of Vehicular Unit

The temperature detector provides temperature per C to associate degree ARM processor. The temperature detector is interfaced to associate degree ADC1 of ARM processor. conveyance speed, position associate degreed temperature unit of measurement confine an extremely SD card. The SD card is interfaced to associate degree ARM processor exploitation SPI (Serial Peripheral Interface). All this information unit of measurement shown on digital display that is interfaced with a GPIO0 associate degreed send it to an observance station (receiver side) by GSM module wirelessly. That's interfaced with UART0 of ARM processor. The aim of GSM is for causation the message to police, car and relatives. The GSM can communicate via the UART communication through RS232 customary. The GPS suits best for vehicle location or chase. to boot an identical information is given to a priority person to induce that information anywhere anytime. The module desires GSM SIM (Subscriber Identity Module).

As per the definite event confine a program associate degreed once collision/accident to happen that is sense by an measuring system that's interfaced to ADC0 of ARM processor. In recent days most of the accident happens due to sottish driver and improper use of restraint. Before the vehicle starts the driving force square measure reaching to be checked by the alcohol device. conjointly if the motive force isn't sporting the safety belt it'll conjointly indicate it and conjointly won't permit the motive force to maneuver the vehicle. Alcohol device is connected to port A that is ready to point if the driving force is in sottish state and can't alter the vehicle to maneuver. safety belt noticeor is employed accustomed detect whether or not or not the driving force is carrying the security harness or not and a watch detector will monitor the drivers carefulness constantly. The alcohol device is connected to port pin RA0.The eye device is connected to RA1.

SUB-MODULES: (i)GSM MODULE:

Global System for Mobile communications (GSM) is that the nearly a la mode wireless customary for mobile phones at intervals the globe. GSM module permits transmission of Short message service (SMS) in TEXT mode and PDU mode. The projected vogue uses SIM300 GSM module in text mode. This vogue uses SIM300 GSM module that offer 900/1800/1900 rate Tri-band for VOICE, SMS, DATA, and FAX. This module operates on AT command over TTL interface. AT command is associate degree abbreviation for Attention command that is recognized by GSM Module. This abbreviation is commonly accustomed begin a command to be send from TE(Terminal Equipment) to Ta (Terminal Adaptor).The data contains data speed, position(longitude, latitude), identity and temperature of a vehicle that is transmitted to the observance station by the SMS through the GSM network.

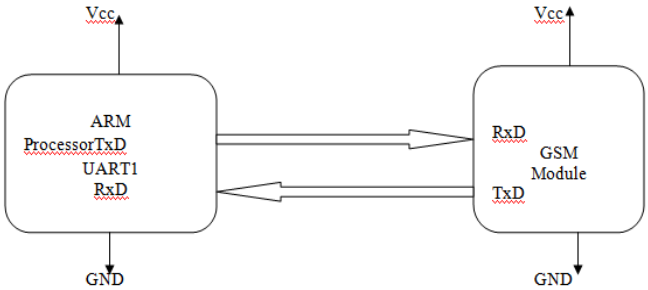

Fig 2 Block Diagram of GSM Module

SIM300 Module works on 12V, 2A power offer. The module is intended at 9600 baud. It shows interfacing of GSM module with ARM Processor on UART1 where TxD pin of ARM processor is connected to RxD pin of GSM module and also the different manner around. The transmitted data from ARM processor exploitation UART1 module contains information concerning Vehicle Identity that may be checked and displayed on Hyper-Terminal and as per the association an identical data is send to a nominative mobile vary and observance station.

(ii) GPSMODULE:

Global Position System (GPS) may be a space-based satellite navigation that provides location and time data all told climate, anywhere on or near the planet. GPS Receiver MT3318 Module is utilized that have a lively patch antenna from Cirocomm. The GPS receiver tracks fifty one satellites at identical time. The module is mounted on the PCB at the aspect of the three.3V low drop transformer,

transmit, receive and power indication LEDs, Schmitt trigger based totally buffer for 5V to three.3V logic level conversion. This GPS receiver provides data output in commonplace National marine physics association (NMEA) format. The GPS receiver gives-157dBm chase sensitivity. The module is intended at 9600 baud. Module desires a 5V offer and will be interfaced with the 5V TTL/CMOS logic. Interfacing of GPS module with ARM Processor on UART1 where TxD pin of ARM processor is connected to RxD pin of GPS module and the other way around.

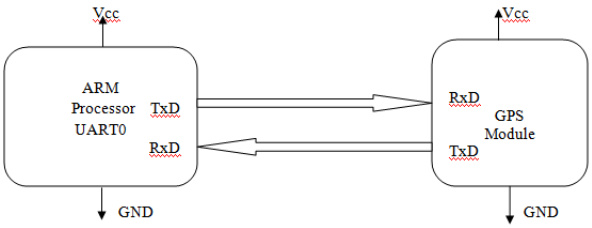

Fig 3 Block Diagram of GPS Module

The data from GPS receiver in NMEA format is received on ARM processor exploitation UART1 protocol that contains data concerning Vehicle position (longitude, latitude) and speed. This information is check on Hyper Terminal of a pc exploitation USB to serial convertor, an identical data is send to a nominative mobile variety and observance station.

(iii)ACCELEROMETER:

An accelerometer measures acceleration. Acceleration may be a live of but quickly speed changes. measuring system device is utilized to measure static (earth Gravity) or dynamic acceleration all told three axes, forward/backward, left/right and up/down. The output of measuring system provides one.65V to 3.3V in positive direction and in negative direction the drop from one.65V to 0V. The output of measuring system is in analogue kind with three fully totally different output voltages each representing X, Y and Z direction of motion. These three voltage signal {are|ar|area unit|square live} measure processed through ADC0 on three fully totally different Channels out there on ARM. ADC0 is intended at four.5MHz clock from system peripheral clock. The eight bit digital output from ADC0 is fed to UART1 of ARM. measuring system is utilized throughout this vogue for the collision detection. the foremost output voltage of accelerator module is three.3V that is a CMOS voltage of the processor.

(iv)ARM 9 PROCESSOR:

ARM9 portfolio provides you the right combination of value, efficiency, integration, and performance, thus you may war the foremost necessary vogue challenges. We've inflated the elemental ARM9 style, optimizing it for speed still as memory and property performance.

We've got an inclination to equip our devices with four of the foremost necessary interfaces for embedded (USB, LCD, Ethernet, and motor control), and supply an honest alternative, thus you may regularly notice exactly what you'd like. LPC32xx series – the only real ARM9 MCU family that has a vector floating-point (VFP) coprocessor at the aspect of LAN, USB OTG, associated associate degree digital display controller.

(v)DATASTORAGE:

The system includes memory card that's utilized to store data. the info contains vehicle 'ID', 'Position' (Longitude, Latitude), date, time and speed of a vehicle. The memory card is expanded relying upon the aim. the info storage provision is enforced exploitation Serial Peripheral Interface (SPI) protocol supported by the LPC2148 ARM processor. This keep data is access anytime for observance (speed of a vehicle, correct path, collision etc.), comparison, and traffic analysis purpose.

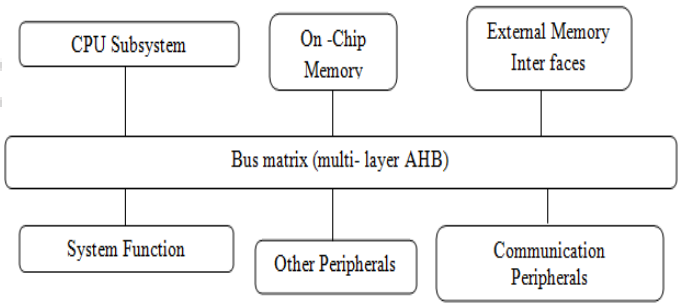

Fig 4 Block Diagram of ARM9 Processor

(vi)RECEIVER/MONITORINGSECTION:

GSM module provides information in text mode. the info is given to a pc by interfacing of GSM module to pc by use of USB to SERIAL device. Most of the laptops are not having port and to boot in sure laptop. as a result of the dimensions of the laptop computer square measure shrinking thus the port square measure removed. the situation, speed associate degreed Identity of a vehicle is show to the graphical user interface and confine an extremely data. {the information|the knowledge|the information} received from GSM module is confine data base and to boot it's show on graphical user interface. simply just in case of accident occur the position of automobile is just track use of Google map code.

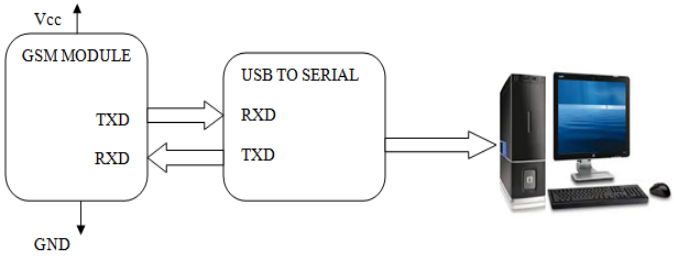

Fig 5 Block Diagram of Receiver/Monitoring Section

The observance station uses one GSM module which could communicate with vary of modules at run time that would be a high real time would really like. This information is also feat to the nighest hospital/police station to induce facilitate merely. This could undoubtedly save the lives.

(vii)SOFTWARE USED:

KeilµVision4 IDE (Integrated Development Environment) may be a Windows based totally front for the compiler and computer program.KeilµVision4 is utilized for writing embedded C programs. Embedded C could be a high level language, that has many aspects of the ANSI C artificial language. customary libraries square measure altered or inflated to agitate the peculiarities of associate degree embedded target processor. The signal from measuring system module is processed by the processor. The analog signal from this module is applied to the on-chip peripheral ADC0. This ADC0 is intended as a 10-bit output data that provides high accuracy compared to the 8-bit microprocessors. This digital data is transmitted through UART1. UART1 transmits the information 8-bit at a time. These digital values square measure transmitted to GSM module through UART1.

(viii)GUI:

The graphical user interface for the projected system is supposed on Visual Studio2010. C# may be a simple, modern, object-oriented, and type-safe artificial language. Microsoft's C# compiler for world wide web Frame work could be a conformist implementation of each of those standards. Exception handling provides a structured and protrusible approach to error detection and recovery. to boot this language is compatible with all Microsoft applications.

(ix)µc/OS-III:

µC/OS-III may be a climbable , ROM able, preventative amount of your time kernel that manages an infinite vary of tasks. µC/OS-III may be a third-generation kernel, providing all of the services expected from a up to date amount of your time kernel also as resource management, synchronization, inter-task communication, and more. However, µC/OS-III to boot offers many distinctive choices not found in various amount of your time kernels, just like the flexibility to perform performance measurements at run time, directly signal or send messages to tasks, and unfinished (i.e., waiting) on such multiple kernel objects as semaphores and message queues.

2) MAIN SERVER MODULE:

An innovative vogue for mechanically dominant the traffic signals and achieving the on prime of mentioned task so as that the car would be ready to cross all the traffic junctions whereas not waiting. every traffic junction will have a controller dominant the traffic flow. The traffic junctions square measure spoken as nodes and each node can have a GSM electronic equipment connected to the controller. The nodes square measure managementledby a main server by feat the control messages to their GSM modems. Once a node is controlled and its traffic signal is formed to be inexperienced for the car to own whereas not waiting, it's same to be in ON STATE. for easy access the server maintains an information for each node, and thence each node will have a novel id for addressing it and its GPS coordinates are keep at intervals the info. therefore exploitation these data the car is guided to the hospital by the server through the shortest route.

The main server is that the central brain of our ITS. It communicates still as controls every a region of the system. The server objectives is chiefly classified into:

- Finding the nighest car to the accident spot
- Sending co-ordinates to the car
- Controlling the nodes at intervals the shortest path

FINDING THE NEAREST AMBULANCE TO THE ACCIDENT SPOT:

Once a vehicle meets with accident, it instantly sends its GPS location to the most server. The server maintains a information of the ambulances out there. The server selects the nighest car to the accident spot exploitation the information containing the most points of free and busy ambulances at that point of it slow. Then the server scans the locations of the free ambulances at intervals the information. It calculates the gap between the accident spot and each car. Then it compares all the distances calculated and selects the nighest car. therefore for taking part in the on prime of functions, the server ought to have the following databases:

- An automobile data - contains list of free and busy ambulances at that time.

- A NODE information – the most Server allocates a novel ID for each node and encompasses a information to containing all the nodes' IDs, GSM numbers and their GPS coordinates.
- A Hospital information - containing their locations (GPS coordinates) with their GSM numbers.

K-RANGE NEAREST NEIGHBOR (KRNN) ALGORITHM:

Recently, many applications based totally on users' location data square measure rapidly used with the event of wireless communication technologies and also the quality of wise phones. Such applications square measure named LBS (location-based services) since they provide further services supported the users' precise locations obtained by location positioning devices, e.g., GPS. LBS applications embody brother search, location-based holidaymaker data, route steering, and retrieval of nearest POIs (points of interest) like restaurants and gas stations, etc.

First, we have a tendency to style 2 question process algorithms (IB kRNN and AIB kRNN) for a question region in road networks. as a result of each algorithms create use of the Island index that will be loaded on the most memory, they'll rapidly technique a k-NN question. Second, we've got an inclination to plot a method to adaptively generate the Island index in AIB kRNN algorithmic program. By considering the node density of each node, we have a tendency to square measure ready to manage a trade-o® between the dimensions of the index and conjointly the vary of nodes. Finally, we provide experimental results showing that our themes outmatch associate degree existing scheme k-Range Nearest Neighbor (kRNN) in terms of the quantity of nodes retrieved and question interval.

Our IB kRNN algorithmic program has the following advantages. First, it reduces the quantity of network expansions by pre-computing the distances between node and their shut POIs. Secondly, it'll rapidly technique a k-NN question over a question region by exploitation the Island index residing in main memory. However, our IB kRNN cannot take into dish density of each node as a results of it uses an identical radius for all nodes once generating the Island index. The shorter radius is employed for nodes with higher dish density. Supported the thought, we've got an inclination to propose associate degree accommodative IB kRNN (AIB kRNN) algorithmic program. Our AIB kRNN uses associate degree accommodative Island index that's generated by considering the dish density of each node. So, our AIB kRNNaccommodatively applies fully totally different radius to each node and performs k-NN question method over a question region by exploitation the accommodative Island index. Our AIB kRNN has the following advantages. simply just in case of nodes with high dish density, the quantity of POIs keep at intervals the accommodative Island index is reduced by exploitation short radius, thus leading to wise performance on house for storing usage. Meanwhile, simply just in case of nodes with low dish density, the quantity of dish at intervals the Island index is exaggerated by exploitation long radius. By doing this, the quantity of network expansions is little, resulting in wise question method performance.

NODE ACCESS AND CONTROL*:*

The nodes at intervals the shortest path square measure accessed and controlled providing the car reaches a distance of around say 1km from the node. These locations unit of measurement keep as a result of the 1km markings. Since the signal should not be unbroken in ON state for a long time, the node access management is finished at intervals the subsequent steps:

- The server first plots a map with the nodes needed for the shortest path and makes 1km markings for each node.
- The locations of 1km markings' (latitude and longitude) square measure taken from the map and keep at intervals the NODES data-base.
- When the ambulance's GPS location and site of anybody 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 gift at intervals the trail, the beginning SIGNAL is distributed to it GSM ID.
- Now, the node is unbroken in ON state till the car crosses the node. Once it crosses the node, the server sends a STOP SIGNAL to the node that brings the node to ancient mode of operation.
- The resolution of the GPS coordinates is that one second represents a one hundred and one.2ft in latitude and sixty one.6ft in line of great circle. thus in every comparison with relevance car unit, it's enough to note the GPS co-ordinate till the accuracy of second's.

3. AMBULANCE UNIT**:**

The ambulance unit encompasses a GPS system and a GSM electronic equipment for transmission GPS information to the most Server. The server receives the GPS data sent by the car at huge intervals of your time. The server sends the coordinates of all the nodes' at intervals the trail to the car. The last 2 bum (Xn-1, Yn-1)

and (Xn, Yn) will indicate the accident location and conjointly the hospital location severally. The car unit on receiving the co-ordinates plots them on to a map with the last two coordinates as a result of the accident spot and conjointly the hospital location to induce the shortest path to the hospital.

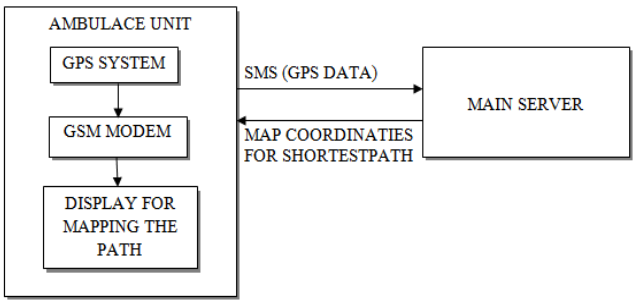

Fig 6 Block Diagram of Ambulance Unit

III. RESULT

The conveyance System provides data of a vehicle like speed, position, through a GPS module associate degreed identity of a vehicle to associate degree observance station associate degreed to a movable in step with explicit event confine an extremely program or an issue from an observance station. conveyance system senses the collision of the vehicle and sends this information in real time to a hospital/police station. The observance station show these information on graphical user interface to boot keep these information in data for additional technique to keep with a program. The car unit consisting of GPS module that tracks the current position of the car all the time. The unit encompasses a controller that stores the actual coordinates of the locations (1km marking and conjointly the traffic signal node). Once the GPS coordinates matches with that of the keep coordinates, it's same to possess reached that place then a symptom is distributed to the traffic junction exploitation RF transmitter that works at 433 rate. The GPS receiver have a resolution of 3m and transmits the info serially at a baud of 9600bps. The {lcd|liquid crystal show|LCD|digital display|alphanumeric display} HD44780 is place in throughout this unit to unendingly display the purpose values of the car. The traffic junction has RF receiver that receives the signal (START signal) that creates the junction to figure in car mode. Once the car crosses the junction it {once additional|another time|yet again|over again|all over again} sends a symptom (STOP signal) to the junction that after more comes back to the traditional mode.

IV. CONCLUSION

The system is useful in well endowed application like investigating, security, tracking, which might be place in in automotive go trucks, cars, motor cycle, and boat. The system is utilized in many applications. Then for dominant the traffic signals in favor of ambulances throughout the accidents. With this method the car is maneuvered from the accident spot to the hospital whereas not suspension. The AARS is proven to be effectual to manage not alone car but to boot authoritative vehicles. thus AARS if enforced in countries with massive population like Bharat can manufacture higher results. The AARS could be a heap of correct with no loss of your time. but there's conjointly a delay caused thanks to GSM messages since it is a queue based totally technique, which could be reduced by giving lots of priority to the messages communicated through the server.

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