Automatic Vehicle Accident Detection and Traffic Control System

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Abstract— The main objective of the project is to find the accident location by means of GPS and GSM technology. The system also controls the traffic density in the specified location. This system also provide vehicle tracking facility through GPS. The main purpose is to provide the information about the vehicle conditions to the authorized persons. In this project LPC2129 microcontroller is used as the main heart of the system and it is also cost effective and very easy to understand. The GSM and GPS module are integrated to the microcontroller which helps in the tracking of the vehicle. The exact location is represented through longitude and latitude values and those values are sent to the registered mobile numbers through GSM modem. This system plays an important role in avoiding the road accident and also helps in the tracking the accidental victims. Safety is very important in today's world. Right use of technology will save lives of the people.

Keywords— *Crash Sensor, GPS (Global Positioning System), GSM (Global Service For Mobile Applications, Microcontroller (LPC2129)*

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I. INTRODUCTION

Road accidents represent the key a part of the accident deaths all over the planet. In step with the Insurance Institute for Highway Safety (IIHS), new cars and its advanced safety options have helped to reduce automotive vehicle connected deaths over the past twelve years. Though it credits technology for modification automotive vehicle accidents, yet the IIHS cannot facilitate accusative dangerous driving behaviors like sottish driving, dashing and not mistreatment seatbelts for still inflicting major traffic deaths. Automatic vehicle accident detection and electronic messaging system is associate system is associate embedded intelligence constituted into the car. System also used to track the vehicle and also it supports for the traffic control system using GPS and GSM modems.

The purpose of the project is to search out the vehicle wherever it's and locate the vehicle by means that of causing a message employing a system which is placed within vehicle system Most of the days we tend to may not be ready to notice accident location as a result of we tend to don't understand where accident can happen. so as to relinquish treatment for burned people, initial we want to grasp wherever the accident happened through location pursuit and causing a message to your related one or to the emergency services. Therefore during this work we tend to area unit using the fundamental Microcontroller (LPC2129) for value effective and also for straightforward understanding. Here we tend to used assembly programming for higher accuracy and GPS and GSM modules that helps to trace the vehicle anyplace on the world. The precise location of the vehicle is distributed to our remote devices (mobile phones) mistreatment GSM modem.

II. SYSTEM WORKING PRINCIPLE

This paper describes regarding the automatic vehicle accident detection and traffic control system using GPS and GSM technology. In this project LPC2129 microcontroller is used. Once the system is switched on the power is supplied to the system and it will be indicated on the LED display. In this project crash sensors are used to detect the obstacle. The crash sensors sense the collision which can be as high as x times of gravitational force and it converts the detected collision into corresponding signals and in turn sends an interrupt to the microcontroller. The GPS module receives the situation of the vehicle that met with an accident and provides the information to the system. This information will be sent to the registered mobile number through message. These messages are received by the GSM module which is present in the detection system. The received message provides the information of the longitude and latitude values which help in tracking the position of the vehicle. In the extended view of this project the traffic density can be monitored through the same system. The traffic density information will sent to the system in the same manner. The system compares the previous GPS information and current GPS information and provides the traffic density of the particular area or location. In this system the vehicle can be tracked by the authorized persons through GPS technology. All the information will be sent to GSM module through longitude and latitude values. The values can be used to locate the vehicle.

Modem performs modulation throughout transmission and also helps to performs demodulation throughout reception. GSM electronic equipment is comparable to portable with no display, keypad, and speakers. It will send and receive messages and calls. The information will be sent to MAX232 IC through RS232 cable. MAX232 synchronizes the baud rates of electronic equipment and microcontroller. It additionally converts RS 232 voltage levels to TTL voltage levels and vice versa. In RS 232, Logic zero is represented in between +3 volts to +25 volts, Logic one is represented in between -3 to -25 volts. In TTL logic zero is represented as zero volts logic one is painted as +5 volts. Microcontroller rather prefers TTL voltage levels instead of RS232 voltage levels. It provides an acknowledgement in the way of an SMS to the mobile phone. Correspondingly the received information or data is given to the microcontroller. Liquid crystal display utilized in the circuit displays the received messages.

LCD is interfaced to any ports of microcontroller, it is accustomed to show the current standing of the GPS and GSM modules, whether the information is been reading from GPS or writing to GSM. The microcontroller is interfaced to GPS and GSM module through a multiplexer and it is activated using select lines which are internally built in the multiplexer. Multiplexer and microcontroller are interconnected through transmit and receive pins.

Usually the processors and any digital circuits require a power supply of 5volts. These powers will be supplied to the system through regulated power supply. Usually the unregulated power supply source is converted to regulated power supply source through LM7805 voltage regulator IC

III.   CRASH SENSORS

The crash sensors should be ready to notice a collision and convert it into corresponding signals at intervals a matter of milliseconds. The fast forces engaged on the sensors straight off when a collision will be as high as one hundred g (100 times the earth's attractive force force). The measure principle used by the crash sensors is typically supported the result of inertia. Once a vehicle is stopped short by a control, all bodies or objects that aren't firmly fastened to the vehicle can still move at the impact speed. The sensors' style permits them to live this acceleration and relay it to the management unit as usable information. Some of the car models square measure fitted with ultra-fast pressure sensors within the front doors to

sight a collision from the facet. Once the vehicle is hit from the facet, the outer door panel is pushed inwards, making excess pressure within the door. If the modification in atmospheric pressure exceeds a precise limit, the device can relay a corresponding signal to the airbag management unit. Acceleration sensors square measure what is more fitted within the neighborhood of the C-posts in order that collisions from the fact that don't cause deformation of the front doors may be detected in time

IV.   GLOBAL POSITIONING SYSTEM

The Global Positioning System (GPS) may be a satellite-based navigation system created of a network of twenty four satellites placed into or-bit by the U.S. Department of Defense. GPS was originally in-tended for military applications, however within the Eighties, the govt. created the system obtainable for civilian use. GPS works in any climatic conditions, anyplace within the world, twenty four hours on a daily basis. No charges to use GPS.

Distance = speed * Time here speed of the GPS signal is that the speed of sunshine, more or less three hundred Km/s. GPS transmissions occur on a frequency of 1575.42 and 1227.60 MHz's each of those frequencies area unit among the L Band.

A.   Functions of GPS

The Global Positioning System satellites transmit signals to instrumentality on the bottom. GPS receivers passively receive satellite signals; they are doing not transmit. GPS receivers need Associate in nursing unclogged read of the sky, so that they square measure used solely outdoors and that they usually don't perform well at intervals wooded areas or close to tall buildings. GPS operations depend upon a really correct time reference that is provided by atomic clocks on board.

Each GPS satellite transmits knowledge that indicates its location and also the current time. All GPS satellites synchronize these operations in order to use that these repetition signals square measure transmitted at a similar instant. The signals, moving at the speed of sunshine, make a GPS receiver at slightly completely different times as a result of some satellites square measure additional away than others. The gap to the GPS satellites is determined by estimating the number of your time it takes for his or

her signals to achieve the receiver. once the receiver estimates the gap to a minimum of four GPS satellites, it will calculate its position in three dimensions for accurate location. There square measure a minimum of twenty four operational GPS satellites in the slightest degree times and variety of spares. The satellites, operated by the U.S. Department of Defense, orbit with a amount of twelve hours (two orbits per day) at a height of regardingeleven,500 miles movement at close to two,000mph. Ground stations square measure wont to exactly track every satellite's orbit

B. Accuracy Of G.P.S

The accuracy of a grip determined with GPS depends on the kind of receiver. Most hand-held GPS units have regarding 10-20 meter accuracy. different sorts of receivers use a way referred to as Differential GPS (DGPS) to get a lot of higher accuracy. DGPS needs a further receiver fastened at a better-known location close. Observations created by the roving units, manufacturing associate accuracy larger than one meter. Once the system was created, temporal order errors were inserted into GPS transmissions to limit the accuracy of non-military GPS receivers to regarding one hundred meters. This a part of GPS operations, referred to as Selective availableness, was eliminated in could 2000

V. GLOBAL SYSTEM FOR MOBILE COMMUNICATION

GSM could be a digital mobile phone system that's wide employed in Europe and different elements of the planet. GSM uses a variation of your time Division Multiple Access (TDMA) and is that the most generally used of the 3 digital wireless phone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses information, then sends it down a channel with 2 different streams of user information, every in its own interval. It operates at either the 900 Mc or one, 800 Mc band.

GSM is that the actual wireless phone normal in Europe. GSM has over one billion users worldwide and is obtainable in one hundred ninety countries. Since several GSM network operators have roaming agreements with foreign operators, users will typically continue to use their mobile phones after they jaunt different countries.

A. History of GSM

GSM may be a cellular network, which suggests that mobile phones connect with it by checking out cells within the immediate neighborhood. GSM networks operate in four completely different frequency ranges. Most GSM networks operate within the 900MHz or 1800 MHz bands. Some countries within the Americas (including North American country and therefore the United States) use the 850 MHz and 1900 MHz bands be-cause the 900 and 1800 MHz frequency bands that were already allotted previously.

The rarer four hundred and 450 MHz frequency bands are allotted in some countries, notably Scandinavia, wherever these frequencies were antecedently used for first-generation systems.

In the 900 MHz band the transmission band is 890–915 MHz, and therefore the downlink band is 935–960 MHz this twenty five MHz information measure is divided into 124 carrier frequency channels, every spaced two hundred kc apart. Time division multiplexing is employed to permit eight full-rate or sixteen half-rate speech channels per frequency channel. There are eight radio timeslots (giving eight burst periods) classified into what\'s referred to as a TDMA frame. [*fr1] rate channels use alternate frames within the same timeslot. The channel rate is 270.833 Kbit/s, and therefore the frame length is four 615ms.

The transmission power within the telephone is restricted to a maximum of two watts in GSM850/900 and one watt in GSM1800/1900.

GSM has used a range of voice codec's to squeeze three 1 kc audio into between five six and thirteen Kbit/s. Originally, 2 codec's, named once the kinds of information channel they were allotted, were used, referred to as [*fr1] Rate (5.6 Kbit/s) and Full Rate (13 Kbit/s). These used a system based mostly upon linear prognosticative committal to writing (LPC). Additionally to being economical with bitrates, these codec's additionally created it easier to spot a lot of necessary components of the audio, permitting the air interface layer to range and better defend these components of the signal.

B. Service provied by GSM

From the start, the planners of GSM wished ISDN compatibility in terms of the services oared and the management signaling used. However, radio transmission limitations, in terms of information measure and cost, don't permit the quality ISDN B-channel bit rate of sixty four kbps to be much achieved. Using the ITU-T dentitions, telecommunication services are often divided into bearer services, teleservices, and supplementary services. The foremost basic teleservice supported

3528

by GSM is telecommunication. As with all alternative communications, speech is digitally encoded and transmitted through the GSM network as a digital stream. There's additionally associate degree emergency service, wherever the closest emergency-service provider is noticed by dialing 3 digits (similar to 911). A variety of knowledge services is oared. GSM users will send and receive information, at rates up to 9600 rate, to users on POTS (Plain previous phone Service), ISDN, Packet Switched Public information Networks, and Circuit Switched Public information Networks employs sorting access ways and protocols as X.25 or X.32. Since GSM may be a digital network, a electronic equipment isn't needed between the user and GSM network, though associate degree audio electronic equipment is needed within the GSM network to interwork POTS.

Other information services embrace cluster three facsimile, as delineate in ITU-T recommendation T.30, which is supported by use of associate degree acceptable fax device. A novel feature of GSM, not found in older analog systems, is that the Short Message Service (SMS). SMS may be a bifacial service for brief alphabetic (up to a hundred and sixty bytes) messages. Messages area units transported in an exceedingly store-and-forward fashion. For point- to-point SMS, a message is often sent to a different subscriber to the service, associate degreed an acknowledgement of receipt is provided to the sender. SMS also can be employed in a cell-broadcast mode, for causation messages admire trace updates or news updates. Messages also can be keep within the SIM card for later retrieval. Supplementary services area unit provided on high of teleservices or bearer services. Within the current (Phase I) speciation's, they embrace many types of decision forward (such as telephony once the mobile subscriber is unapproachable by the network), and decision blackball of outgoing or incoming calls, as an example once roaming in another country. Several extra supplementary services are going to be provided in the part two speculations, a admire caller identification, telephone, multi-party conversations.

C. GSM Features

- Mobile Frequency varies Rx: 925-960;
- Lone-Star State: 880-915
- Multiple Access technique: TDMA/FDM
- Duplex technique: FDD
- Variety of Channels: 24 (8 users per channel)
- Channel Spacing: 200 kilocycles
- Modulation: GMSK (0.3 Gauss-Ian Filter)
- Channel Bit Rate: 270.833Kb

VI. CIRCUIT DIAGRAM
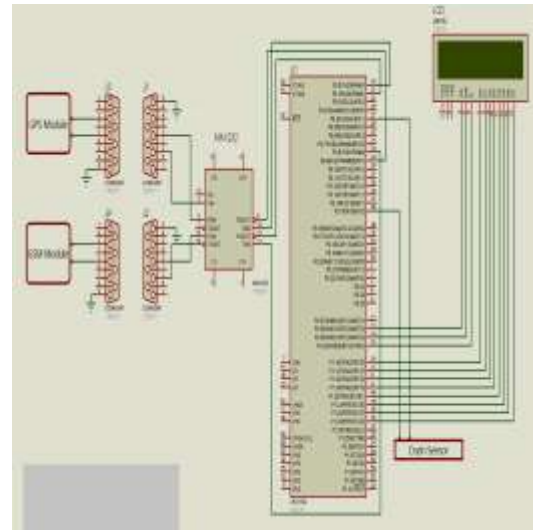
VII. MICROCONTROLLER LPC2129

The LPC2109/2119/2129 square measure supported a 16/32-bit ARM7TDMI-S processor with period emulation and embedded trace support, in conjunction with 64/128/256 kilobyte of embedded high-speed non-volatile storage. A 128-bit wide memory interface and a novel accelerator architecture modify 32-bit code execution at most clock rate. For essential code size applications, the choice 16-bit Thumb mode reduces code by quite half-hour with minimal performance penalty.

With their compact 64-pin package, low power consumption, varied 32-bit timers, 4-channel 10-bit ADC, 2 advanced will channels, PWM channels and forty six quick GPIO lines with up to 9 external interrupt pins these microcontrollers square measure significantly appropriate for automotive and industrial management applications, similarly as medical systems and fault-tolerant maintenance buses. With a large vary of further serial communications interfaces; they are conjointly suited to communication gateways and protocol converters as well as several alternative general applications

Features and benefits

- Fast GPIO ports change port pin toggling up to 3.5 times quicker than the first device. They additionally afford a port pin to be scan at any time no matter its performing.
- Dedicated result registers for ADC(s)ν scale back interrupt overhead. The ADC pads are 5 V tolerant once designed for digital I/O function(s).
- UART0/1ν embrace UN complete information measure generator, auto baud capabilities and handshake flow-control absolutely enforced in hardware.

- Buffered SSP serial controller supporting SPI, 4-wire SSI, and Micro wire formats.
- SPI programmable ν knowledge length and master mode sweetening.
- Wide ranging Code scan Protection (CRP) permits completely different security levels to be implemented. This feature is out there in LPC2109/2119/2129/00 devices further. General purpose timersν will operate as external event counters.

Key features common for all devices

- 16/32-bit ARM7TDMI-S microcontroller in a very small LQFP64 package.
- 8/16ν computer memory unit on-chip SRAM.
- 64/128/256ν computer memory unit on-chip flash program memory. 128-bit wide interface/accelerator enables high speed sixty megacycle operations.
- In-System Programming (ISP) and In-Application Programming (IAP) via on-chipν boot loader code.
- Flash programming takes one ms per 512 B line. Single sector or full chip erase takes four hundred ms.
- Embedded ICE-RT interfaceν allows breakpoints and watch points. Interrupt service routines will still execute whereas the foreground task is debugged with the on-chip Real Monitor code.
- Embedded Trace Macro cell (ETM)ν allows non-intrusive high speed period tracing of execution.
- Two interconnected will interfaces (one for LPC2109) with advanced acceptance filters.
- Four-channel 10-bit A/Dν device with conversion time as low as a pair off.μ.44
- Multiple serial interfacesν as well as 2 UARTs (16C550), quick I2C-bus (400 Kbit/s) and two SPIs.
- Sixty megacycle most central processing unit clock out there from programmable on-chip Phase-Locked Loop with subsiding time of one hundred s.μ
- Vectored Interrupt Controller with configurable priorities and vector addresses.ν.
- Two 32-bit timers (with four capture and 4 compare channels), PWM unit (six outputs), period Clock (RTC) and watchdog.
- Up to four-six five V tolerant general purpose I/O pins. Up to 9 edge or level sensitive external interrupt pins out there.
- On chip oscillator with associate in nursing operative vary of one mega cycle to thirty mega cycle.
- Two low power modes Idle and Power-down.
- Processor wake-up from Power-down mode via external interrupt.

- Individual enable/disable of peripheral functions for powerν optimization.
- Twin power supply central processing unit operative voltage vary of one 0.15 V).±.65 V to 1.95 V (1.8 V I/O powerν offer vary of three±.0 V to 3.6 V (3.3 V ten %) with five V tolerant I/O pads

VIII. CONCLUSION

An operating model of Automatic vehicle accident detection and Traffic Control System electronic messaging system employing a GPS and GSM modems has been enforced with success. The biggest advantage of the analysis is, whenever the crash sensing element is activated measure going to be straightaway obtaining the acknowledgement from GSM electronic equipment to the mobile numbers that are hold on in EEPROM, with none delay. This technique locates the accident spot accurately, realizing the automation of accident detection and electronic messaging system. Consequently, it will save the valuable time needed to save lots of the accident victims. This technique can also be implemented through vibration sensors and sound sensors which are more sensitive in nature. In addition to this, the system will also monitor the traffic density in the particular area or specified location. Moreover this system will also help in tracking the vehicle by authorized persons.

IX. MODULE PICTURE

ACKNOWLEDGMENT

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