Identifying Vehicle Positioning System, Accident Detection and Theft Control by using ARM 7 LPC 2148 Micro Controller

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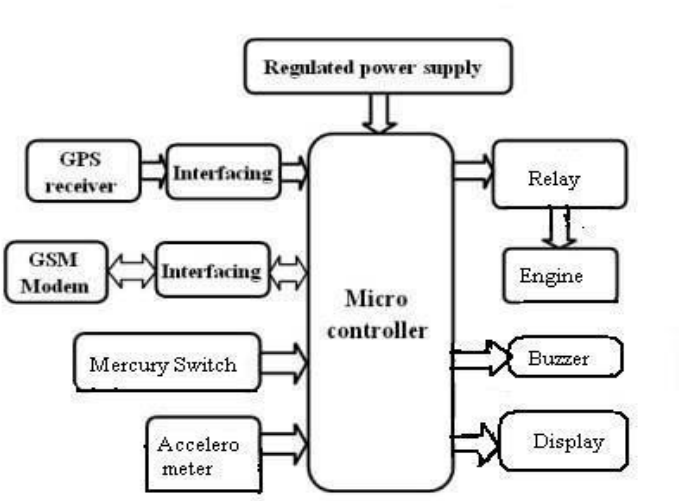
***Abstract*— Now-a-days lot of accidents happen on highways due to increase in traffic and also due to rash driving of the drivers and in many situations the family members, ambulance and police authority may not be informed in time. This results in delaying the help reached to the person suffered due to accident. Our project Vehicle Positioning System with GPS and GSM modem is designed to avoid such situations. Another application of this project is that it is use for early accident detection. It can automatically detect traffic accidents using sensors and immediately notify owner. One more application is used to find the exact location of the vehicle and GSM is used to send the message to the owner of the vehicle. At once if the vehicle seems to be theft, the owner just has to send an SMS to that vehicle, that means a vehicle will be stopped all the doors will be closed then the theft will be locked in the car.**

Keywords*— *Accident alert, accelerometer, GSM, GPS, vehicle tracking

1. INTRODUCTION

This project can be used to control the thefting of vehicles, track the thefted vehicles and finding the location of vehicle and also implement the scene of accident alarm system. In this we are trying to program a GPS/ GSM module incorporating an accelerometer to report occurrences of accident automatically via the GSM communication platform (using SMS messaging) to the nearest agencies such as hospitals, police stations, fire services and so on, giving the exact position of the point where the crash had occurred.

2. BLOCK DIAGRAM



This can provide early response and rescue of accident victims, saving properties and lives. The whole paper is based on arm controller. This controller is used to coordinate all the activities in the system. The components details are ARM 7(LPC 2148), Accelerometer (MMA7660FC), GPS module (MR 87), and GSM module (SIM 300)

3. SYSTEM DISCRIPTION

The heart of above system is ARM 7LPC2148, GPS module and GSM module . Power supply require for GPS, GSM and ARM7LPC2148 is 3.3V &5V. Keypad is used to enter security code. Accelerometer & temperature controller is used for pre-accident detection system. GPS module is used to display the co-ordinates of any location with the help of GSM module. If any value of temp-controller & accelerometer is changed beyond limit then buzzer will on & if driver can't stop the buzzer than it will consider as a major accident then coordinators of the location along with vehicle no. is send to owner, police station and few more contacts.

4. MODULES AND THEIR DES IGN

a . ARM 7 LPC 2148 MICROCONTROLLER

LPC2148 Pro Development Board is a powerful development platform based on LPC2148 ARM 7TDMI microcontroller with 512K on-chip memory. This board is powered by USB port and does not need external power supply. It is ideal for developing embedded applications involving high speed wireless communication (Zigbee / Bluetooth / Wi-Fi), USB based data logging, real time data monitoring and control, interactive control panels etc. The on -chip USB controller provides direct high speed interface to a PC/ laptop with speeds up to 12Mb/s. The UART boot loader eliminates need of an additional programmer and allows you to program using serial port. The on board peripherals include SD/MMC card interface, USB2.0 interface, 4Kbit I2C EEPROM, Xbee / Bluetooth / Wi-Fi wireless module interface, ULN2003 500mA current sinking driver, L293D DC motor controller, 16X2 character LCD and many more. The on -chip peripherals and the external hardware on the development board are interconnected using pin headers and jumpers. The I/O pins on the microcontroller can be accessed from a 50 p in male header. This direct access to I/O pins enables you to connect your own devices very easily to the processor.

FEATURES OF ARM 7MICROCONTROLLER

- USB 2.0 Full-speed compliant device controller with 2 kB of endpoint RAM.
- Two 10-bit ADCs provide a total of 14 analog inputs Single 10-bit DAC provides variable analog output Two 32-bit timers/external event counters (with four capture and four compare channels each), PWM unit (six outputs) and watchdog.
- Low power Real-Time Clock (RTC) with independent power and 32 kHz clock input.
- Multiple serial interfaces including two UARTs, two Fast I²C-bus (400 kbit/s), SPI and SSP with buffering and variable data length capabilities.
- Vectored Interrupt Controller (VIC) with configurable priorities and vector addresses.
- Up to 45 of 5 V tolerant fast general purpose I/O pins in a tiny LQFP64 package.

b. GPS MODULE

GPS is a wireless communication module. This design adapts the current leading GPS technology and the integrated positioning chip LEADTEK LR9548S. Specifically Designed for OEM Applications, it has a GPS receiver module with high sensitivity, low power consumption, and 20 channels. Compared with other independent GPS solutions GPS9548 is able to help Users gain and continuously track GPS signals at a very low signal intensity, which means GPS9548 can be used in the environment where it has never been thought to be accessible, such as Buildings of the city building, dense forest, garage, and many indoor environment, with a positioning accuracy of less than 10 meters. With only an addition of relevant circuit at the periphery, positioning information including time, longitude, latitude, rate, moving direction, etc., can be output through the serial. The GPS module can receive the data by connected toARM7development-boardURAT0through RS 232 port., or even to monitor high -valued assets in transit.

c. GSM MODULE

GSM/ GPRS MODEM is a class of wireless MODEM devices that are designed for communication of a computer with the GSM and GPRS network. It requires a SIM (Subscriber Identity Module) card just like mobile phones to activate communication with the network. Also they have IMEI (International Mobile Equipment Identity) number similar to mobile phones for their identification. A GSM/ GPRS MODEM can perform the following operations:

1. Receive, send or delete SMS messages in a SIM.
2. Read, add, search phonebook entries of the SIM.
3. Make, Receive, or reject a voice call.

The MODEM needs AT command**s**, for interacting with processor or controller, which are communicated through serial communication. These commands are sent by the controller/processor. The MODEM sends back a result after it receives a command. Different AT commands supported by the MODEM can be sent by the processor/controller/computer to interact with the GSM and GPRS cellular network.

A GSM/ GPRS module assembles a GSM/ GPRS modem with standard communication interfaces like RS -232 (Serial Port), USB etc., so that it can be easily interfaced with a computer or a microprocessor / microcontroller based system. The power supply circuit is also built in the module that can be activated by using a suitable adaptor.

d. ACCELEROMETER

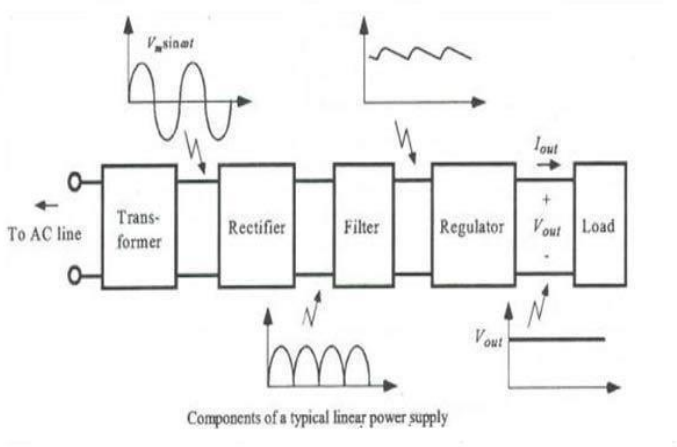
An accelerator looks lik**e** a simple circuit for some larger electronic device. Despite its humble appearance, the accelerometer consists of many different parts and works in many ways, two of which are the piezoelectric effect and the capacitance sensor. The piezoelectric effect is the most common form of accelerometer and uses microscopic crystal structures that become stressed due to accelerative forces. These crystals create a voltage from the stress, and the accelerometer interprets the voltage to determine velocity and orientation.

e. TEMPERATURE SENSOR

This project uses IC LM35 as a sensor for detecting accurate Centigrade temperature. Linearity defines how well over a range of temperature a sensor's output consistently changes.Unlike thermistor, Linearity of a precision IC Sensors are very good of 0.5°C accuracy and has wide temperature range. its output voltage is linearly proportional to the Celsius (Centigrade) temperature. The LM35 is rated to operate over a -55° to +150°C temperature range. It draws only 60 µA from its supply, it has very low self-heating, less than 0.1°C in still air. LM 35 Operates from 4 to 30 volts.

f. POWER SUPPLY

LPC2148 works on 3.3 V power supply. LM 117 can be used for generating 3.3 V supply. However, basic peripherals like LCD, ULN 2003 (Motor Driver IC) etc. works on 5V. So AC mains supply is converted into 5V using below mentioned circuit and after that LM 117 is used to convert 5V into 3.3V



Components of a typical linear power supply

- **Transformer** is used to step down 230V A C to 9V AC supply and provides isolation between power grids and circuit.
- **Rectifier** is used to convert AC supply into DC.
- **Filter** is used to reduce ripple factor of DC output available from rectifier end.
- **Regulator** is used to regulate DC supply output.

g. LIQUID CRYSTAL DISPLAY

LCD stands for Liquid Crystal Display which is used to display numbers, strings and special characters as per the application. It is one of the widely used modules in embedded system. Almost all embedded product requires LCD.Advantage of LCD over LEDs is its ability to display any number, alphabet, special characters and user defined symbol (at extra effort for programming) without increasing number of pins required to be connected with controller.Interfacing of LCD with LPC2148 differs little bit compared to interfacing with 8051 or A VR which operates on 5V. LCD operates on 5V but LPC 2148 operates on 3.3V so we have to take care of this fact for the controller pins which has to be connected with LCD.

Interfacing LCD with LPC2148 MicroController

h. MERCURY SWITCH

The Mercury switch used in this project as an input sensor which is to detect the accident impact. Whenever a vehicle hits an obstacle the collision is detected by the mercury switch and it sends signal
to the micro controller.

i. RELAY

A relay is used for electronic to electrical interfacing i.e. it is used to switch on or off electrical circuits operating at high AC voltage using a low DC control voltage. A relay generally has two parts, a coil which operates at the rated DC voltage and a mechanically movable switch. The electronic and electrical circuits are electrically isolated but magnetically connected to each other, hence any fault on either side does not affects the other side.

5. ALGORITHM

- Step 1: Start the process
- Step 2: Set counter =3.
- Step 3: Enter code from keypad.
- Step 4: Check code with previously stored code.
- Step 5: Is it same? If "YES" then go to step 8.If "NO" then go to step 6.
- Step 6: Decrease counter.
- Step 7: Is counter=0? If "YES "then inform to police And owner. If "NO" then go to Step 3.
- Step 8: Send text message to owner for car access.
- Step 9: Check all parameters of sensor.
- Step 10: Is any parameter beyond range? If "YES" then go to Step 11. If "NO" the message will not be send to owner.
- Step 11: Buzzer is "ON".
- Step 12: Check the buzzer is stopped within 1 minute. If "YES" message will not be send to owner. If "NO" go to Step 13.
- Step 13: Send message o police station & owner.
- Step 14: Stop.

6. RESULT AND DISCUSSION

In the above paper the system is used for theft control as well as accident detection and prevention system. Initially to on the car owner or driver must enter specific code. If code is

correct then message is send to owner for accessing of car. If anybody enter wrong code for three times then a message is send to owner and police station along with co -ordinates of location about illegal access of car. So in this way security system is much better than other security systems. Another application is that in this various sensors are placed which indicates occurrence of an accident just like gas sensor, alcohol detector, accelerometer. If range of that sensor increases beyond specific range then buzzer will "on" for one minute and driver can't stop the buzzer within one minute then it will detect as a accident and a message will send to owner, police station & two previously stored numbers with co-ordinates of that location. And if unfortunately car is stolen at that time owner can stop the car by sending a message.

7. CONCLUSION

This paper is displaying one of the models of the accident notification system using two modems GSM and GPS. The paper showed the proposed system design, the block diagram, working principle and the simulation results. The main idea of the working principle of the system is when the occurrence of accident or fire, Limit switch or temperature sensor will be pressed automatically then sending a signal to microcontroller for activating GSM and GPS modems. initially GPS modem identify the location of an accident then sending Coordinates through SMS by using GSM modems to mobile numbers such as, family members, friends and police stations to take immediate action and help the victims of accidents .

8. FUTURE SCOPE

In the future this project can be developed to make it best than preset ,In order to use it in several application such as can be used for disclosure of liquor, which checks if the person has consumed alcohol or not .The eye sensor makes sure that the person in driver seat does not falls asleep. Thus this system ensures the life security. Also can be done with advanced vehicle security system with theft control and accident notification. It can be used for monitoring adolescent drivers by their parent's .In case of vehicle theft situations the owner can know the vehicles current location and based on that he can stop the vehicle by sending a predefined SMS message to this system. After receiving SMS message from owner this system automatically stops the ignition system hence the vehicle will not function any more.

9. REFERENCES

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