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Travolution — an Embedded System in Passenger Car for Road Safety

Nakka Rukkaiah
M. Tech Student,
Department of ECE
Avanthi Institute of Engineering & Technology,
Hyderabad, TS, India.

K. Guru Prasad, M.Tech
Assistant Professor,
Department of ECE
Avanthi Institute of Engineering & Technology,
Hyderabad, TS, India.

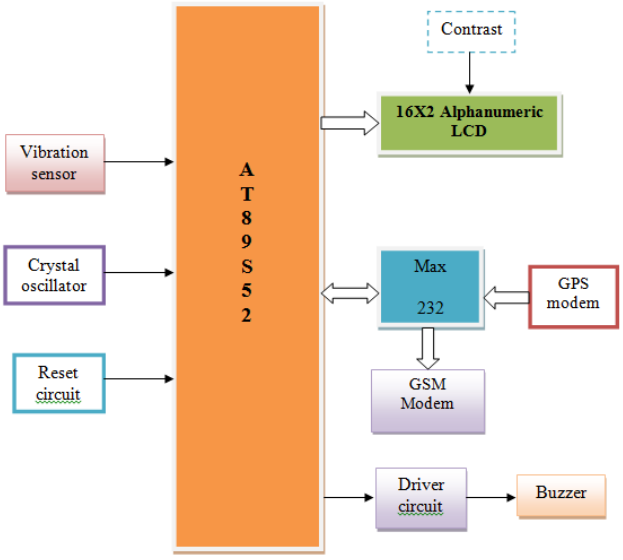
Abstract:
Security in travel is primary concern for every one. This Project describes a design of effective alarm system that can monitor an automotive / vehicle / car condition in traveling. This project is designed to inform about an accident that is occurred to a vehicle to the family members of the traveling persons.

Existing system

This Project presents an automatic vehicle accident detection system using GPS and GSM modems. The system can be interconnected with the car alarm system and alert the owner on his mobile phone. This detection and messaging system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude.

The Microcontroller processes this information and this processed information is sent to the user/owner using GSM modem A GSM modem is interfaced to the MCU. The GSM modem sends an SMS to the predefined mobile number and informs about this accident. This enable it to monitor the accident situations and it can immediately alerts the police/ambulance service with the location of accident.

The project is built around the AT89S52 micro controller from Atmel. This micro controller provides all the functionality of the SMS alert system. It also takes care of filtering of the signals at the inputs. The uniqueness of this project is, not only alerting the neighbors by its buzzer, but also it sends a caution SMS to stored mobile numbers.



Drawback

There are no sensors included for alcohol detection and distance calculation

Proposed system

This Project presents an automatic vehicle accident detection system using GPS and GSM modems. The

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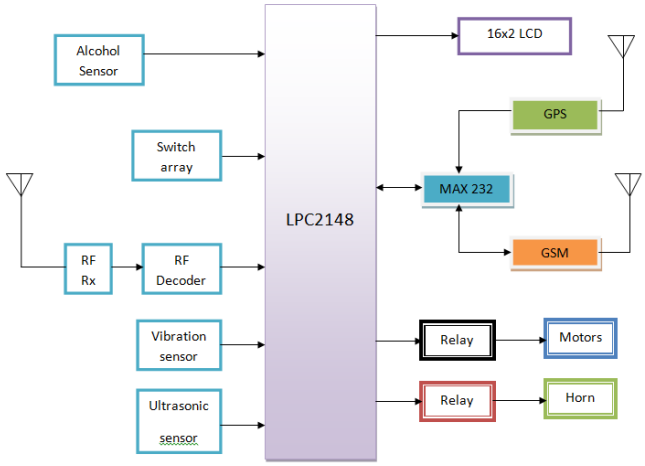
system can be interconnected with the Alcohol detection, and alert the owner on his mobile phone. This detection and messaging system is composed of a GPS receiver, Microcontroller and a GSM Modem. GPS Receiver gets the location information from satellites in the form of latitude and longitude.

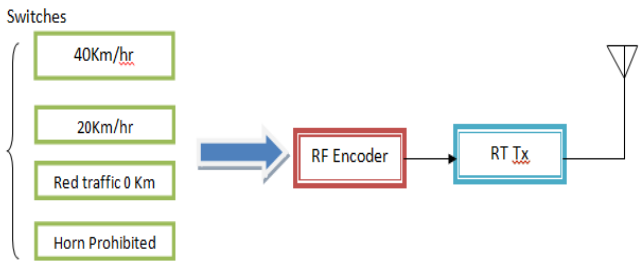
Alcohol sensor is provided to know whether the driver is alcoholic or not. The red traffic light zone, over speed detection in restricted areas, horn prohibited areas will be provided by RF transmitter. The vehicle security is enhanced as all the features are embedded in it. We also have few relays to stop the car, to slow down the car and also to stop the horn.

Block Diagram:

Receiver section



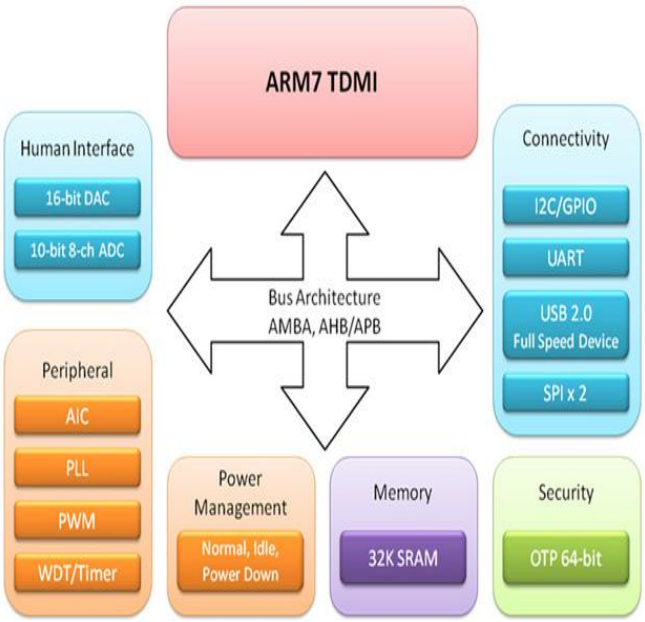
Tx Side:



LPC2148 controller:

The **LPC2148** are based on a 16/32 bit ARM7TDMI-S™ CPU with real-time emulation and embedded trace support, together with 128/512 kilobytes of embedded high speed flash memory.

A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at maximum clock rate. For critical code size applications, the alternative 16-bit Thumb Mode reduces code by more than 30% with minimal performance penalty. With their compact 64 pin package, low power consumption, various 32-bit timers, 4- channel 10-bit ADC, USB PORT,PWM channels and 46 GPIO lines with up to 9 external interrupt pins these microcontrollers are particularly suitable for industrial control, medical systems, access control and point-of-sale. With a wide range of serial communications interfaces, they are also very well suited for communication gateways, protocol converters and embedded soft modems as well as many other general-purpose applications.



ARM PROCESSOR:

The ARM processor core originates within a British computer company called Acorn. In the mid-1980s they were looking for replacement for the 6502 processor used in their BBC computer range, which were widely used in UK schools. None of the 16-bit architectures becoming available at that time met their requirements, so they designed their own 32-bit processor.

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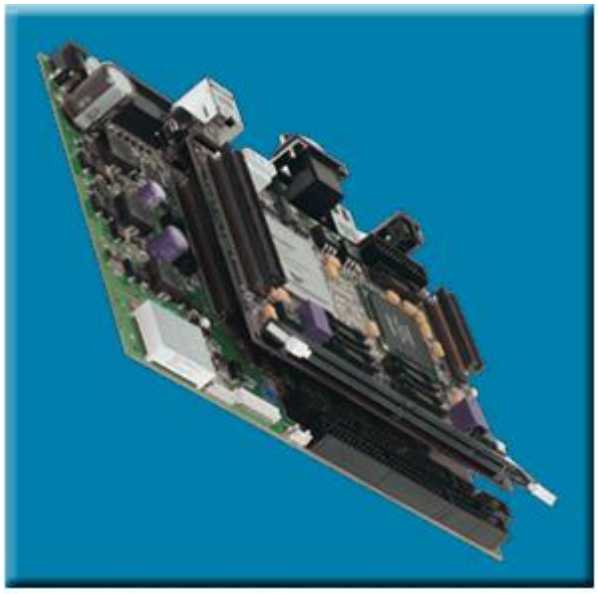
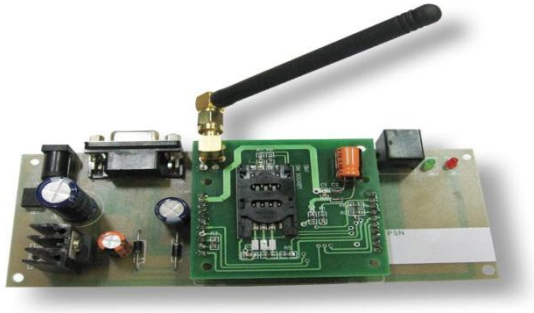


Global System for Mobile Communication (GSM)

Definition:

GSM, which stands for Global System for Mobile communications, reigns (important) as the world's most widely used cell phone technology. Cell phones use a cell phone service carrier's GSM network by searching for cell phone towers in the nearby area. Global system for mobile communication (GSM) is a globally accepted standard for digital cellular communication.

GSM is the name of a standardization group established in 1982 to create a common European mobile telephone standard that would formulate specifications for a pan-European mobile cellular radio system operating at 900 MHz. It is estimated that many countries outside of Europe will join the GSM partnership.



General Features:

- Tri-band GSM/GPRS900/1800/1900Mhz
- GPRS multi-slot class 10
- GPRS mobile station class –B
- Complaint to GSM phase 2/2+
  i. -class 4(2W @900MHz)
  ii. -class 1(1W @/18001900MHz)
- Dimensions: 40x33x2.85 mm
- Weight: 8gm
- 7. Control via AT commands
- (GSM 07.07, 07.05 and SIMCOM enhanced AT commands)
- SIM application tool kit
- supply voltage range 3.5…….4.5 v
- Low power consumption
- Normal operation temperature: -20 'C to +55 'C
- Restricted operation temperature : -20 'C to -25 'C and +55 'C to +70 'C
- storage temperature: -40 'C to +80 'C

Basic Concept of GPS

A GPS receiver calculates its position by precisely timing the signals sent by the GPS satellites high

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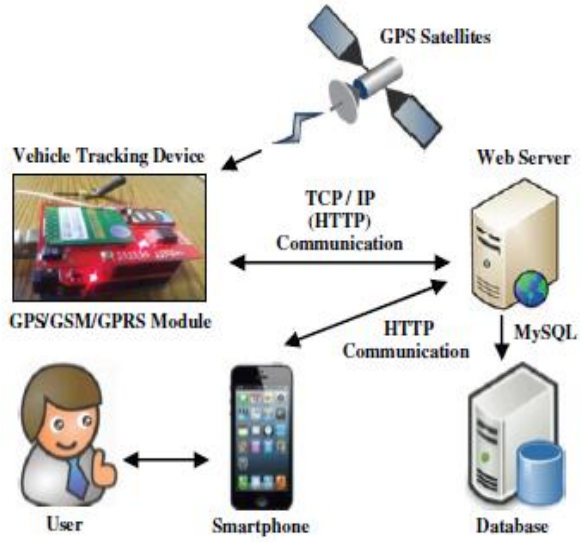
above the Earth. Each satellite continually transmits messages which include

- the time the message was transmitter
- The general system health and rough orbits of all GPS satellites (the almanac).
- precise orbital information (the ephemeris)



Features:

- 5V DC or AC circuit
- Requires heater voltage
- Operation Temperature: -10 to 70 degrees C
- Heater consumption: less than 750m

Dimensions:

- 16.8mm diameter
- 9.3 mm height without the pins

APPLICATIONS

- Automotive and transport vehicles
- Security, Remote monitoring, Transportation and logistics
- This system is also can be interfaced with Vehicle airbag system

FUTURE SCOPE

Air bag can be introduced. The exact position can be seen in the Google maps

Alcohol Gas Sensor - MQ-3

This alcohol sensor is suitable for detecting alcohol concentration on your breath, just like your breathalyzer. It has a high sensitivity and fast response time. Sensor provides an analog resistive output based on alcohol concentration. The drive circuit is very simple, all it needs is one resistor. A simple interface could be a 0-3.3V ADC.

ADVANTAGES:

- Sophisticated security
- Monitors all hazards and threats
- Alert message to mobile phone for remote information
- Mobile number can be changed at any time

CONCLUSION

Here We Have Designed and implemented Travolution — An embedded system in passenger car for road safety with using ARM7 LPC2148 controller.

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Author Details

Nakka Rukkaiah
M. Tech Student, Dept of ECE
Avanthi Institute of Engineering & Tech
Hyderabad, TS, India

Mr. K.Guru Prasad received a B.Tech (ECE) degree from VITS JNTA University, India in 2011, M.Tech(ECE) degree from AITS,JNTUH university, India in 2013 and . At present he is rendering his services as Asst. professor At Avanthi Institute of Engineering & Technology, Hyderabad and possessing 3 years of experience in teaching at different levels. His research interests include Digital image processing and signal processing.