Advanced Security System for Automobile

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Abstract: - *the development of Technology and the number of motor vehicles has increased to a large extent. But now a day the road accidents have increased to uncertain level. So, it is therefore necessary that we adopt some measures to minimize these road accidents. This system is composed of a GPS receiver, Microcontroller and a GSM Modem. This system contains single board embedded system that is equipped with GPS and GSM modems along with Microcontroller that is installed in the vehicle. During vehicle motion, its location can be reported by SMS message. The use of GSM and GPS technologies allows the system to track vehicle and provides the most up-to-date information about the vehicle.*

Keywords— Gsm Module (Sim300), Gps Module, Microcontroller, Led, Sensor.

I. INTRODUCTION

The PIC16F877A CMOS FLASH-based 8-bit microcontroller is upward compatible with the PIC16C5x, PIC12Cxxx and PIC16C7x devices. It features 200 ns instruction execution, 256 bytes of EEPROM data memory,[1,2] self-programming, an ICD, 2 Comparators, 8 channels of 10-bit Analog-to-Digital (A/D) converter, 2 capture/compare/PWM functions, a synchronous serial port that can be configured as either 3-wire SPI or 2-wire I2C bus, a USART, and a Parallel Slave Port.

PIC16F877A has RISC architecture. This term is often found in computer literature, and it needs to be explained here in more detail. Harvard architecture is a newer concept than von-Neumann. It rose out of the need to speed up the work of a microcontroller. In Harvard architecture, data bus and address bus are separate. Thus a greater flow of data is possible through the central processing unit, and of course, a greater speed of work. Separating a program from data memory makes it further possible for instructions not to have to be 8-bit words. PIC16F877A uses 14 bits for instructions which allows for all instructions to be one word instructions.[3] It is also typical for Harvard architecture to have fewer instructions than von-Neumann's, and to have instructions usually executed in one cycle.

Microcontrollers with Harvard architecture are also called "RISC microcontrollers". RISC stands for Reduced Instruction Set Computer. Microcontrollers with von-Neumann's architecture are called 'CISC microcontrollers'. Title CISC stands for Complex Instruction Set Computer [4].

Since PIC16F877A is a RISC microcontroller, that means that it has a reduced set of instructions, more precisely 35 instructions. (Ex. Intel's and Motorola's microcontrollers have over hundred instructions) All of these instructions are executed in one cycle except for jump and branch instructions. According to what its maker says, PIC16F877A usually reaches results of 2:1 in code compression and 4:1 in speed in relation to other 8-bit microcontrollers in its class. PIC16F877A perfectly fits many uses, from automotive industries and controlling home appliances to industrial instruments, remote sensors, electrical door locks and safety devices. It is also ideal for smart cards as well as for battery supplied devices because of its low consumption.

EEPROM memory makes it easier to apply microcontrollers to devices where permanent storage of various parameters is needed (codes for transmitters, motor speed, receiver frequencies, etc.). Low cost, low consumption, easy handling and flexibility make PIC16F877A applicable even in areas where microcontrollers had not previously been considered (example: timer functions, interface replacement in larger systems, coprocessor applications, etc.).

II. OUR WORK

The rapid development of electronics provides secured environment to the human. As a part of this 'ADVANCED VEHICLE SECURITY SYSTEM WITH THEFT CONTROL AND ACCIDENT NOTIFICATION' is designed to reduce the risk involved in losing the vehicle and providing accident notification which will reduce the rate of deaths.

This tracking 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

This is an inexpensive device which reduces the problem associated with accident notification and antitheft control

III. BLOCK DIAGRAM

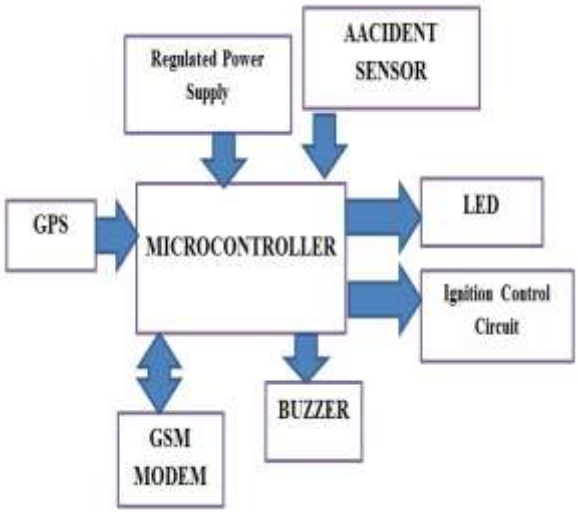

Fig.1 shows the block diagram.

A. Power supply:

Power supply is the major concern for every electronic device .Since the controller and other devices used are low power devices there is a need to step down the voltage and as well as rectify the output to convert the output to a constant dc

B. Microcontroller PIC16F877A

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2. High-Performance RISC CPU

- Lead-free; RoHS-compliant
- Operating speed: 20 MHz, 200 ns instruction cycle[5]
- Operating voltage: 4.0-5.5V
- Industrial temperature range (-40° to +85°C)
- 15 Interrupt Sources
- 35 single-word instructions
- All single-cycle instructions except for program branches (two-cycle)

3. Special Microcontroller Features

- Flash Memory: 14.3 Kbytes (8192 words)
- Data SRAM: 368 bytes
- Data EEPROM: 256 bytes
- Self-reprogrammable under software control
- In-Circuit Serial Programming via two pins (5V)
- Watchdog Timer with on-chip RC oscillator
- Programmable code protection
- Power-saving Sleep mode
- Selectable oscillator options
- In-Circuit Debug via two pins

4. Peripheral Features

- 33 I/O pins; 5 I/O ports
- Timer0: 8-bit timer/counter with 8-bit prescaler
- Timer1: 16-bit timer/counter with prescaler
- Can be incremented during Sleep via external crystal/clock
- Timer2: 8-bit timer/counter with 8-bit period register, prescaler and postscaler
- Two Capture, Compare, PWM modules
- 16-bit Capture input; max resolution 12.5 ns
- 16-bit Compare; max resolution 200 ns
- 10-bit PWM
- Synchronous Serial Port with two modes:
- SPI Master
- I2C Master and Slave
- USART/SCI with 9-bit address detection
- Parallel Slave Port (PSP)
- 8 bits wide with external RD, WR and CS controls
- Brown-out detection circuitry for Brown-Out Reset
- Analog Features
- 10-bit, 8-channel A/D Converter
- Brown-Out Reset

5. Analog Comparator module

- 2 analog comparators
- Programmable on-chip voltage reference module[6]
- Programmable input multiplexing from device inputs and internal VREF
- Comparator outputs are externally accessible

C. G.S.M Modem:

Telecommunication services can be divided into bearer services, teleservices, and supplementary services. The most basic tele service supported by GSM is telephony. As with all other communications, speech is digitally encoded and transmitted through the GSM network as a digital stream. There is also an emergency service, where the nearest emergency-service provider is notified by dialling three digits[7].

D. G.P.S:

The Global Positioning System (GPS) is a Global Navigation Satellite System (GNSS) developed by the United States Department of Defense. It is the only fully functional GNSS in the world. It uses a constellation of between 24 and 32 Medium Earth Orbit satellites that transmit precise microwave signals, which enable GPS receivers to determine their current location, the time, and their velocity. Its official name is **NAVSTAR GPS[8]**. Although

NAVSTAR is not an acronym, a few backronyms have been created for it. The GPS satellite constellation is managed by the United States Air Force 50th Space Wing. GPS is often used by civilians as a navigation system.

E. Accident sensor:

Accident sensor is a simple switch which uses the air bag mechanism which was readily available in the car[9]. The air bag was built such that whenever an accident occurs it senses it and comes out. Our switch is attached to the air bag circuit and made to switch on whenever the air bag turns on allowing the controller to know the information regarding the occurrence of accident and the controller immediately sends the accident information and location where it occurred to the concerned persons.

IV. CIRCUIT DIAGRAM

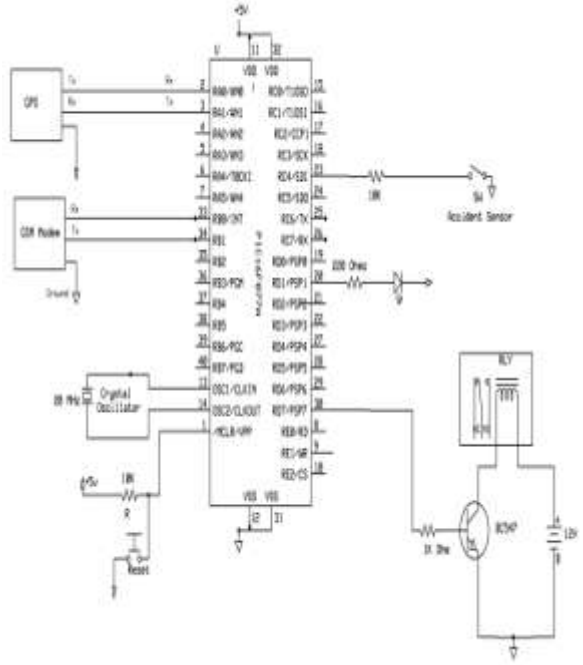

Fig.2 shows Circuit diagram.

Circuit Description

In this project the GPS is used to provide the exact position of the vehicle. The information that is collected by the GPS modem is passed to the microcontroller on its request. The information provided by the GPS system contains longitudinal and latitude positions .It also provide the speed and time of the vehicle.

Here we use PIC17f877A microcontroller. It mainly controls the all function of the project. It gets the information from the GPS modem and passed it to the GSM modem. It controls the ignition sensor and accident sensor.

GSM modem is used to send messages to the predefined numbers stored in the microcontroller. This GSM modem uses AT commands in order to send messages to the predefined number.

APPLICATIONS

- VIP vehicle tracking.
- Child and animal tracking.
- Accident Notification of Vehicle.
- Ambulance tracking.
- Vehicle Theft Control

LIMITATIONS

For the location of the vehicle, the GPS provides the information in the form of latitude and longitude which further requires software such as Google Map to know the name of the area and the nearest landmark [10]. However by attaching an external Memory card to the project consisting of respective information can make the limitation to overcome

V. CONCLUSION

The project has been successfully designed and implemented for the "ADVANCED VEHICLE SECURITY SYSTEM WITH THEFT CONTROL AND ACCIDENT NOTIFICATION".

It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully thus contributing to the best working of the unit.

Secondly, using highly advanced IC's and with the help of growing technology the project has been successfully implemented and tested.

Finally we conclude that GPS and GSM based Security System add a huge for the rapid growth of Technology.

ACKNOWLEDGMENT

We would like to express our sense of gratitude to Mr. Deepak Rasaily, Sr. Lecturer (ECE Department), our project guide Mrs.Cherryla Tobden and our project coordinator Mr. Subodh Chettri and Shyam Chhinal for their inspiring advice, supervision and guidance.

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