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Anti-Theft Tracking System and Security System for Automobiles using GSM and ARM

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Abstract: *This paper describes the development of an Anti-Theft Tracking System and Security System for Automobiles using GSM, GPS and ARM7. The vehicular module is used to track, monitor, and surveillance and finds the accident spot or theft spot and intimate to the monitoring station. The proposed design provides information regarding vehicle Identity, and position on real time that is UTC Time. This information are collected by the ARM7 TDMI-S core processor and send through the GSM module to the autherised person. For security purpose we are interfacing EEPROM for password protection user has to enter the password by using hex keypad, if it is matches with the internal password then only it activates the ingnition key.*

Keywords: *GPS, GSM, ARM7, UTC Time, EEPROM, ingnition key and hex keypad.*

1. INTRODUCTION

There are various GPS (Global Positioning System) based tracking systems prevailing today. Still in the Indian scenario they are not in much of use because of economy. Similarly, all over the world the systems installed are predominantly for the four wheelers; but for a country like India where majority of the population thrives using two wheelers, here is the cheapest source of an anti-theft tracking system. This system works purely on GSM (Global System for Mobiles) and proves to be enormously effective. A security system is essential for motorist nowadays as the number of motorcycle theft increases every year. Various security systems are available in the market with variety of functions, operating modes and features. Most of the systems are expensive which make motorcyclists could not afford to have a security system that is efficient

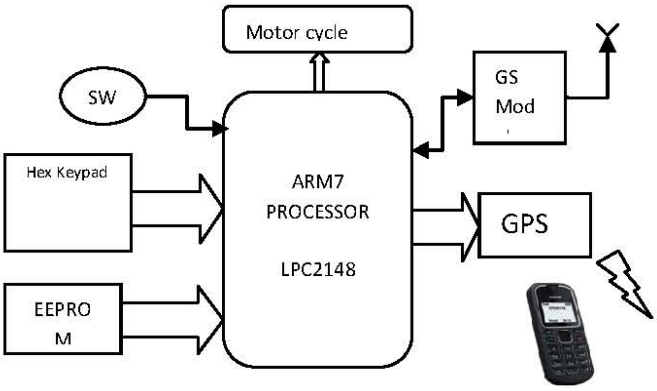

Fig1. *Block diagram*

This system has the following features:

The complete block diagram is as shows in figure 1.The vehicular system [VS] includes hardware that consists of an ARM 7 TDMI core processor, GPS module, GSM module, EEPROM, Hex keypad,

l6x2 LCD, and ignition key and switches. The whole VS works on a 5V or 9V dc regulated power supply. The GPS receiver module interfaced with UART1 of ARM processor provides utc time and location information. Vehicular teft time , position and are sent to user mobile. All this information are shown on LCD that is interfaced with a GPIO0 and send it to a monitoring station (receiver side) by GSM module wirelessly that is interfaced with UART0 of ARM processor. Also the same information is given to a concern person to get that information anywhere anytime. The module requires GSM SIM (Subscriber Identity Module).

2. FLOW CHART

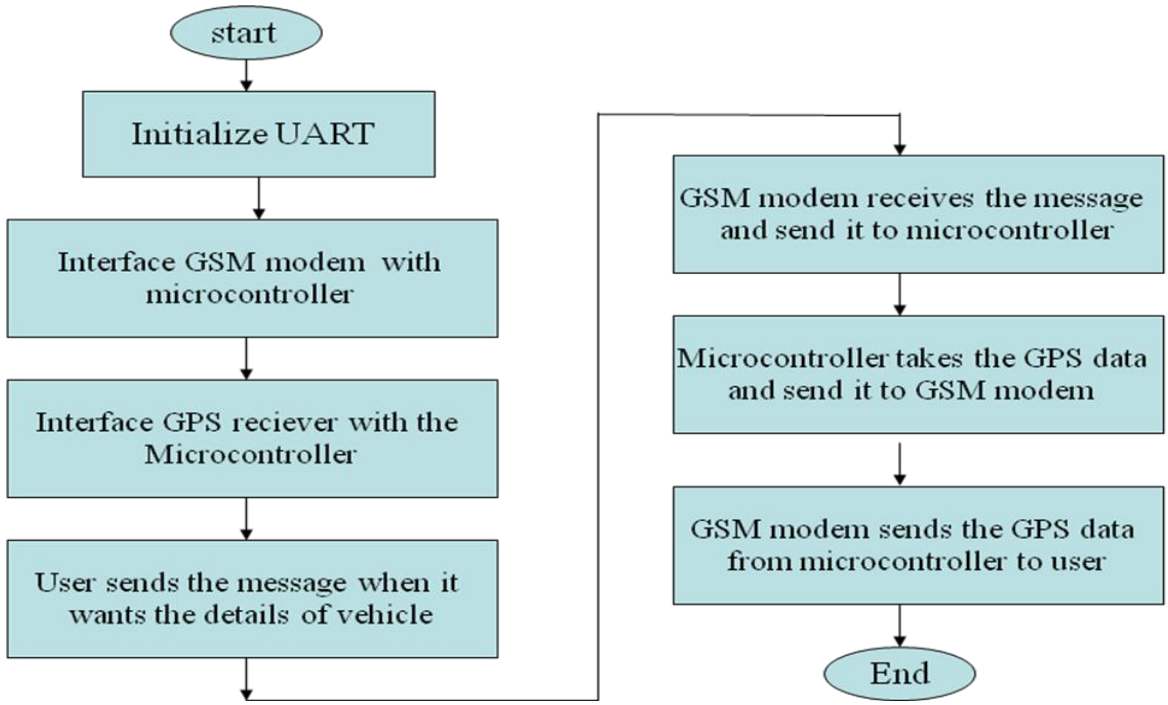

Fig2. *Software Design*

3. HARDWARE DESIGN

ARM7 Controller: ARM7 controller used in control system communicate the image comparison unit and communicates the GSM and GPS modules. The ARM7 controller receives id command from IMU via RS232 compare this with data based stored in EEPROM. if the ID matches with predefine one then the information such as particular name assigned to the ID, location of the person and time when the person is detected is send as a SMS to the server center.

The LPC2148 microcontrollers are based on a 32 bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combines the microcontroller with embedded high speed flash memory of 512 kB. A 128-bit wide memory interface and unique accelerator architecture enable 32-bit code execution at the maximum clock rate. For critical code size applications, the alternative 16-bit Thumb mode reduces the code by more than 30 % with minimal performance penalty.

Due to their tiny size and low power consumption, LPC2148 microcontrollers are ideal for the applications where miniaturization is a key requirement, such as access control and point-of-sale. A blend of serial communications interfaces ranging from a USB 2.0 Full Speed device, multiple UARTS, SPI, SSP to I2Cs and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication.

GSM Module: SIM300 Module is used for GSM communication Designed for global market, SIM300 is a Tri-band GSM/GPRS engine that works on frequencies EGSM 900 MHz, DCS 1800 MHz and PCS 1900 MHz. SIM300 features GPRS multi-slot class 10/ class 8 (optional) and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.With a tiny configuration of 40mm x 33mm x 2.85mm , SIM300 can fit almost all the space requirements in our applications, such as smart phone, PDA phone and other mobile devices. In this hardware SIM300 is only interfaced with RS232, Regulated power Supply 4.0V SIM Tray Antenna with LED indications. Connectivity details mention in figure5.

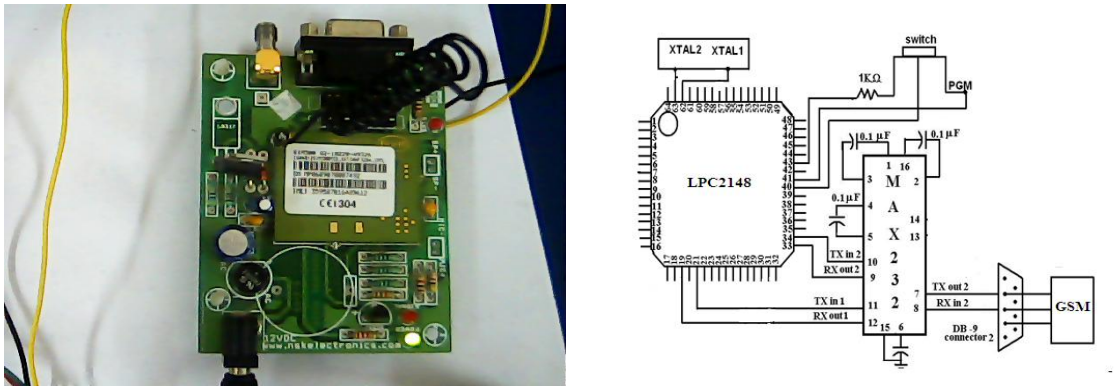

Fig3. *SIM900 GSM MODULE*

In order to realize SMS alarm, it is necessary to use the AT command to design SMS sending and receiving procedures, including protocol data and SMS text. SMS can realize remote monitoring. When the system is abnormal; it can inform the mobile phone in no time.

Table2. *AT commands*

AT Commands	Function Notes
AT+CMGD	Delete SMS Message
AT+CMGF	Set SMS format
AT+CMGL	List all SMS
AT+CMGR	Receive SMS Commands
AT+MGS	Send a SMS command

4. GPS RECEIVER

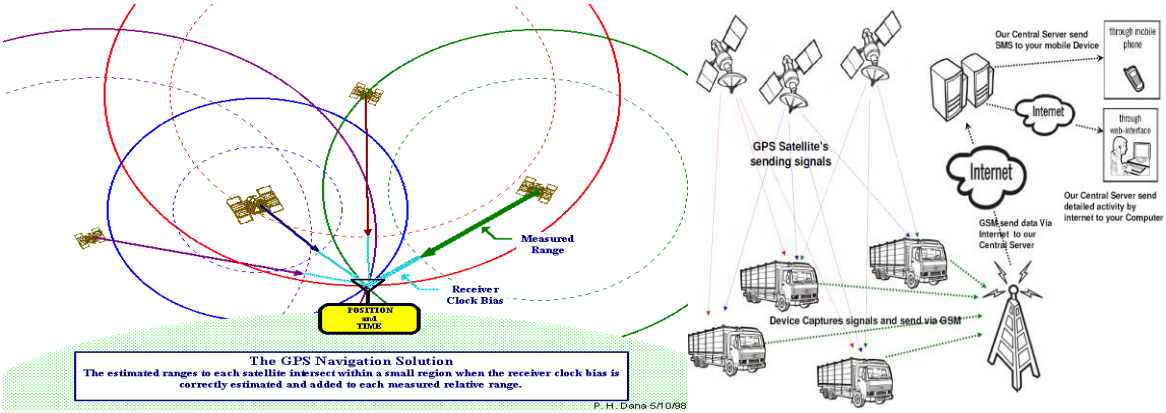

Fig4. *GPS Receiver*

The Global Positioning System (GPS) offers the capability to accurately determine location anywhere on earth in addition to speed, altitude, heading, and a host of other critical positioning data. GPS is widely used in military, consumer, and service markets with applications ranging from container shipping to weapons systems and handheld devices.

The GPS system consists of 24 satellites orbiting in six planes around the earth. The satellites transmit a microwave signal, which is read by the GPS receiver on earth. The GPS receiver requires a successful lock onto at least four GPS satellites to gather an accurate signal for calculating position and velocity. The module triangulates its position with relation to three satellites, using a fourth satellite as a clock source.

The GPS system is designed such that at any point, a GPS module on earth has a clear view of at least four satellites, barring any obstruction such as buildings, interiors of a canyon, dense foliage, or mountains. This application note details important data considerations and implementation methods to integrate a GPS receiver with a LPC2148 device, finally, the GPS data is parsed and displayed onto an LCD screen. This application note guides a developer in integrating GPS applications and providing portable code that can be bolted into a user's application: Handheld receivers calculate latitude ,Longitude and velocity, Developed by Department of Defense, Orbiting navigational satellites Transmit position and time data.

5. GPS RECEIVER INTERFACING WITH LPC2148

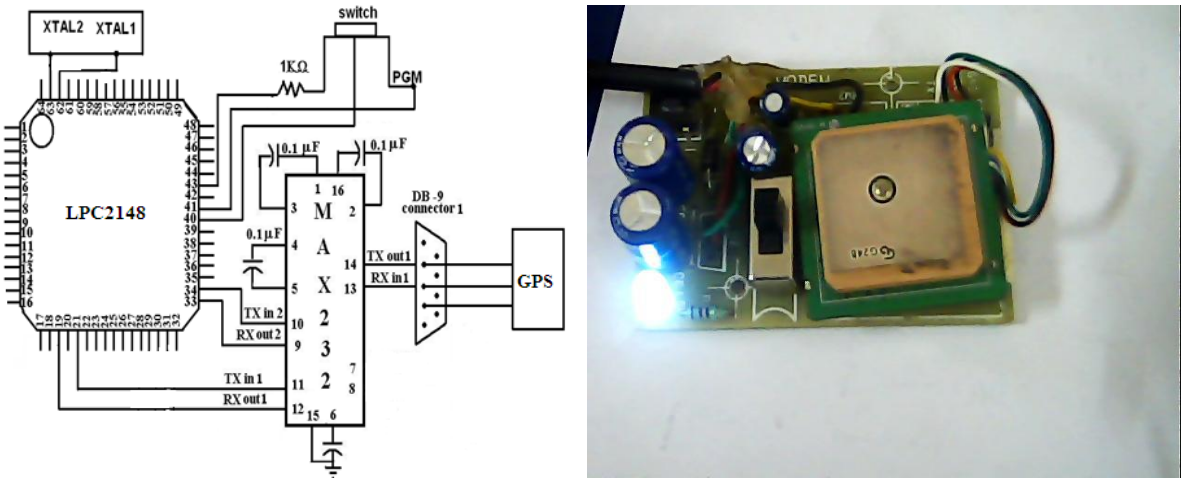

Fig5. *GPS Module*

The GPS Smart Receiver is an ultra low power GPS receiver based on the proven technology found in this 16 channel GPS receivers and NEMERIX chipset solution. The positioning application meets strict needs such as car navigation, mapping, surveying, security, agriculture and so on. Only clear view of sky and certain power supply are necessary to the device. With its ultra low power consumption, the smart receiver tracks up to 16 satellites at a time, re-acquires satellite signals in 1 second (average) and updates position data every second.

6. SERIAL EEPROM

Fig6. *Serial EEPROM*

The Microchip Technology Inc. 24AA04/24LC04B (24XX04*) is a 4 Kbit Electrically Erasable PROM. The device is organized as two blocks of 256 x 8-bit memory with a 2-wire serial interface. Low-voltage design permits operation down to 1.7V, with standby and active currents of only 1 µA and 1 mA, respectively. The 24XX04 also has a page write capability for up to 16 bytes of data. The 24XX04 is available in the standard 8-pin PDIP, surface mount SOIC, TSSOP, 2x3 DFN, 2x3 TDFN, and MSOP packages and is also available in the 5-lead SOT-23, or 4-lead Chip Scale package.

7. HEX KEYPAD EXPLANATION

The hex keypad is a peripheral that connects to the DE2 through JP1 or JP2 via a 40-pin ribbon cable. It has 16 buttons in a 4 by 4 grid, labelled with the hexadecimal digits 0 to F. An example of this can been seen in Figure 1, below. Internally, the structure of the hex keypad is very simple. Wires run in vertical columns (we call the m C0 to C3) and in horizontal rows (called R0 to R3).

These 8 wires are available externally, and will be connected to the lower 8 bit s of t he port. Each key on the keypad is essentially a switch that connects a row wire to a column wire. When a key is pressed, it makes an electrical connection between the row and column. The internal structure of the hex keypad is shown in Figure 2. The specific mapping of hex keypad wires (C0 to C3 and R0 to R3) to pins is given in Table 1.

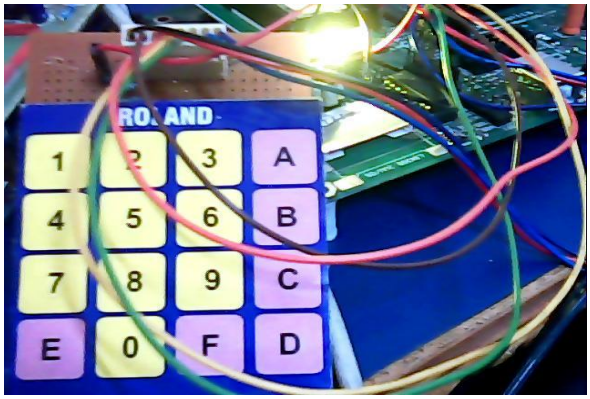

Fig7. *Hex keypad*

8. RESULTS AND DISCUSSION

The experimental results obtained fulfils with the requirements of the system. The hardware and software results show in figure8.

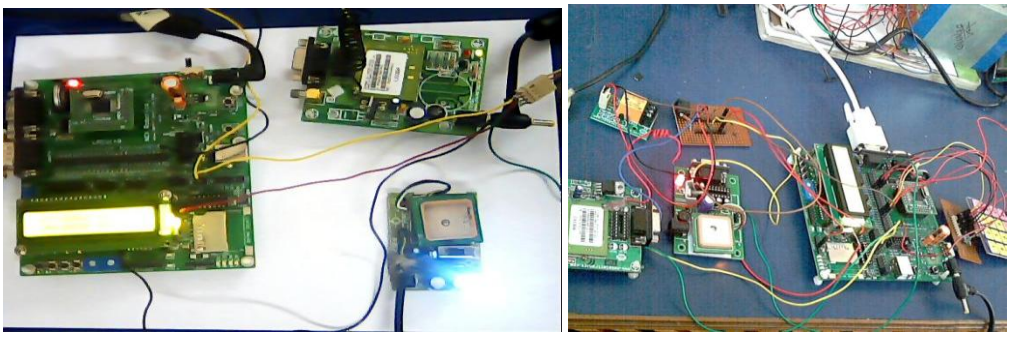

Fig8.1. *Results&Hardware integration*

The main objective of the implementation is Anti-Theft Tracking System. The above diagram shows the integration of all modules like gsm,gps and keypad with ARM7 Processor.Once the passward is enetred correctly then only the vehicle will be atarted othervise it won't start. If we enetered wrong password then it will send a message to autherised person.

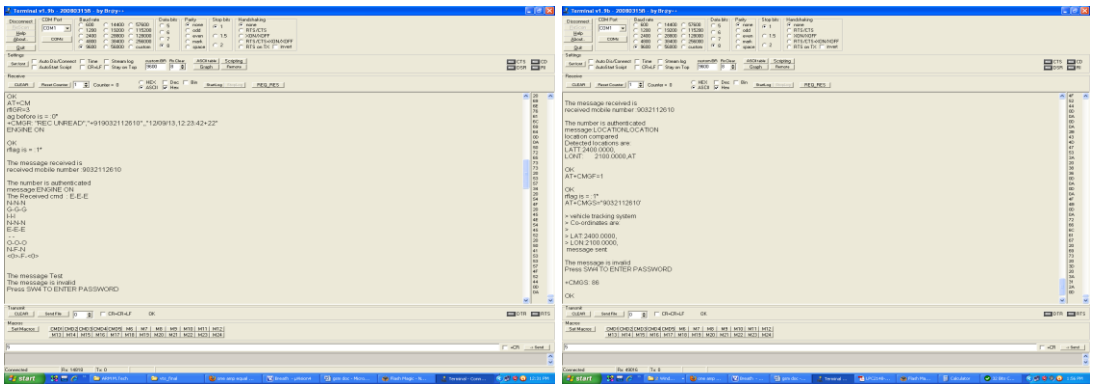

Fig8.2. *Results screen shots*

The above screen shots shows the output results. before starting the vehicle we need to enter password and if it matches thenit will show like this fig8.2.next it will send a message to the vehicle owner.

9. CONCLUSION

The development of a GSM based security system incorporating microcontroller has been described in this paper. The system could detect an attempt of stealing a motorcycle or vehcle and inform the owner by sending a message via a GSM mobile phone successfully. It provides an efficient way of preventing Motorcycle or vehcile theft. The system was built on the technology of embedded system. The functions of whole system such as the GSM network and the GPS technology are perfect. The location of the identified person is known by using GPS and the current time by UTC time. Thus the identified person's location and time is sending to the authentication's number by GSM network.

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