Design of Anti Theft Control and Accident Alarm System Using Arm and GSM for Tracking the Vehicle

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ABSTRACT: Anti theft control system for automobiles that tries to prevent the theft of a vehicle, The main aim of the project is to track the thefted vehicles and their present location using GSM module and the design and implementation of scene of the accident alarm system based with wireless network communications based on ARM, GPS and GSM, Pre-set of treatment centre as the information processing terminal for the location display and warns the alarm for the treatment people. This system makes use of an embedded chip that has an inductive proximity sensor, which senses the key during insertion and sends a text message to the owner's mobile stating that the car is being accessed. This is followed by the system present in the car asking the user to enter a unique password. The password consists of few characters and the car key number. If the user fails to enter the correct password in three trials, a text message is sent to the police with the vehicle number and the location tracked using a GPS module. The message is also sent to the owner about the unauthorized usage.

Package: LPC2148 microcontroller, GSM module, GPS module, temperature sensor and vibration sensor

I. 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, by using this system we can reduce the dead percentage of people with the accident occur using the wireless communication technologies. This project covers the details regarding ARM7TDMI-S microcontroller, GSM module, GPS module and different types of sensors such as temperature sensor and vibration sensor.

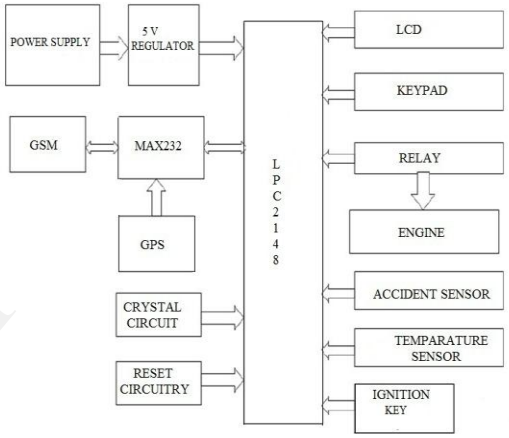

Figure: 1 Block diagram of transmitting section

As we need 5v and 3.3v dc power for our project we have to design power supply. To do the total operation without manual, we need microcontroller. To generate oscillations, we used crystal oscillator. Reset is nothing but system reset, execution starts from first onwards. To display all messages, we need 16*2 LCD. We used key to on/ off the vehicle. The keypad is used to enter the password for start the vehicle. To measure the engine temperature, we used LM35 sensor. To detects the vehicle accidents, we use vibration sensor. To send the messages to vehicle owner and to receiving section, we used GSM module. To find the vehicle location, we used GPS module. We used max232 driver to connect modem and microcontroller.

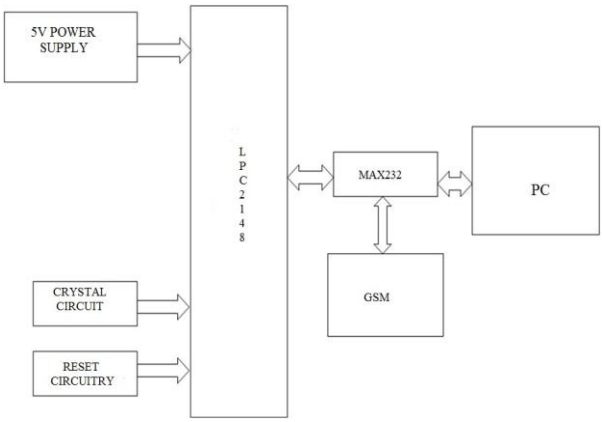

Figure: 2 Receiving section of block diagram

As we need 5v and 3.3v dc power for our project we have to design power supply. To do the total operation without manual, we need microcontroller. To generate oscillations, we used crystal oscillator. Reset is nothing but system reset, execution starts from first onwards. We used max232 driver to connect modem and microcontroller. Here GSM is used to receiving the messages from main section. By using the GPS application software we can see the vehicle location with the help of google map in pc.

II. HARDWARE COMPONENTS AND DESIGN

The hardware design of the project is having two sections. The first one is individual vehicle is equipped with a system called main section or transmitting section, which consist of GSM and GPS. The second one is receiving section or pre treatment section. Here we using a LPC2148microcontroller, which is a high performance and low power consumption. There are various GPS (Global Positioning System) based tracking systems prevailing today. Apart from the various GPS tracking devices introduces a first of its kind vehicle tracking system that works only using GSM technology, which would be the cheapest source of vehicle tracking anti-theft system. The working is simple and just similar to carrying a mobile phone along with you and connecting to it from another device. Here we vary the working from that of the GPS which connects through the internet and then a user interface, by just displaying the information containing the location and other essential details through an SMS With the problem of global population aging increasing, lack of medical hardware at the near of accident place, inadequate accident sense system performance and other related issues have become increasingly prominent. For this presents the design and implementation of scene of the accident alarm system based with wireless network communications based on ARM, GPS and GSM, Pre-set of treatment centre as the information processing terminal for the location display and warns the alarm for the treatment people near by the accident location. For this process initially a vibrator detector is fixed to each side of the vehicle so that when the vehicle is met with an accident or if it hits any object, it can be detected, after detecting which is sensed by the microcontroller. After sensing the signal, the corresponding action is done by the microcontroller.

This project consists of wireless communication for communication with the accident sense system and the Pre-set of treatment centre. The main part is the Pre-set of treatment unit, which acts as an Information processing unit. Individual vehicle is equipped with a system called as accident sense system, which consists of GSM and GPS. When the accident occurred, Vehicles state and locations will be transmitted to the Pre-set of treatment centre though wireless communication technologies of GSM through short message format. Location information of the vehicle is tracked using the GPS module. The information of mobile vehicle is transmitted to the Pre-set of treatment unit. The Pre-set of treatment unit consists of the microcontroller with and GSM module. The GSM module in this section receives the short messages transmitted from each of the vehicle when accident occurs. After receiving related information, the treatment centre will display this information on its map i.e. on PC. In this project, in order to obtain the vehicle engine temperature, we use temperature sensor. Initially this temperature value has to be read and fed to the microcontroller. If the temperature value is exceeds the 50^0 C, then the vehicle engine is off and a text message is send to the owner about the engine is over heat. This temperature value has to be sensed. Thus a sensor has to be used and the sensor used in this project is LM35. It converts temperature value into electrical signals. LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated.

Microcontroller: The LPC2141/42/44/46/48 microcontrollers are based on a 16-bit/32-bit ARM7TDMI-S CPU with real-time emulation and embedded trace support, that combine microcontroller with embedded high speed flash memory ranging from 32 kB to 512 kB. A 128-bit wide memory interface and

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a 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 code by more than 30 % with minimal performance penalty. Due to their tiny size and low power consumption, LPC2141/42/44/46/48 are ideal for applications where miniaturization is a key requirement, such as access control and point-of-sale. Serial communications interfaces ranging from a USB 2.0 Full-speed device, multiple UARTs, SPI, SSP to I2C-bus and on-chip SRAM of 8 kB up to 40 kB, make these devices very well suited for communication gateways and protocol converters, soft modems, voice recognition and low end imaging, providing both large buffer size and high processing power. Various 32-bit timers, single or dual 10-bit ADC(s), 10-bit DAC, PWM channels and 45 fast GPIO lines with up to nine edge or level sensitive external interrupt pins make these microcontrollers suitable for industrial control and medical systems.

Watchdog Timer: The purpose of the watchdog is to reset the microcontroller within a reasonable amount of time if it enters an erroneous state. When enabled, the watchdog will generate a system reset if the user program fails to 'feed' (or reload) the watchdog within a predetermined amount of time.

Real Time Clock: The RTC is designed to provide a set of counters to measure time when normal or idle operating mode is selected. The RTC has been designed to use little power, making it suitable for battery powered systems where the CPU is not running continuously (Idle mode).

Crystal Oscillator: On-chip integrated oscillator operates with external crystal in range of 1 MHz to 25 MHz. The oscillator output frequency is called fosc and the ARM processor clock frequency is referred to as CCLK for purposes of rate equations, etc. fosc and CCLK are the same value unless the PLL is running and connected.

Transformer: Usually, DC voltages are required to operate various electronic equipment and these voltages are 5V, 9V or 12V. But these voltages cannot be obtained directly. Thus the a.c input available at the mains supply i.e., 230V is to be brought down to the required voltage level. This is done by a transformer. Thus, a step down transformer is employed to decrease the voltage to a required level.

Rectifier: The output from the transformer is fed to the rectifier. It converts A.C. into pulsating D.C. The rectifier may be a half wave or a full wave rectifier. In this project, a bridge rectifier is used because of its merits like good stability and full wave rectification.

Filter: Capacitive filter is used in this project. It removes the ripples from the output of rectifier and smoothens the D.C. Output received from this filter is constant until the mains voltage and load is maintained constant. However, if either of the two is varied, D.C. voltage received at this point changes. Therefore a regulator is applied at the output stage.

Voltage Regulator: As the name itself implies, it regulates the input applied to it. A voltage regulator is an electrical regulator designed to automatically maintain a constant voltage level. In this project, power supply of 5V and 12V are required. In order to obtain these voltage levels, 7805 and 7812 voltage regulators are to be used. The first number 78 represents positive supply and the numbers 05, 12 represent the required.

RS232 Cable: To allow compatibility among data communication equipment, an interfacing standard called RS232 is used. Since the standard was set long before the advent of the TTL logic family, its input and output voltage levels are not TTL compatible. For this reason, to connect any RS232 to a microcontroller system, voltage converters such as MAX232 are used to convert the TTL logic levels to the RS232 voltage levels and vice versa.

MAX 232: Max232 IC is a specialized circuit which makes standard voltages as required by RS232 standards. This IC provides best noise rejection and very reliable against discharges and short circuits. MAX232 IC chips are commonly referred to as line drivers.

To ensure data transfer between PC and microcontroller, the baud rate and voltage levels of Microcontroller and PC should be the same. The voltage levels of microcontroller are logic1 and logic 0 i.e., logic 1 is +5V and logic 0 is 0V. But for PC, RS232 voltage levels are considered and they are: logic 1 is taken as -3V to -25V and logic 0 as +3V to +25V. So, in order to equal these voltage levels, MAX232 IC is used. Thus this IC converts RS232 voltage levels to microcontroller voltage levels and vice versa.

GSM: GSM (Global System for Mobile communication) is a digital mobile telephone system that is widely used in Europe and other parts of the world for transmitting mobile voice and data services. GSM uses a variation of Time Division Multiple Access (TDMA) and is the most widely used of the three digital wireless telephone technologies (TDMA, GSM, and CDMA). GSM digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. It

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operates at either the 900 MHz or 1,800 MHz frequency band.

GPS Technology: The Global Positioning System (GPS) is a satellite based navigation system that sends and receives radio signals. A GPS receiver acquires these signals and provides the user with information. Using GPS technology, one can determine location, velocity and time, 24 hours a day, in any weather conditions anywhere in the world for free. GPS was formally known as the NAVSTAR (Navigation Satellite Timing and Ranging). Global Positioning System was originally developed for military. Because of its popular navigation capabilities and because GPS technology can be accessed using small, inexpensive equipment, the government made the system available for civilian use. The USA owns GPS technology and the Department of Defense maintains it.

Vibration Sensor: Here we use a ceramic piezoelectric buzzer plate for vibration detection. Piezoceramic buzzers generate sound through the bending vibrations of a thin metal plate adhered to a piezoceramic disc.

Temperature Sensor (LM35): In this project, in order to obtain the vehicle engine temperature, we use temperature sensor. Initially this temperature value has to be read and fed to the microcontroller. This temperature value has to be sensed. Thus a sensor has to be used and the sensor used in this project is LM35. It converts temperature value into electrical signals. LM35 series sensors are precision integrated-circuit temperature sensors whose output voltage is linearly proportional to the Celsius temperature. The LM35 requires no external calibration since it is internally calibrated. The LM35 does not require any external calibration or trimming to provide typical accuracies of ±1⁄4°C at room temperature and ±3⁄4°C over a full −55 to +150°C temperature range.

III. EXPECTED RESULTS

The information is transmitting between the above two sections with the help of GSM module. The GSM is also send a text message to the owner about status of the vehicle and by using this system we can reduce dead percentage of people using the wireless communication technologies, and we can also find the accident occurred location using GPS technology.

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