Vehicle Monitoring and Tracking System based on ARM7 and Android Application

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ABSTRACT

A vehicle monitoring and tracking system gives the better solutions in the security issues of various applications. Based on ARM7 and android application is designed and implemented for monitoring the vehicle based on location. Security to this system can be provided using finger print module for authentication purpose. The vehicle will be started only when the authorized person enters into the vehicle and provides finger print to biometric device so that by using this authentication process we can avoid misusing of vehicle and thefts. The GPS is a one of location reorganization technology that is used in several applications. GPS is also used for vehicle tracking and monitoring. The tracking system of our proposed system informs the location and route travelled by vehicle and also the GSM technology is used for sending alert message to mobile. In our proposed system we are making use of LPG Gas leakage sensor MQ2 and temperature sensor LM35 to provide a safety for the travelers.

KEYWORDS: *Vehicletracking,ARM7,sensors,fingerprintmodule,GPS,GSM.*

I. INTRODUCTION

Vehicle tracking technology allows seeing our vehicle location and other features through the GPS system Vehicle Tracking and monitoring System is the technology used to determine the location of a vehicle using different methods like GPS, GSM and ARM7. This system is an important tool for tracking each vehicle at a given period of time and now it is becoming increasingly popular for people having expensive cars and hence as a theft prevention and retrieval device. The system consists of modern hardware and software components enabling one to track their vehicle. In order to reduce man power and saving of money, here the system provides easy tracking solution using Embedded Board. This system gets tracking information of the vehicles like vehicle location, Date, Time. And also provides safety mechanisms with the help of temperature sensor and gas leakage sensor. Hence in the case of raising the temperature inside the vehicle due to some reason or leakage of the LPG gas inside the vehicle, the alert message get send to the authenticated persons. The GSM module is used which transmit

the updated vehicle information such as sensors values and alert messages to the authenticated users and remotely located users can get those vehicle information on Smartphone. That shows the real time vehicle location in the Smartphone [3]. Thus, users will be able to continuously monitor a moving vehicle on demand using the Smartphone and determine the estimated distance and time for the vehicle to arrive at a given destination. Some of the functional unit of the vehicle tracking system is consists of 32 bit microcontroller, GPS Modem, finger print module, GSM modem and LCD. First we need to initialize the finger print module, GPS, GSM and LCD. Since we are using GPS by using latitude and longitude we can find out the vehicle position.

II. SYSTEM ANALYSIS AND REQUIREMENTS

As shown in the figure 1 of the vehicle tracking system; here we interface GPS module, GSM module, finger print module, LPG gas sensor and temperature sensor with ARM7 microcontroller. And also we design power supply for all the components. The proposed system controlled with

ARM7. It is placed inside the vehicle, once the enrolled finger template matches with the already stored finger template all components are get initialized. After that GPS and GSM SIM300 module communicate with ARM7. The latitudes and longitudes current path received from GPS get compared with the already stored latitudes and longitudes. If latitudes and longitudes not match with stored one then it give alert massage will get sent to the owners mobile using GSM module. Here for tracking the vehicle, the proposed system provides login facility on web page for Vehicle owner, students and their parents, also proposed system provides student's safety with the help of temperature sensor LM35 and gas leakage sensor MQ2. These sensors get interface with ARM7. If the temperature inside the vehicle crosses the specific value or LPG gas get leakage inside the vehicle then the alert message will sent to the vehicle's owner. Likewise safety mechanism provided by system.
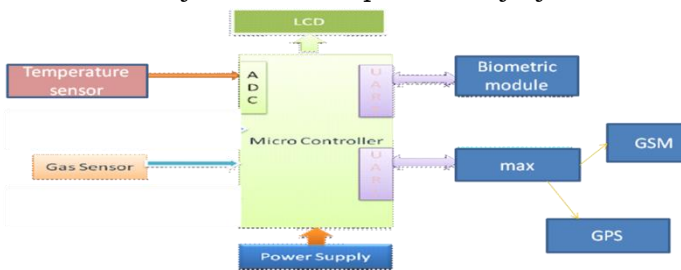

Figure 1 complete block diagram of the vehicle tracking and monitoring system

A. GSM Module

A GSM modem is a specialized type of modem, which accepts a SIM card, and operates over a subscription to a mobile operator, just like a mobile phone. From the mobile operator perspective, a GSM modem looks just like a mobile phone [. A GSM modem can be a dedicated modem device with a serial, USB or Bluetooth connection, or it may be a mobile phone that provides GSM modem capabilities.GSM/GPRS RS232 Modem from LABZ is built with SIMCOM Make SIM900 Quad-band GSM/GPRS engine, works on frequencies 850 MHz, 900 MHz, 1800 MHz and 1900 MHz it is very compact in size and easy to use as plug in GSM Modem [5]. The Modem is designed with RS232 Level converter circuitry, which allows you to directly interface PC Serial port .The baud rate can be configurable from 9600-115200 through AT command. Initially Modem is in Auto baud mode. This GSM/GPRS RS232 Modem is having internal TCP/IP stack to enable you to connect with internet via GPRS. It is suitable for SMS as well as DATA transfer application in M2M interface. The

modem needed only 3 wires (Tx, Rx, GND) except Power supply to interface with microcontroller/Host PC. The built in Low Dropout Linear voltage regulator allows you to connect wide range of unregulated power supply (4.2V -13V) to send & Read SMS [5].

B. GPS Receiver

The hardware interfaces for GPS units are designed to meet NMEA requirements. The GPS receiver provides data in NMEA 0183format with a 1Hz update rate. Generally message received by GPS is in NMEA [National Marine Electronics Association] message format and NMEA protocol which is most commonly used is NMEA0183 protocol. GPS sentences beginning with the following specifications:$GPGGA, $GPGSA, $GPGSV, $GPRMC, and $GPVTG. And sentences also begins with $GPMSS, $GPZDA.

C. Biometric Module

First the user has to confirm its identification before entering. For user identification finger print sensor is used. The finger print sensor is attached to arm processor. The role of arm processor will be to access the finger print sensor by using its commands. There is Serial Communication between Finger Print Module and microcontroller. The operations carried out will be as follows:
i] Adding the members.
ii] Matching the members;
iii] Checking whether members are valid or invalid. The user will first put her/his thumb on sensor. Matching will be done from sensor data base. If match found then access will be granted, detail of member will be displayed on the LCD screen.

D. Temperature Sensor

A simple temperature sensor using one LM35. Precision Integrated-circuit temperature device with an output voltage linearly-proportional to the centigrade temperature. It can measure temperature from -55c to +150c. The voltage output of the LM35 increases 10mV per degree Celsius rise in temperature. LM35 can be operated from a 5V supply and stand by current is less than 60μA.The purpose of this sensor in this system is to monitor the temperature. It is designed that whenever the temperature goes beyond 40˚ C the vehicle tracking system has to send the SMS to vehicle owner and displayed on LCD board. Temperature sensor LM35 is interfaced to the microcontroller. The conversion of Celsius and

Fahrenheit is done by certain formula. The output is displayed in the serial monitor.

E. Gas Sensor

Gas Sensor MQ2 Sensitive material of MQ-2 gas sensor is SnO2, which with lower conductivity in clean air. When the target combustible gas exist, the sensor's conductivity is higher along with the gas concentration rising. Use simple electro circuit, Convert change of conductivity to correspond output signal of gas concentration. If the GAS concentration is higher than vehicle tracking and monitoring system has to send the SMS to vehicle owner and the output is displayed in the serial monitor.

III. RESULT

We are using a Biometric module for Authentication purpose. Vehicle will starts when only the authorized person finger enrollment matches with the stored template, it is also gives the security from the vehicle thief. In the GPS device interact with satellite and gives the current latitude and longitude values. These values are compared with already stored latitude and longitude values, if both values match it shows location are matched. Otherwise it shows location is not found. Using GSM message will send to the mobile. Using that v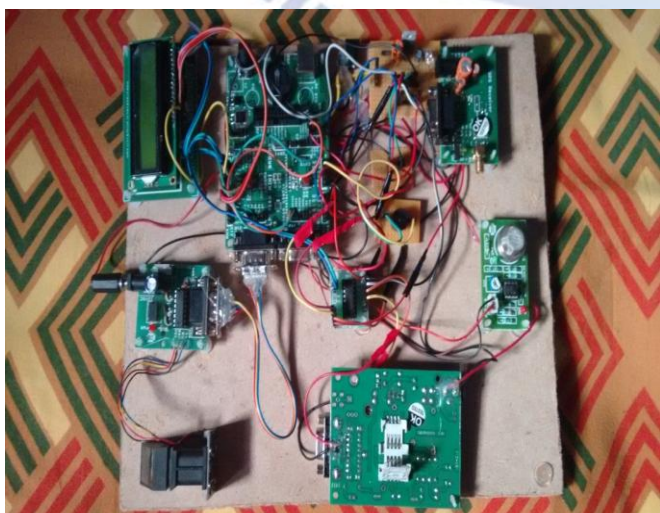alue we can track the current location of vehicle. In this module GPS device interact with satellite and gives the current latitude and longitude values. These values are compared with already stored latitude and longitude values, if both values match it shows location are matched. Otherwise it shows location is not found. Using GSM message will send to the mobile. Using that value we can track the current location of vehicle
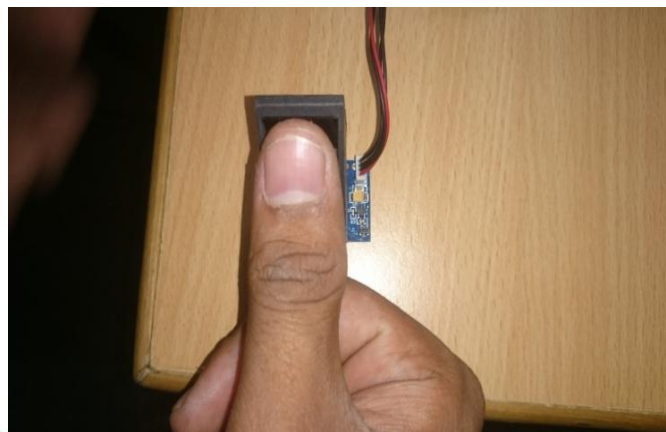

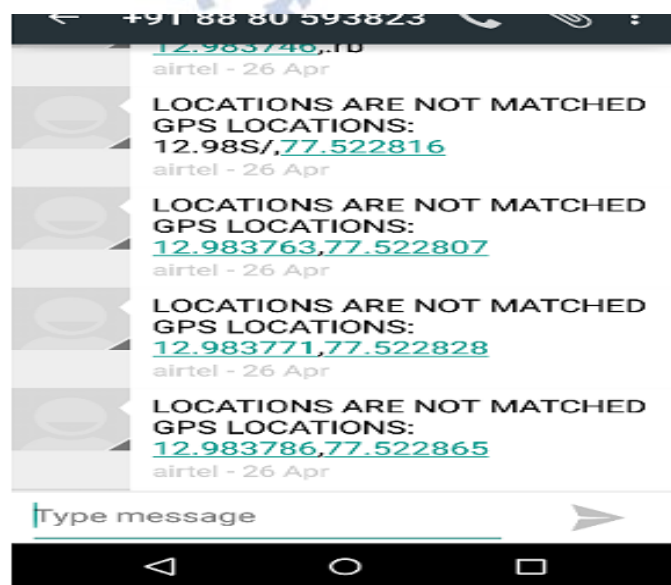**Figure 3 scanning of the fingerprint**

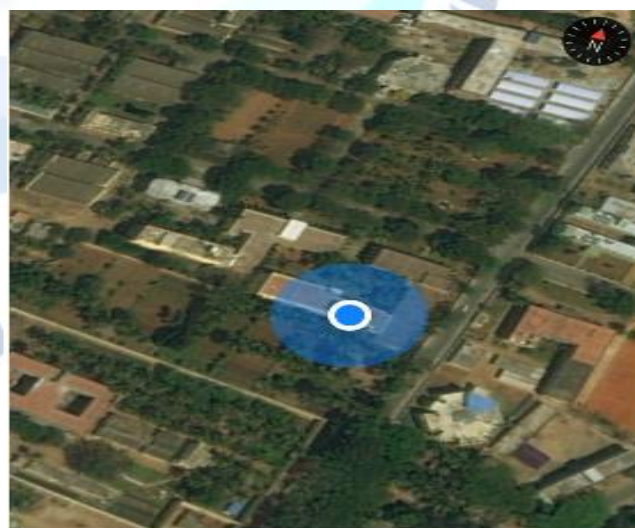**Figure 4 location latitude and longitude values from GPS through GSM**

Figure 5 pointed location

The figure 2 shows the overall project module and the desired outputs are successfully obtained.

Figure 2 Complete project modules

The figure 3 shows the scanning of finger to enroll the finger. The figures 4 and 5 show the SMS alert of latitude and longitude of current vehicle location and pointing of location using map. Here in the case of raising the temperature inside the vehicle due to some reason or leakage of the LPG gas inside the vehicle, the alert message get send to the authorized person.

IV. CONCLUSION

The proposed system makes good use of GPS and android applications by providing safe and secure traveling to the travelers. This is done using wrong path alert mechanism. It helps to find the current location of vehicle. Biometric module provides the safety of vehicle by authenticating the driver. Traveler's safety mechanism is also provided using temperature and LPG gas leakage sensors. As per traveler's safety concern, the proposed system also gives alert massage to authorized mobile so that authorized person also knows about their traveler's safety.

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