

Intelligent Wireless Embedded System for Vehicle Control in Transportation System Based on GSM and GPS Technology

S.Srivani¹, M.Haritha², K. Sumalatha³

Assoc Professor¹, Assoc Professor², Asst Professor³

srivani1972@gmail.com¹, mgharitha@gmail.com², kadire.suma@gmail.com³

Malla Reddy Engineering College for Women, Hyderabad, Telangana State, India

Abstract— Currently almost of the public having an own vehicle, theft is happening on parking and sometimes driving insecurity places. The safe of vehicles is extremely essential for public vehicles. Vehicle security and accident prevention is more challenging. So in order to bring a solution for this problem this system can be implemented. Vehicle security enhancement and accident prevention system can be developed through the application of ignition control (tracking and locking), fuel theft, accident detection and prevention, driver fatigue, pollution control and speed limiting with efficient vehicle management system. The need for this project is to provide security to the vehicles by engine locking system which prevents the vehicle from unauthorised access. This technique helps to find out the exact location of the accident and with the help of server an emergency vehicle can be sent to the exact location to reduce the human life loss. It also detects the behaviour of the driver through sensors whether he/she is drowsy or drunk, so that occurrence of accident can be prevented. The place of the vehicle identified using Global Positioning system (GPS) and Global system mobile communication (GSM). This is more secured, reliable and low cost. **Index Terms—** Vehicle Tracking, Locking, embedded System, GPS, GSM.

I. INTRODUCTION

The GPS/GSM based System is one of the most important systems, which integrate both GSM and GPS technologies. It is necessary due to the many of applications of both GSM and GPS systems and the wide usage of them by millions of people through out the world [1]. This system designed for users in land construction and transport business, provides real-time information such as location, speed and expected arrival time of the user is moving vehicles in a concise and easy-to-read format. This system may also useful for communication process among the two points.

Currently GPS vehicle tracking ensures their safety as travelling.

This vehicle tracking system found in clients vehicles as a theft prevention and rescue device. Vehicle owner or Police follow the signal emitted by the tracking system to locate a robbed vehicle in parallel the stolen vehicle engine speed going to decreased and pushed to off. After switch of the engine, motor cannot restart without permission of password. This system installed for the four wheelers, Vehicle tracking usually used in navy operators for navy management functions, routing, send off, on board information and security. The applications include monitoring driving performance of a parent with a teen driver. Vehicle tracking systems accepted in consumer vehicles as a theft prevention and retrieval device. If the theft identified, the system sends the SMS to the vehicle owner. After that vehicle owner sends the SMS to the controller, issue the necessary signals to stop the motor.

In this paper, proposed method is presented in section 2 and related technology in section 3. The sensors used in the vehicle tracking and locking System are described in section 4 and section 5 gives the conclusion.

II. PROPOSED METHOD

In this proposed work, a novel method of vehicle tracking and locking system used to track the theft vehicle by using GPS and GSM technology. This system puts into sleeping mode while the vehicle handled by the owner or authorized person otherwise goes to active mode, the mode of operation changed by in person or remotely. If any interruption occurred in any side of the door, then the IR sensor senses the signals and SMS sends to the microcontroller. The controller issues the message about the place of the vehicle to the car owner or authorized person. When send SMS to the controller, issues the control signals to the engine motor. Engine motor speeds are gradually decreases and come to the off place. After that all the doors locked. To open the door or restart the engine, authorized person needs to enter the passwords. In this method, tracking of vehicle place easy and doors locked automatically, thereby thief cannot get away from the car.

- Accident location and vehicle theft identification involves vehicle tracking using GPS technology.
- Vehicle security is enhanced by ignition control system.
- Anti-vehicle theft using engine locking system.
- Fuel theft can be prevented by monitoring the fuel level in fuel tank.
- Accident identification system provides the location at which accident occurs.
- Driver fatigue system provides information about drivers heart beat rate, eye blink rate which prevent accident because of the drowsiness or drunk and drive by the driver.
- Obstacle detection system helps in stopping the vehicle when an obstacle is detected using IR sensor and pollution detection helps in controlling pollution from vehicle using CO sensor.
- GSM and GPS is used for tracking the location of vehicle and for providing Short Message Service (SMS).

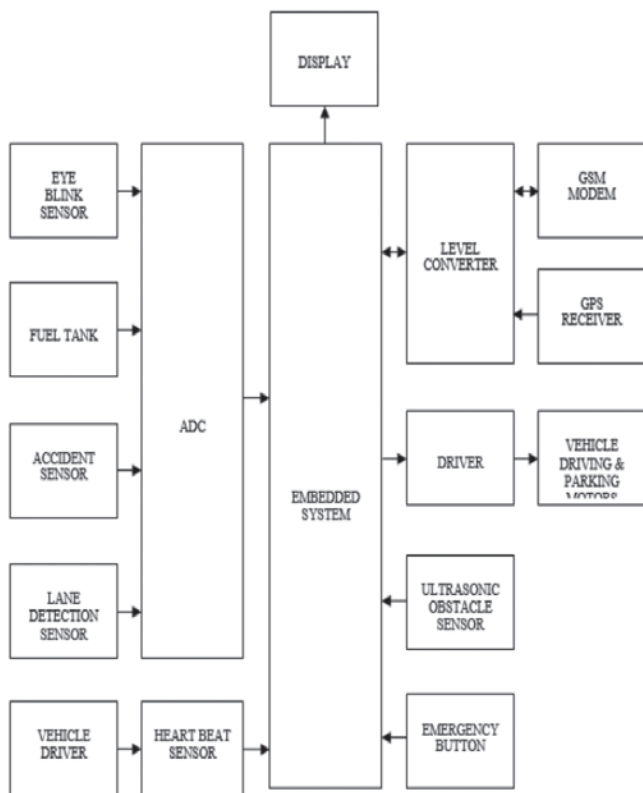


Fig.1. Block diagram of Vehicle tracking and locking system based on GSM and GPS

III. TECHNOLOGY

A. GPS Technology

The Global Positioning System (GPS) is a satellite-based navigation system consists of a network of 24 satellites located into orbit. The system provides essential information to military, civil and commercial users around the world and which is freely accessible to anyone with a GPS receiver. GPS works in any weather circumstances at anywhere in the world.

A GPS receiver must be locked on to the signal of at least three satellites to estimate 2D position (latitude and longitude) and track movement. With four or more satellites in sight, the receiver can determine the user's 3D position (latitude, longitude and altitude). Once the vehicle position has been determined, the GPS unit can determine other information like, speed, distance to destination, time and other. GPS receiver is used for this research work to detect the vehicle location and provide information to responsible person through GSM technology.

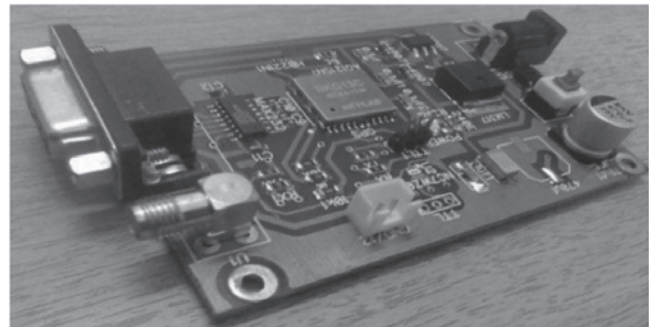


Fig.2. GPS module

B. GSM Modem SIM300 V7.03

The GSM modem is a specialized type of modem which accepts a SIM card operates on a subscriber's mobile number over a network, just like a cellular phone. It is a cell phone without display. Modem sim300 is a triband GSM/GPRS engine that works on EGSM900MHz, DCS1800MHz and PCS1900MHz frequencies. GSM Modem is RS232-logic level compatible, i.e., it takes -3v to -15v as logic high and +3v to +15 as logic low. MAX232 is used to convert TTL into RS232 logic level converter used between the microcontroller and the GSM board. The signal at pin 11 of the microcontroller is sent to the GSM modem through pin 11 of max232. This signal is received at pin 2 (RX) of the GSM modem. The GSM modem transmits the signal from pin3 (TX) to the microcontroller through MAX232, which is received at pin 10 of IC1 [9].

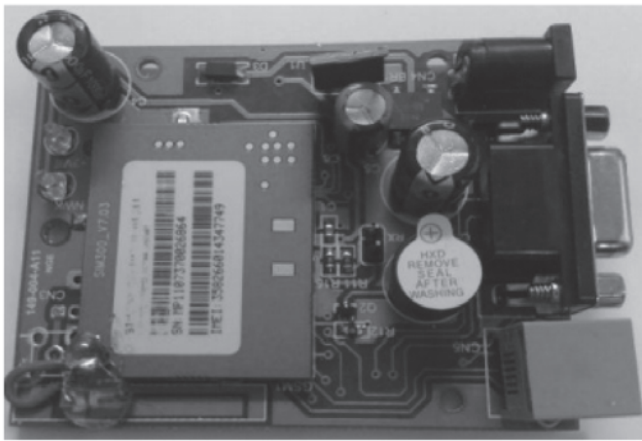


Fig.3. GSM module

IV. SENSORS

A. Eyeblink Sensorm

Vehicle accidents are most common if the driving is inadequate. These happen on most factors if the driver is drowsy or if he is alcoholic. If sensor detects that the driver is unconscious while driving in traffic or at the middle of the road, the vehicle is expected to detect the edge of the road and then stop. If it does so the vehicle may not disturb the other vehicles.

B. IR Sensor

IR Transmitter is an LED which emits infrared rays. IR Receiver is used to receive the IR rays. Both IR transmitter and receiver should be placed straight line to each other. The transmitted signal is given to IR transmitter whenever the signal is high, the IR transmitter LED is conducting and it passes the IR rays to the receiver. The IR receiver is connected with comparator.

C. Gas Sensor

The system has two modules namely the Gas sensing module and the Obstacle detection module and they are interfaced with the microcontroller.

Obstacle Sensing Module

The obstacle sensing module is used to sense such that, accidents due to unwanted parking of the vehicles and collision with trees and other objects especially during the night time could be avoided. These obstacles could be detected using various methods such as ultrasonic sensors.

Gas sensing module

The gas sensing module is used to sense the presence of toxic gases such as CO, LPG, Alcohol and other toxic gases inside the vehicle. If critical levels of gases were found, the CO exceeds 20ppm and the level of LPG exceeds 10,000ppm and the

presence of alcohol is detected then the digital data from the gas sensing module is sent to the microcontroller which displays the information about the gas leakage inside the vehicle and produces an alarm to alert the persons inside the vehicle. It also sends a text message to the authorized person through GSM modem connected to the microcontroller such that remedy measures could be taken by the authorized person and to give proper medical treatment to them if required.

D. Float Level Sensor

Level sensors detect the level of substances that flow, including liquids, slurries, granular and materials. Fluids and fluidized solids flow to become essentially level in their containers (or other physical boundaries) because of gravity whereas most bulk solids pile at an angle of repose to a peak. The substance to be measured can be inside a container or can be in its natural form (e.g., a river or a lake). The level measurement can be either continuous or point values. Continuous level sensors measure level within a specified range and determine the exact amount of substance in a certain place, while point-level sensors only indicate whether the substance is above or below the sensing point. Generally the latter detect levels that are excessively high or low. There are many physical and application variables that affect the selection of the optimal level monitoring method for industrial and commercial processes. The selection criteria include the physical: phase (liquid, solid or slurry), temperature, pressure or vacuum, chemistry, dielectric constant of medium, density (specific gravity) of medium, agitation (action), acoustical or electrical noise, vibration, mechanical shock, tank or bin size and shape. Also important are the application constraints: price, accuracy, appearance, response rate, ease of calibration or programming, physical size and mounting of the instrument, monitoring or control of continuous or discrete (point) levels.

E. Heart Beat Sensor

The circuit is designed to measure the heart rate. IR transmitter and receiver measure the heart rate. Infrared transmitter is one type of LED, which emits infrared rays generally called as IR Transmitter. Similarly IR Receiver is used to receive the IR rays transmitted by the IR transmitter. One important point is both IR transmitter and receiver should be placed straight line to each other. The IR transmitter and receiver are placed in the pulse rate sensor. When we want to measure the pulse rate, the pulse rate sensor has to be clipped in the finger. The IR receiver is connected to the Vcc through the resistor which acts as potential divider. The potential divider output is connected to amplifier section. When supply is ON the IR transmitter passes the rays to the receiver. Depending on the blood flow, the IR rays are interrupted. Due to that IR receiver conduction is interrupted so variable pulse signals are generated in the potential divider point which is given to A1 amplifier through

the capacitor C1. The coupling capacitor C1 is used to block the DC component because the capacitor reactance is depends on the frequency. For DC component the frequency is zero so the reactance is infinity now capacitor acts as open circuit for DC component.

F. Ultrasonic Sensor

Ultrasonic sensors (also known as transceivers when they both send and receive) work on a principle similar to radar or sonar which evaluate attributes of a target by interpreting the echoes from radio or sound waves respectively. Ultrasonic sensors generate high frequency sound waves and evaluate the echo which is received back by the sensor. Sensors calculate the time interval between sending the signal and receiving the echo to determine the distance to an object. This technology can be used for measuring wind speed and direction (anemometer), fullness of a tank and speed through air or water. For measuring speed or direction a device uses multiple detectors and calculates the speed from the relative distances to particulates in the air or water. To measure the amount of liquid in a tank, the sensor measures the distance to the surface of the fluid. Further applications include: humidifiers, sonar, medical ultrasonography, burglar alarms and non-destructive testing. Systems typically use a transducer which generates sound waves in the ultrasonic range, above 18,000 hertz, by turning electrical energy into sound, then upon receiving the echo turn the sound waves into electrical energy which can be measured and displayed. The technology is limited by the shapes of surfaces and the density or consistency of the material.

V. CONCLUSION

In this paper, we have proposed method of vehicle tracking and locking systems used to track the theft vehicle by using GPS and GSM technology. This system puts into the sleeping mode when vehicle is handled by the owner or authorized persons; otherwise goes to active mode. The mode of operations changed by persons or remotely. When the theft identified, the responsible people send SMS to the micro controller, then issue the control signals to stop the engine motor. After that all the doors locked. To open the doors or to restart the engine authorized person needs to enter the passwords. In this method, we easily track the vehicle place and doors locked.

- Thus in this project we have provided the means of accident prevention using eye blink sensor, accident sensor wherein the vehicle is stopped immediately and intimated wherever needed.
- It involves automated security system that provides high security to driver through the use of GPS and GSM technologies.
- It involves obstacle detection with lane detection for efficient vehicle parking management at emergency situation.
- The GPS and GSM have been used for tracking the vehicles to identify the accident and theft location.
- This system has been incorporated as a single unit inside the vehicle.

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