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AN INTELLIGENT AUTOMOBILE ANTI-THEFT SYSTEM

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ABSTRACT

Security, especially theft security of vehicle in common parking places has become a matter of concern. An efficient automotive security system is implemented for anti-theft using an embedded system integrated with Global Positioning System (GPS) and Global System for Mobile Communication (GSM).This proposed work is an attempt to design and develop a smart anti-theft system that uses GPS and GSM system to prevent theft and to determine the exact location of vehicle. GSM system is also installed in the vehicle for sending the information to the owner of the vehicle because GPS system can only receive the vehicle location information from satellites. The preventive measures like engine ignition cut-off, fuel supply cut of are installed in the vehicle which is controlled using user or owner's GSM mobile. The owner can lock or unlock his/her vehicle with the help of SMS. This complete system is designed taking into consideration the low range vehicles to provide them extreme security.

Key words: MEMS Accelerometer, Global system for mobile communication, Global positioning system.

INTRODUCTION

These day's vehicle robbery cases are higher than any other time, it has gotten to be fundamental to give a vehicle a superb security with the main solid hostile to burglary gadget Vehicle focal locking framework guarantees the best ensure to secure your vehicle from various types of burglary cases. It is a vehicle security gadget that offers fantastic insurance to your vehicle. However this framework couldn't demonstrate to give complete security and openness to the vehicle in the event of burglary. So a more created framework makes utilization of an inserted framework focused around GSM innovation[1,2].

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Architecture of the proposed system

The main objective of this paper is to design and develop a next generation vehicle theft prevention system with the following features.

Intelligent gravity lock: The system is armed automatically when the driver moves away from the vehicle. It is disarmed only when a specific gesture is made in the hand-held wireless key fob. The 3D gesture is made in mid-air and can be reprogrammed by the user on the fly. The air gesture is recognized using a 3-axis MEMS Accelerometer that senses the gravitational force exerted upon it. A stolen keyfob thus cannot be used to enter into the vehicle without performing the secret gesture. The password is stored in an external non-volatile serial EEPROM memory[3,5].

Keyless entry through gestures: If the gesture is valid the keyfob transmits a unique encrypted code that changes every time when this gesture is made. The keyfob communicates with automotive vehicle unit using IEEE 802.15.4 wireless networking protocol. This prevents thieves from detecting the static codes which were used in older keyless entry systems[4].

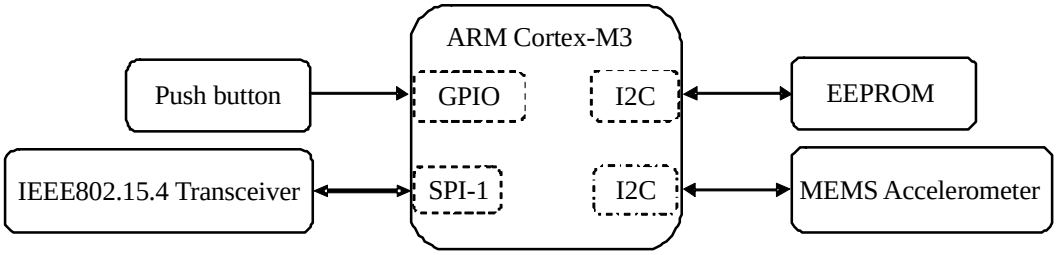

Fig. 1: Block diagram of smart key unit

Touch screen ignition: A unique touch gesture is made on the 65K Color Touch screen TFT Display that acts as the software key. The system verifies this and then accepts the hardware key, which is the actual keyfob normally used. This feature can be temporarily disabled and enabled via SMS sent by the owner. This is useful in situations such as when someone (like a mechanic) other than the owner wants to handle the vehicle and the owner does not want the other person to know the secret onscreen password. A serial EEPROM memory is used to store the password.

Adjustable motion alarm sensitivity: The vehicle unit constantly monitors the vehicle motion after being armed (locked). The integrated motion sensing subsystem measures the vehicles three dimensional position and detects any unauthorized motion if the

vehicles is moved or tilted that exceeds a threshold level When someone tries to break into the vehicle forcibly, the alarm triggers the siren and head lamps and sends an SMS to the owner.

Ubiquitous vehicle tracking: GPS and GSM technologies enable the vehicle owners to track and monitor the vehicle with cell phone at anytime from anywhere. The important enhancement in this feature is its ability to inform the vehicle position even during a GPS outage using dead reckoning method. This is achieved with the help of Inertial Navigation Sensors that consists of a 3-axis MEMS Magnetometer and a 3-axis MEMS Accelerometer which will act as a tilt compensated compass module.

Car finder: When the owner approaches the vehicle, the system automatically verifies the code from remote key and the vehicle emits a head light flash and horn beep to show its presence. This feature is known as car finder and it assists the owner to locate the vehicle in a parking lot where several vehicles are parked.

Remote fuel cut-off: This feature is very useful especially in case of auto theft. If the vehicle is somehow hacked into and taken, you can send message that will slowly cut-off the fuel supply, thereby disabling the vehicle. The fuel supply is cut off by a servo motor controlled valve.

Boundary indication via GPS: This feature restricts the vehicle movement within a particular area. For example, if the owner wants the car to move only within a particular city, once it moves out of city borders the owner would immediately receive an SMS alert as to the current location of the vehicle[6,7].

Hardware specifications

Power supply

A power supply provides a constant output regardless of voltage variations. "Fixed" three-terminal linear regulators are commonly available to generate fixed voltages of plus 3 V, and plus or minus 5 V, 9 V, 12 V, or 15 V when the load is less than about 7 amperes.

ARM cortex mo

The ARM Cortex™-M3 processor is the industry-leading 32-bit processor for highly deterministic real-time applications including microcontrollers, automotive body systems, industrial control systems and wireless networking and sensors.

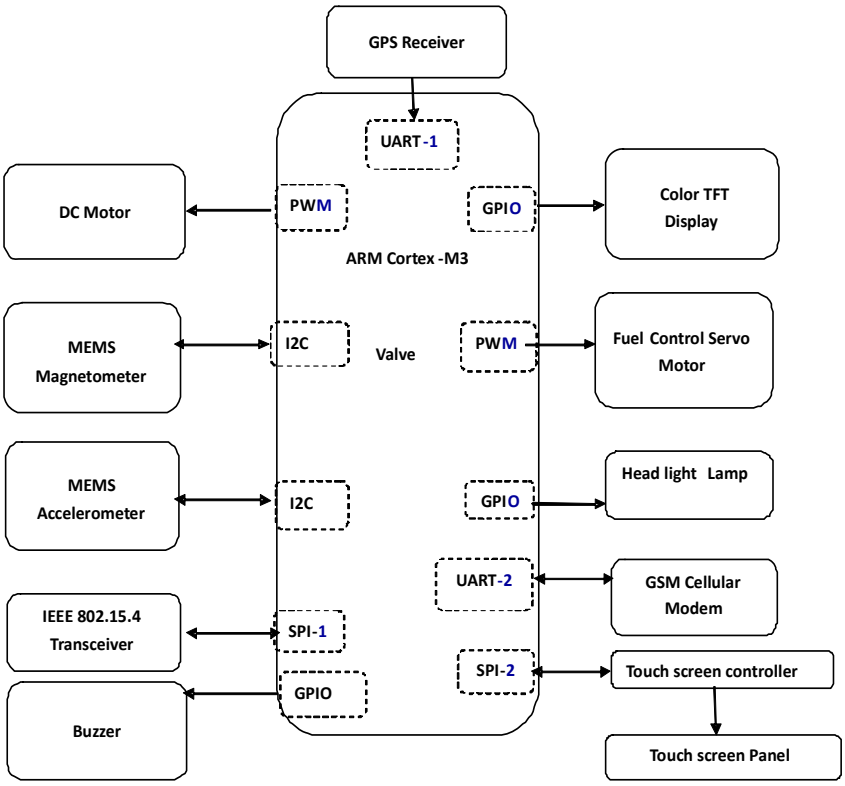

Fig. 2: Block diagram of vehicle unit

Serial peripheral interface

Serial Peripheral Interface is a simple interface, which enables to communicate microcontroller and peripheral chips or intercommunicate between two or more microcontrollers. SPI Bus uses synchronous protocol, where transmitting and receiving is guided by clock signal generated by master microcontroller.

I^2 C Protocol

I^2C is a multi-master serial computer bus invented by Philips that is used to attach low-speed peripherals to a motherboard, embedded system, or cell phone.

MEMS Accelerometer

An accelerometer is a device for measuring acceleration and gravity induced reaction forces. The LIS302DL is an ultra compact low-power three axes linear accelerometer. It includes a sensing element and an IC interface able to provide the measured acceleration to the external world through I2C/SPI serial interface.

RESULTS AND DISCUSSION

This paper describes an air gesture recognition system by using MEMS accelerometer. The innovative vehicle key is designed in which gesture key from key fob is compared with the stored key to secure opening of the vehicle door. This provides more protection to the vehicle even when the key fob is stolen. Also by adding many features like Cryptographic key less entry, keypad entry, adjustable motion alarm sensitivity, Remote fuel cut-off, GPS fencing etc the system becomes more secure.

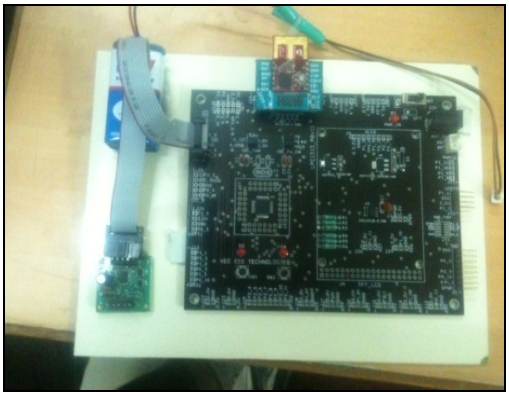

Fig. 3: Gravity lock key Fob

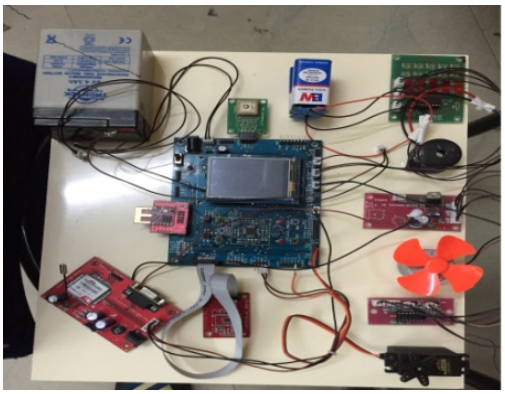

Fig. 4: Gravity lock vehicle unit

CONCLUSION

The smart automobile anti theft system designed is offering protection even when the keyfob is stolen. We call it the real smart keyfob. This unit allows us to track the vehicle even in GPS denied environments such as within buildings, underground and dense city regions. The present day motion and tilt alarms will alert the owner even for an unintentional touch by a passing person or an accidental hit by a ball from a playing child. Our system eliminates this with adjustable motion alarm sensitivity feature. A central user Interface to configure and customize the vehicle security system which is not present in the previous vehicle designs.

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