Fuel Theft Detection

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ABSTRACT: *Currently almost of the public have their own vehicle, fuel theft is happening in the parking where there is no CCTV surveillance or any kind of security. Vehicle security is more challenging. So in order to bring a solution for this problem this system can be implemented. In today's world, actual record of fuel filled and fuel consumption in vehicles is not maintained. It results in a financial loss. To avoid this microcontroller based fuel monitoring system is implemented. The system makes use of an embedded system based on Global System for Mobile communication (GSM) Technology and the LPC 2148 microcontroller. It is an ultra-low power, RISC architecture controller. It contains inbuilt 10 bit ADC, serial communication interface. Real Time Clock (RTC) is also provided to keep the track of time. In this project a try is given to program a GSM module incorporating to report occurrences of fuel theft detection automatically via the GSM communication platform (using SMS messaging).The main concept in this design is introducing the mobile or cell phone into an embedded system communication. The designed system is very simple & cost is low.*

Keywords-*Bike,GSM, Microcontroller, Mobile.*

I.   Introduction:

The idea behind the project is to detect the fuel theft attempted in the vehicle. This is done as to avoid loads of fuel losses takes place in private vehicles and various government transport facilities.As of now we are implementing this project on short term basis but it can be implemented on entire government transport services as well as private travelling services.The beauty of this project is one will know the theft has occurred while controller is sitting in office or anywhere in real time environment. Working on this project as electronics and telecommunication engineer we are making our country one step ahead by proper utilization of the taxes paid by Indian public.

In above project heart of the system is ARM7LPC2148, and GSM module.This can provideearly response and action can be taken in the real time.The whole project is based on Arm controller. Thiscontroller is used to coordinate all the activities in theSystem. The components details are ARM 7 (LPC2148),GSM module (SIM 900)and level float sensor.

II.   Existing System:

Conventional system included just a 3way fuel knob which had pipes on its either sides. The pipe was so easy to remove from that knob, so that the larcener could remove and hold that pipe directly into his bottle and steal the fuel. Existing system consists of a 3 way fuel valve with a provided key which is placedon the fuel cock. Fuel flows through it only when the key is plugged into it. But the main disadvantage is though it has a

key there is a part where the larcener could cut the pipe and do the fuel theft. One more disadvantage is owner had to carry two keys where one key entertaining is kind of burden.

III. Proposed System:

The aim to design and develop this system in the real time environment is to prevent the fuel theft. It consists of a microcontroller circuit and GSM module. This will be used in a bike with a battery. When the vehicle is in the parking or any place in idle mode and if someone tries to take off the fuel this system will detect the decreasing level of the fuel with the help of the float sensor and create an event. This event created by the microcontroller will send a SMS with help of the GSM module on owner's mobile phone and will also ring a buzzer or siren present in the bike.

The beauty of the system is that the larcener will not be able to deactivate this system because the system will be hidden in the side panel of the bike and also the buzzer will be hidden.
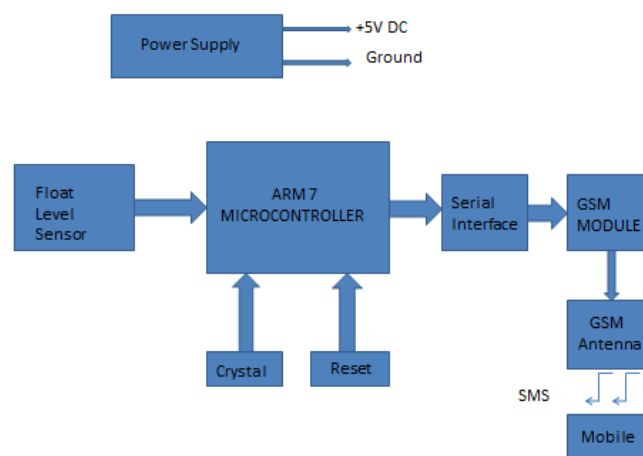

Figure1: Block Diagram of the System.

3.1 Level Sensor:

Level sensor with integral float actuator and a pitch thread with a choice of normally open, normally open high voltage, normally closed or change over contacts. It is capable of switching up to 265Vac/300Vdc at 10VA. It is ideally suited to liquid and air conditioning condensate and industrial process control applications.

Hermetically sealed, magnetically operated contacts continue to operate long after optical and other technologies fail due to contamination.

No standby power required.
Simple installation with thread and nut.

3.2micro-Controller

The LPC2148 microcontrollers are based on an ARM7 TDMI-S CPU with real-time emulation and embedded trace support that combine the microcontroller with embedded high-speed flash memory ranging from 32kB to 512kB. 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 code by more than 30 % with minimal performance penalty.

Due to their tiny size and low power Consumption, LPC2148 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 8kB up to 40kB, 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.

3.3 Reset Circuit:

Reset button is essential in a system to avoid programming pitfalls and sometimes to manually bring back the system to the initialization mode.

MCP 130T is a special IC used for providing stable RESET signal to LPC 2148.

3.4 Serial Interface:

RS-232 INTERFACE: The Electronics Industry Association (EIA) has produced standards like RS232 (1962), RS422, RS423, RS485 that deal with data communications. Communication as defined in the **RS232** standard is an asynchronous serial communication method. The word serial means, that the information is sent one bit at a time. Asynchronous tells us that the information is not sent in predefined time slots. Data transfer can start at any given time and it is the task of the receiver to detect when a message starts and ends.

Thesestandards allows the data transmission from one transmitter to One receiver at relatively slow data rates (up to 20 Kbytes/sec) and short distances up To 50ft with max baud rate but this distance can be increased at the cost of lower baud rates.

RS232 is preferred for interface between DTE and DCE employing Serial binary data interchange. The equipment at the far end of the connection is named the DTE device (Data Terminal Equipment, usually a computer or terminal),has a male DB25 connector, and utilizes 22 of the 25 available pins for signals or ground. Equipment at the near end of the connection (the telephone line interface) is named the DCE device (Data Circuit-terminating Equipment, usually a modem), has a female DB25 connector, and utilizes the same 22 available pins for signals and ground. The cable linking DTE and DCE devices is a parallel straight through cable with no crossover or self-connects in the connector hoods.

RS232 uses voltage level +3V to +25V for 0 and -3V to -25V for logic 1.

These signals are not TTL compatible. Therefore to interface TTL devices using RS232C it is essential to use line drivers and receivers. Generally MC1488, MC 1489 or MAX232 line drivers are used to make this standard TTL compatible.

MAX232: As mentioned earlier, RS232's voltage levels are not compatible with microcontroller so to make it compatible MAX232 is used, which is known as line drivers. It converts the TTL levels to RS232 voltage levels and vice versa.

Advantage of MAX232 is that it uses 5V power supply, which is same as for microcontroller.

It requires capacitor ranging from 1 to 22uF. Most widely used is 22uF.

3.5 Gsm Module:

Global System for Mobile Communications (GSM) is the most popular mobile phone system in the world. The name GSM first comes from a group called Group Special Mobile (GSM), which was formed in 1982 by the European Conference of Post and Telecommunications Administrations (CEPT) to develop a pan-European cellular system that would replace the many existing incompatible cellular systems already in place in Europe. But when GSM service started in 1991, the abbreviation "GSM" was renamed to Global System for Mobile Communications from Group Special Mobile.

GSM uses Frequency Division Multiplexing AND Time Division Multiplexing. FDMA divides the frequency ranges for GSM, which are 890-915, 935-960 and some others that the book didn't have. Each is divided into 200 kHz wide channels. As far as TDMA goes, each time slot is 577 micro seconds long, 8 time slices is a frame, lasting for a grand total of 4.615ms. A multi frame consists of 51 frames, 51 multi frames make up a Super frame, and 2048 Super frames make a Hyper frame which is 2715648 frames.

SMART CARD: The smart card is like a microcomputer which has memory, CPU and operating system. By programming the rom, it can store the sensitive data with very high security level. So it provides a good way to store the Ki and IMSI and other sensitive user data. A3 and A8 security algorithms are implemented in Subscriber identity module of a GSM mobile station.

IV.   Working:

The system detects whether the vehicle is turned off. If the fuel decreases while vehicle is turned offit triggers an event. This event is linked to message sending functionality and buzzer ringing functionality.

Fuel level sensing gauge will be connected to µC through an ADC. A GSM modem with a SIM card will be interfaced with µC. If the fuel level in the tank decreases while vehicle is in OFF state, then an alert will be sent to user's mobile in text form and also it will blow a siren fitted in the vehicle. The sharp ringing buzzer will distract the people around and also will let the larcener caught. The buzzer will not stop ringing until the

fuel level stops decreasing. Once the fuel level stops decreasing the buzzer will automatically stop ringing after 30seconds and also a message will be sent to the user/owner of the vehicle acknowledging that the theft has been taken care.

V.   Flowchart:
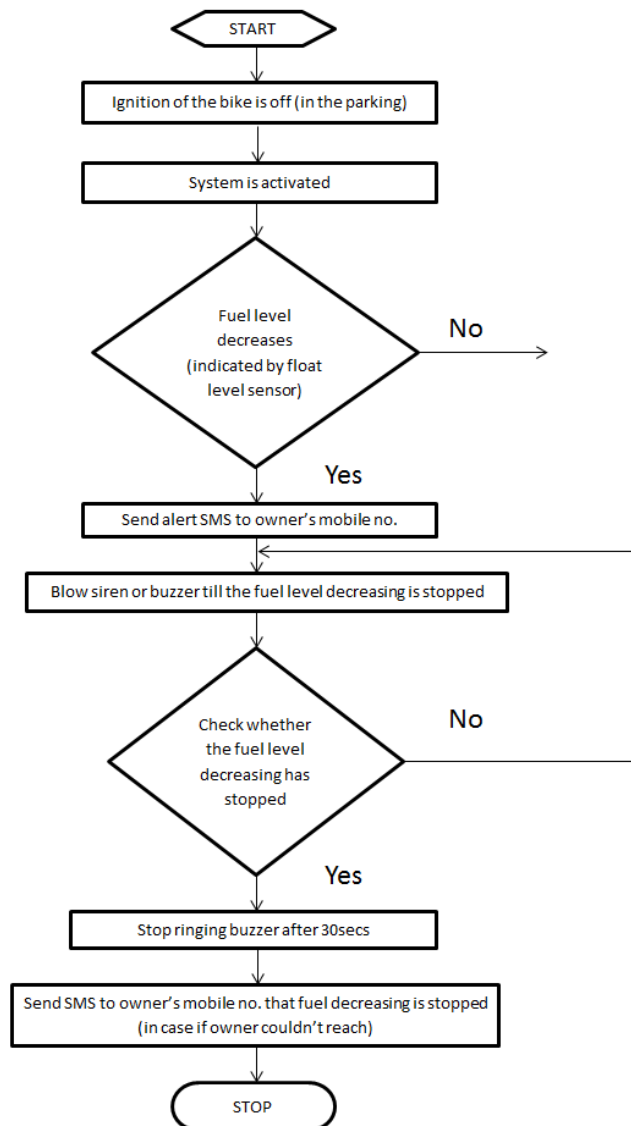
VI.   Result:

As a person tries to forcibly siphon fuel from the vehicle, the system alerts the user/owner via priority text message (SMS) while producing a sharp ringing sound to draw attention until the fuel siphoning stops, 30 seconds after which the system will shut down the ringing, about which, it will inform the user.

VII.   Conclusion And Future Scope:

This is a unique method of designing and implementing a low cost circuit to detect the fuel theft attempted by using GSM technology and ARM LPC2148. In future there is no doubt, that all of the vehicle will be embedded with this unique kit. The Proposed scheme will help us to solve the fuel theft problem. Hence the larceners will not be able to theft the fuel or vehicle by any chance and it provides the complete protection.

Ideally this system could be made more convenient and secure with the use of solenoid valve instead of

3way fuel valve so the system could also create an event to close the valve electrically when the theft is attempted. This design can be made more flexible in future to support camera, web based tracking software also PC based stand-alone software. Also the owner can register as many numbers from the family with system considering the system may fail when there is no network coverage area.

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