

DETECTION OF FUEL THEFT IN HEAVY VEHICLE

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ABSTRACT –

In the aspect to facilitate and enhance the vehicle's features such as speed, mileage and volumetric level of fuel by providing it with the detection of level and restrict illicit activities using sensor. It is implemented using Vehicle Area Network (VAN) and embedded design. It suggests a computerized technique in heavy vehicles. Due to the high costs, theft more and more every day and the results in a large loss. In the proposed system, owner of the vehicle immediately receive a message when the fuel tank is opened by the operator or by a fuel traded and also the height of the fuel tank when opening and closing of the tank. The poised system uses Wireless based communication for monitoring the vehicle's position. Initially, the process involves measuring fuel level followed by eliciting the information and sends it to the server for further detection. Finally, the message is sent along with vehicle position and fuel level in the tank. This enables in identifying the level of fuel at different times whenever the tank is opened. This improvement in sensors will be a great boon to eradicate fuel theft and vehicle positioning issues.

KEYWORDS- fuel theft; Vehicle Area Network (VAN); Wireless communication; fuel trafficker.

1. INTRODUCTION

Automation is mandatory to handle all type of systems. It is made possible by embedded design which is a combination of both computer and mechanical system, often with real-time computing constraints. In today's world, it is common to control most of the devices, by automation since it optimizes by reducing the size and cost of the product and increase the reliability and performance. Embedded systems are based on Microcontroller and their applications range from portable devices to large installations and it also extends to large complex systems. Specialized internal communications network which requires for vehicle control such as assurance of message delivery of non-conflicting messages. It is very common to transportation system that has been affected by many causes such as fuel theft, premature dry out, fuel leakage, and improper fuel consumption in engine and disputes during the fuelling of vehicle. These issues cause a drastic loss in fuel level, which in turn makes the authorities to get into a great trouble.

It leads to an excessive impact to the authorities because fuel theft is a major problem faced by the owners and drivers. It is a local error that occurs in the vehicle transported, because fuel theft offers the unauthorized persons in a beneficiary part. Since it leads to huge loss for the investors but at the same time, it paves a way for the people who involve in illegal activities. The proposed system examines to detect the amount of fuel that has been holdup. It determines the fuel theft in all aspects and intimates the authorities through messages. This systematic approach with the upcoming techniques will tend to reduce the fuel theft in an effective way which is the boon to our society.

1.1 Necessity for Protection

The logistics achieve a vast improvement in efficient delivery of goods. The technology improvement also helps to improve its development. But there is no proper solution to overcome the problems. Already, the sensor is fixed in fuel meter. When the fuel is reduced dramatically within a short range of time, the information is sent to the owner by SMS. When the fuel tank is opened, the counter is incremented to find out how many times the tank is opened and the information is sent to the owner by SMS.

1.2 Requirements for Protection

- Float Level Sensor's principle
- Information Retrieval techniques
- Wireless Tx-Rx
- Global Positioning System

2. LITERATURE SURVEY

2.1 Design and Implementation of a New Nonradioactive-Based Machine for Detecting Oil-water Interfaces in Oil Tanks

Ahmed M. Al-Naamany et al (2007) describes that a new ultrasound-based technique was developed to determine oil, emulsion and water level in the oil tank. It consists of a compact, programmable ultrasound-based multilayer level measuring device for a feed forward neural network is implemented. The advantages of this method over current methods include contactless distance measurement, higher precision, lower costs, easier configuration and non-ionizing radiation is used. The other advantage of this technology to light-based method is its insensitivity to a dusty and smoky environment and the independence of the object material and surface. Preliminary trials were carried out on the device.

A new ultrasound-based hardware device for multilayer level measurement (MLLM) is presented. This solution uses the fact that the ultrasonic characteristics of an emulsion or suspension vary significantly with varying disperse phase volume fraction. Actual results are very encouraging and show that the device can be easily measured with high accuracy. Moreover, since all its circuits are arranged outside the tank, the device can operate in hazardous to clean or sterile environments and cope with surface scum or soil mud. Therefore, the approach can also be extended to measure different types of media allow. The system was designed so that they can work in remote areas autonomously over long periods in which the environmental conditions (ie, temperature) vary within wide ranges.

2.2 Contactless Liquid-level Measurement Frequency-Modulated Millimetre Wave Through Opaque Container

Tatsuo Nakagawa et al (2013) describe a non-contact method for measuring liquid level by an opaque container is proposed. A millimeter-wave Doppler sensor is to detect by a target container developed, and measures the liquid level on the basis of the absorption of millimeter waves in the liquid. One of the challenges is to accurately measure liquid level

(sub-millimeter error) in spite of the inherently large beam diameter of the millimeter wave by diffraction. A piezoelectric vibrator permits accurate measurement by a limited portion of the spread beam to reflect and it is modulated in the frequency of the other part of the beam to differ. The feasibility of our proposed method for clearly an air-liquid interface detecting hidden in an opaque container is confirmed experimentally. The non-linearity error of the measured liquid level within 0.5 mm.

Level measurement necessary for various applications, such as factory automation, industrial processes and medical instruments. There is a wide variety of methods for measuring the level of which in the field of mechanical float and capacitive and optical sensors ultrasonic method. General capacitive level sensors measure the electrical capacitance between two electrodes immersed in a liquid and calculate the liquid level of the capacity. A capacitive sensor semi cylindrical mounted to a liquid container can measure liquid level, without coming into contact with the liquid, has, but its accuracy is not high, because the capacity of the distance between the container and the sensor is highly dependent. Optical sensors such as CCD cameras can measure fluid without the liquid with the image processing. However, to capture an image of the surface of the liquid, the container should be transparent, or the optical sensors should be introduced into the container. By the use of ultrasonic sensors, level can be calculated from the area between the sensor and the liquid surface. However, these sensors cannot be used for sealed containers. The principle of measurement is based on the absorption properties of a millimeter wave to a target liquid.

2.3 Embedded System of a Wireless-Based Theft Monitoring

S.Vijayaraghavan et al (2010) describes that ZigBee is a new global standard for wireless communication with the characteristics of low cost, low power consumption and low data rate. The design and implementation of a ZigBee-based wireless theft monitoring proposed in this paper. The experimental results show that the design to meet the basic needs of auto theft monitoring. It can act as a platform of wireless monitor system and provides a new hardware design approach for wireless ZigBee networks. The theft can be identified and a text message is sent through GSM. Simultaneously, the camera takes the picture at runtime. Wired systems are complex to manipulate any kind of circuit design. The system uses forzigbee module for data transmission system with the help of GSM and video camera. The main application of zigbee areas covers industrial control, consumer electronics, automotive automation, agricultural automation and medical equipment control. In the above automation system is the main application of theft monitoring system. In GSM based automation system, if the sensor is to detect the signal, so that GSM modem has to send the data to the specified mobile phone number, but the disadvantage of this system, when the mobile is outside the range, then message is not received. In video camera automation system, the camera takes the video all the time. Here the data is transmitted only via a wireless connection. When the phone goes out of range, then the recorded video data is not available.

2.4 Vehicle Monitoring and Theft Prevention System Using ARM Cortex

NurulHutha.S et al (2013) describes vehicle theft by professional thieves a persistent problem throughout the world and a greater challenge comes been. A modern vehicle uses remote keyless entry system and an immobilizer system as the main weapon against vehicle theft. But these systems do not prevent unauthorized access of the vehicle to some degree. Smart gravitational lock is used to prevent the theft by the air gesture keys used by the keychain of the vehicle, which provides a high level of safety for the vehicle. If it is not using Keychain, then the vehicle is ensured by touch screen ignition where the software key, where gesture on the touch screen. GPS and GSM technologies enable the vehicle owner from anywhere to track the vehicle at all times and monitor. While GPS outage environment inertial sensor is used, the 3-axis MEMS magnetometer and accelerometer contains that inform the vehicle positions to the owner by using dead reckoning method. To restrict movement of the vehicle within a certain range, GPS fencing, is used in the fence radius, can be programmed on the touch-screen display.

The integrated motion detection sub-system is used, the vehicle measures the 3-D position and to detect when the vehicle is moved or inclined, if the threshold is exceeded. With car theft, fuel supply is carried out slowly to cut off thereby disabling by sending the message the vehicle. To reduce the incidence of theft of the car and to be the intellectualized auto-guard demand of people's needs, the car with the accelerometer for secret key is made available gesture. To improve the safety and reliability of the vehicle, the unit between intellectualized protection and remote control. There are still some security holes that these technologies do not address. For example, while the immobilizer can prevent a thief from a car engine starting and driving, it is not in the location away from the professional thief towing, the car to stop.

The professional thieves can then remove the stolen vehicle and the components re-sell. GPS and GSM technologies enable the vehicle owner from anywhere to track the vehicle with the mobile phone at all times and monitor. The major improvement in this function is the ability to inform the vehicle position even during a GPS failure with Dead Reckoning method. This is achieved with the aid of inertial navigation sensors, the 3 -axis MEMS magnetometer and a 3 -axis MEMS accelerometer is one that compensates for the inclination compass module acts. If the owner approaches the vehicle, the system automatically checks the code of the remote button and the vehicle sends a head light flash and horn sound off to indicate its presence. This feature is known as car finder and it helps the owner the vehicle in a parking lot, where several vehicles are parked to find.

2.5 Real Time Vehicle Theft Identity and Control System Based on ARM 9

D. Narendar Singh et al (2013) describes, Due to the insecure environment, the ratio of vehicle theft increases rapidly. Due to this, manufacturers of luxury automobiles have to ensure the authorization for owners and also in built the anti- theft system to prevent the vehicle from theft. The proposed system

for intelligent cars to prevent loss or theft with Advanced RISC Machine (ARM) processor. It performs real-time user authentication (driver, who starts the engine) with face detection, the principle component analysis (PCA) algorithm. According to the comparison result (authentic or not), ARM processor triggers certain actions. If the result is not authentic ARM generates the signal blocking the car access (i.e. the interrupt signal to car engine to stop his action) and inform the car owner on the unauthorized access via Multimedia Message Service (MMS) with the help of GSM/GPRS modem. Also it can be extended to the current position of the vehicle with the help of the GPS modem as Short Message Services (SMS). It proposes an extendable Emergency Response System for smart car to prevent it from loss or theft with Advanced RISC Machine (ARM) processor RISC (Reduced Instruction Set Computing refers). In this method the Face detection subsystem (FDS) aims at the recognition face (who try to access the Auto). Using PCA algorithm of the own common values of the person is found and compares the image with the nearest value in some mathematical form. If the person matches the existing owner's identity, vehicle starts or else the owner will get MMS with Geographical co-ordinate values of the vehicle location as SMS.

In each electric motor, operating is based on simple electromagnetism. A current-carrying conductor generates a magnetic field; if this is then in an external magnetic field will experience a force that is proportional to the current in the conductor and the strength of the external magnetic field. As you know, from playing with magnets as a kid, opposite (north and south), while tightening the polarities as polarities (north and north, south and south) repel. The internal configuration of a dc motor is designed to capture the magnetic interaction between a current-carrying conductor and an external magnetic field to generate.

2.6 Modified Type Intelligent Digital Fuel Indicator System

There are many sensor is based on the market available techniques for measurement of level and there is a narrow idea of the quantity of fluid, but it can be an accurate approximation of the quantity as in cars by fuel m where an idea of whether the tank is full, half full or empty, etc. can be determined. The fill level of the detector and the Optimizer play an important role in tanks for the specification of the liquid of a specific density. This device Digital displays the level of the liquid in the tank, fuel composition & current function of the vehicle using the load sensors. A fuel level detector (tank display) is a device in a car or another vehicle, measures the amount of fuel remaining in the vehicle. This type of system can be used to measure the amount of gasoline or any other type of liquid. There is usually or sensor measures the amount of fuel actually and leaves a dial indicator or indicator, passes this information outside of the container. A tank display can be designed in a number of different ways and many measuring devices are several deficiencies, the measured values can be less accurate. The two parts of the fuel gauge are the remote sensing or sensor and the display or display. A sensor unit is the part of a tank display within or to the actual storage containers on a single vehicle. For example, the sensor unit

consists of a float in the tank, connected with a metal rod that leads to a small electrical circuit. The float raises or lowers. Depending on the quantity of fuel in the tank, wheel speed, braking torque, load (vehicle passenger's luggage) & acceleration ratio etc.

2.7 Fuel Gauge Sensing Technologies for Automotive Applications

The paper describes the existing fuel display techniques used in cars i.e. the traditional fuel display system and the smart fuel display system. It describes its function and a comparison is made between the two existing techniques based on performance, complexity and cost of development. Some problems in relation to the existing techniques are identified and a better alternative sensing technology. A tank display (or gas) is an instrument used to indicate that the level of the fuel in the tank. The system consists of two important circuits, is used to record and display fuel level. The sensor unit normally sends a float type of fuel level sensor to measure, while the indicator measures the amount of electrical current through the sensor unit and indicates that voltage from the fuel tank sensor. There are different techniques to implement remote sensing and systems. The existing traditional and the micro controller-based type float measuring techniques are far from exact. On the conservative, but the microcontroller-based procedure is more accurate in comparison to the traditional procedures but still lacks accuracy by means of the fuel in the tank, if sloshing float sensor is calibrated with reference to the size and the curves of the tanks. Efficient and reliable sensing technology is the capacitive level sensing system, the use of tilt sensor as well as a microprocessor, remedial measures code installed, located on the fuel sensor signal on the basis of the inclinometer measurements provide highly precise measurement of the level of fuel in the tank.

2.8 Vehicle Tracking and Locking System Based on GSM

Currently, the majority of people have a vehicle, on the other hand theft rate on the increase. Mostly theft occurs on parking areas. The safety of vehicles is very important. Vehicle tracking and locking system fitted to the vehicle to follow the place and the motor. The place of the vehicle is identified with Global Positioning System (GPS) and GSM. These systems be monitored constantly and a moving truck and reports the status on demand. If the theft is identified, the responsible person sends an SMS to the micro-controller, and then question the control signals to stop the engine. Authorized person must send the password to the controller to start the vehicle and open the door. This is more secure, reliable and cost-effective.

If an interruption in each side of the door, then the IR sensor detects the signals and an SMS text message is sent to the micro-controller. The controller sends the message about the place of the vehicle to the vehicle owner or authorized person. Speeds are gradually reduced and finally stopped and then all the doors are locked. The door to open or restart the engine, authorized person desires to enter the passwords. In this method the track the position of the vehicle is easy.

2.9 Intelligent Anti-Theft and Tracking System for Automobiles

Before an efficient automotive security system is

implemented for anti-theft with an embedded system in conjunction with a Global Positioning System (GPS) and GSM. The clients communicates via this system and determine their current locations and status with Google Earth. The user can use the position of the vehicles specifically on Google Earth. Using GPS locator, the objective of the current location is determined and together with various parameters received from vehicle data port, using Short Message Service SMS via GSM networks with a GSM modem is connected to a PC or laptop. The GPS coordinates are corrected with a discrete Kalman filter. To lock the vehicle, the user can turn off a group of each vehicle, if any intruders seek it through the blockade of the gas. This system is very safe and efficient to report emergencies such as accident or engine damage.

A cost-effective vehicle tracking and monitoring system is presented. The program incorporated a transmitting module that contains an embedded system which combines GPS and GSM devices to retrieve the location and condition of the vehicle information and send it to the other stationary module. The second module collects the information transmitted via SMS and processes it in a compatible format on Google Earth to the position and the vehicle status online.

2.10 Fuel Estimation for Heavy Vehicles Level Using a Kalman Filter

The aim of the system is to have a more accurate method for measuring the level in the fuel tank. The level should be displayed for the driver and an early warning system should be implemented to make the operator aware, if the fuel level is too low. It is also an essential objective is the development of an estimate of the distance that the vehicle could travel is required before refuelling. The fuel level estimation system modelled with mat lab Simulink and simulated with measurement data collected by real driving scenarios. After evaluation of the system is in one of the control devices (electrical control devices), which is on a test vehicle, communicates with other systems. After the implementation, more tests will be carried out with the test vehicle to verify that the same functionality is achieved during the simulations is provided by the system in a vehicle. The fuel level is estimated with a KF (Kalman filter), the fuel consumption and filling level measurement results in a good performance. A more stable level estimate is reached. The KF is more demanding in terms of memory allocation, processor speed and the required inputs to look at the comparison of the two methods. A further disadvantage with the KF is dependent on the samples from the fuel level sensor to a first estimate during the boot process. The KF is easy with several inputs, use information from other sensors on other parts of the vehicle.

2.11 Anti-Theft Control System Design Using Embedded System

This system provides an anti-theft control system for automobiles that attempts to prevent the theft of a vehicle. This system makes use of a built-in chip that has an inductive proximity sensor, the meaning of the key during insertion and sends an SMS to the owner of the mobile, indicates that the car is accessed. This is followed by the system in the car, in which the user is prompted to enter a unique password. The password consists of letters and the car key. If the

user does not enter the correct password in three studies, an SMS message is sent to the police with the vehicle number, and the situation is with a GPS module. The message is also sent to the holder on the illicit use. Further, the injector of the cars will be disabled so that the user is not to start the car. At the same time a secret lock system is activated and the unauthorized user receives in the car and only the owner is the key to the mystery lock system can disable the mechanism. The design is robust and simple. This regulation contains a micro controller & a mobile for the purposes of the communication. The Global System of Mobile Communications (GSM) is the most widely used standard for mobile phones in the world. Over billion people use GSM services in the world. The usability of the GSM standard allows international roaming very often between mobile phone operators, so subscribers to use their phones in many parts of the world.

2.12 A Novel Fluid Level Sensor: Dual Purpose, Auto ranging, Self-Calibrating

A fluid level sensor distinguishes between isotropic liquids due to their electrical conductivity and dielectric constants. The sensor determines the electrical properties of the fluid that selects the appropriate method for measuring conductivity or capacity, then calculates the depth of the probe in the liquid studied. Readings include the depth of insertion, dielectric constant and electrical conductivity. The probe is automatic range selection and self-calibrating. Many vehicles with internal combustion engine of today run on a mixture of gasoline and ethanol and other fuel additives. It is desirable to create a robust, low-cost measuring device to the level of the fuel in the vehicle tank. Capacitive or conductive probes can be used in this application, but they suffer from serious defects. Before ultramodern capacitive sensor depth probes are not intended for use with these compounds due to the complex nature of the variation of the dielectric constant as a function of the concentration of various kinds. The same applies to pre-art conductivity sensor depth probes. The effect of temperature on these measurements is also a concern. A depth measurement probe, not suffer these shortcomings. The probe is mechanically simple and uses automatic range selection electronic circuits to measure both fluid properties and the depth of the probe in a liquid.

2.13 Design, construction, and implementation of a remote fuel-level monitoring system

Cars, motorcycles, trucks, generators, and compressors are powered by internal combustion engine needs refuelling so that it can run. The problems associated with this equipment is to know how to contain fuel to know how much fuel is left and to know how best to the fuel will be stored for the safety, security and benefits. In addition to the rising cost of fuel, there are also cases of fuel theft (from both stationary tanks and Transport Tanker), fuel leakage, premature dehydration, inaccurate fuel refill, improper engine consumption and driver" consistency means". In order to address the above issues and to prevent damage to reputation, the Aplicom 12 GSM module is connected via a wireless network to offer a convenient and cost-effective fuel-level monitoring system.

Reza et al. worked on micro-controller-based automated water level sensing and controlling. A

micro-controller receives inputs from the sensor unit detects the water level via an inverter. After the input variable has been processed by the microcontroller, the resulting output (ON/OFF), the condition of the tank was generated. The limitation of this paper is that the system was only implemented locally. Remote monitoring and controlling were later carried out by different authors. Hemnandan et al. designed and implemented an embedded control-based system for remote monitoring level from a diesel generator. If the fuel level status is required, Short Message Service (SMS) to the M33 GSM module in a remote location. The ultrasonic sensor detects the status, on both the LCD display and LED bar display.

3. SYSTEM ANALYSIS

3.1 Purpose

The application uses the mikroC PRO for PIC which is a powerful, feature-rich development tool for PIC microcontrollers. The techniques necessary to develop mikroC PRO for PIC microcontrollers are followed. It is designed to provide the programmer with the easiest possible solution to develop applications for embedded systems, without compromising performance or control. PIC is the most popular 8-bit chip in the world that is used in a variety of applications and C, appreciated for its efficiency is the natural choice for the development of embedded systems.

3.2 Product Functionality

1. *Fuel level calculation:* It is a second level calculation. Here it will measure the fuel level.
2. *Retrieving Information:* It is the third process to collect and store the values that are retrieved from the float level sensor.
3. *Calculations:* This performs all the calculations that are listed here
 - a) *Fuel Theft Calculation:* When there is any major change in the fuel level in a short period of time, notification is to be sent using Wireless module
 - b) *Mileage Calculation:* Based on the vehicle and its depreciation, the mileage per litre will be calculated

3.3 Hardware Specifications

The hardware comprises of microcontrollers, input and output devices, memories etc., on chip and they can be used for a specific application. A small computer designed in a single chip is a single chip micro-computer. A single chip microcomputer usually contains a microprocessor RAM, ROM, timers, interrupts, and peripheral control into a single chip. This chip micro-computer is also called micro-controller. These Microcontrollers are used for variety of applications where it replaces the computer. The usage of this microcomputer for a specific application, in which the microcontrollers a part of application, is called embedded systems. Embedded systems are used for real time applications with high reliability, accuracy and precision.

3.4 Hardware Interfaces

1. Key:

A key is a variable value that is applied using an algorithm to a string or block of unencrypted text to produce encrypted text, or to decrypt encrypted text. The length of the key is a factor in considering how difficult it will be to decrypt the text in a given message.

2. REKEYING:

Rekeying refers to the process of changing the encryption key of an ongoing communication in order to limit the amount of data encrypted with the same key.

3. LCD:

A Liquid Crystal Display (LCD) is a thin, flat screen apparatus from any number of color or monochrome pixels arrayed in front of the light source or reflector. It is often used in battery operated electronic devices because it with very small quantities of electrical energy. Each pixel of an LCD typically consists of the layer of molecules between two transparent electrodes and polarization filters, the axes of the transmission are (in some cases) 355 to each other. Without liquid crystals the polarization filter, light, by the first filter is blocked by the second (crossed) polarizer. The surfaces of the electrodes in contact with the liquid crystal material are treated to the liquid crystal molecules in a certain direction. This heat treatment is usually a thin polymer film is unidirectional betalning rubbed, a cloth. The direction of the liquid crystal alignment is then defined by the direction of the rub. Before the application of an electric field, the orientation of Liquid Crystal molecules is determined by the orientation on the surface. In a Twisted Nematic (still the most common liquid crystal device), the surface orientation direction at the two electrodes are perpendicular to each other so that the molecules are in a spiral structure, or twist. Because the liquid crystal material is birefringent, light through a polarizing filter is rotated by the liquid crystal Helix, as it passes through the liquid crystal layer to make it through the second polarised filter. Half of the incoming light is absorbed by the first polarisation filter, but otherwise the entire assembly is transparent. When a voltage is applied across the electrodes, a torque acts to align the liquid crystal molecules parallel to the Electric field, distorting the helical structure (this is resisted by elastic forces since the molecules are constrained at the surfaces. This reduces the rotation of the polarization of the incident light, and the device appears gray. If the applied voltage is large enough, the liquid crystal molecules in the center of the layer are almost completely untwisted and the polarization of the incident light is not rotated as it passes through the liquid crystal layer. This light will then be black. By controlling the voltage applied across the liquid crystal layer in each pixel, light can be allowed to pass through in varying amounts thus constituting different levels of gray. The optical effect of a twisted device in the voltage-on state is far less dependent on variations in the device thickness than that in the voltage-off state. Because of this, these devices are usually operated between crossed polarizer's such that they appear bright with no voltage (the eye is much more sensitive to variations in the dark state than the bright state). These devices can also be operated between parallel polarizer's, in which case the bright and dark states are reversed. The voltage-off dark state in this configuration appears blotchy, however, because of small thickness variations across the device. Both the liquid crystal material and the alignment layer materials contain ionic compounds. If an electric field of a Specific Polarity is for a long time, the ionic material is on the surfaces and affects the performance of the device.

This is avoided by either an AC power or by reversing the polarity of the electric field as the device is directed (the response of the liquid crystal layer is identical, independent of the polarity of the applied area). If a large number of pixels is required in a display, it is not possible to use any direct since each pixel would require independent electrodes. Instead of that display is a multiplex system. In a multiplex display, electrodes on the one side of the display are grouped and wired together (typically in columns), and each group gets its own power source. On the other hand, the electrodes are also grouped (usually in rows), with each group a voltage drop. The groups are designed in such a way that each pixel has a unique, undivided combination of source and sink. The electronics or the software drives the electronics will then decreases in sequence and drives sources for the pixels of each fall.4)

Specifications

Significant factors in the evaluation of a LCD monitor are:

- Resolution: The horizontal and vertical size is expressed in pixels (e.g. 1024x768). Unlike CRT monitors, LCD monitors have a native-supported resolution for optimal viewing.
- Point Distance: the distance between the centers of two adjacent pixels. The smaller the point distance size, the fewer granularities is present, which results in a sharper image. Dot pitch can be the same in both a vertical and horizontal or other (less frequently).
- Visible Size: The size of the LCD panel, measured on the diagonal (more known as Active display area).
- Response time: The minimum time that required to a pixel change the color or brightness.
- Matrix Type: active or passive.
- Viewing angle (coll., more known as the view direction).
- Color Support: How many types of colors are supported (coll., more known as color space).
- Brightness: The amount of light from the display (coll., more known as luminance).
- Contrast Ratio: the ratio between the brightest and the darkest dark.
- Aspect ratio: the ratio of the width to height (for example, 4:3, 16:9 or 16:10). Input ports (e.g., DVI, VGA, LVDS, or even S-Video and HDMI).

4. PIC Microcontroller:

PIC18F4550 belongs to the family of the PIC18F microcontroller. PIC18F4550 is among the advanced Microchip Technology. This micro-controller is very famous in between hobbyists and learner by IT functionalities and features such as ADC and USB integration. A typical PIC18F4550 is available in various packages such as dip, QPF and QPN. These packages can be selected in accordance with the project requirements. PIC18F4550 is an 8-bit microcontroller. PIC18F4550 was implemented with nanowatt technology therefore requires a very low power consumption for the operation. PIC18F4550 has 16 bit instruction set architecture (ISA), which has a degree of freedom for programmers with

different data types, Tab, instructions, memory architecture, addressing modes, interrupt and IO operations. PIC18F4550 also has an extended command set as a special feature; it is an optional extension to the PIC18 command set.



Figure 1 PIC18F4550 Microcontroller

Memory Specifications: a PIC18F4550 has 256 Byte EEPROM (Electrically Erasable Programmable Read-only memory), and 2 KB SRAM (Static RAM) and 32KB Flash memory, in return shows a different degree of freedom for programmers.

Communication protocol: PIC18F4550 is noticed such as advanced as it also uses sophisticated protocols for communication. The modern protocols such as USB, SPI, EUSART, well supported in PIC18F4550. These technologies integrate with nanowatt technology (As mentioned above) to produce, PIC18F4550, well-equipped, low power microcontrollers.

A dedicated ICD/ICSP port allows programmers to code and debug easy. Advanced Flash program and the 1KB of dual access RAM for USB are for the buffering. PIC18F4550 consists of up to 13 channels for analog to digital converter. The converter accuracy amounts to 10-bit to convert analog to digital signal relative. PIC18F4550 is compatible to work with various internal and external clock sources. It comes with four integrated timer or an external oscillator can be used for time recording. The frequency limit for a PIC18F4550 is from 31 KHz to 48 MHz the microcontroller PIC18F4550 is with ADC comparators and other such peripheral devices such as a built-in function.

- Register associated with ports in the PIC18F4550. Each port in the PIC18F4550 is equipped with three 8 Bit register for IO operations. TRISX (8-bit), LATX(8 Bit), PORTX (8 bit)
 - TRISX, where X is the name of the ports are either of A, B, C, D, E. for example TRISA TRISB, etc. This tab shows the direction of the pins (input or output). For example "TRISB = 0xF0", all pins in connector B at the output.
 - LATX: locking tab reds and changes the write operation on the value of the I/O pin is saved and the output of data to the external hardware.
 - PORTX: reads the device that stores the input level of the pins and reads and registered the input signal from the external device if the pin is configured as input.
- High-Performance RISC CPU:*
- Only 35 single-word instructions to learn. All single-cycle instructions except for program branches, which are two-cycle. Operating speed: DC – 20 MHz clock input DC – 200 ns instruction cycle. Up to 8K x 14 words of Flash Program Memory, Up to 368 x 8 bytes of Data Memory (RAM), Up to 256 x 8 bytes of EEPROM Data Memory. Pin out compatible to other 28-pin or 40/44-pin.

5. Peripheral Features:

- Timer0: 8-bit timer/counter with 8-bit prescaler. Timer1: 16-bit timers/counters with prescaler, during sleep via external crystal/clock. Timer2: 8-bit timer/counter with 8-bit period register, prescaler and post-scalar. Capture, compare two PWM module / Synchronous Serial Port (SSP) with SP (Master mode) and I2C™ (Master/Slave).
- Universal synchronous Asynchronous Receiver
- Transmitter/USART (SCI) with 9-bit address detection
- Parallel Slave Port (PSP) - 8 bits wide with external RD, WR and CS controls (40/44-pin only)
- Brown-out detection circuitry for the brown-out reset (boron).

4.1 Analog Features:

- 10-bit, up to 8-channel Analog-to-Digital Converter (A/D)
- Brown-out Reset (BOR)
- Analog Comparator module with:
- Single-supply 5V In-Circuit Serial Programming
- Watchdog Timer (WDT) with its own on-chip RC
- Programmable code protection
- Power saving Sleep mode
- Selectable oscillator options
- In-Circuit Debug (ICD) via two pins

6. CMOS Technology:

- Low-power, high-speed Flash/EEPROM technology
- Fully static design
- Wide operating voltage range (2.0V to 5.5V)
- Commercial and Industrial temperature ranges
- Low-power consumption

4. SYSTEM STUDY

4.1 Problem Statement

If there is any theft in the fuel or if the vehicle is accessed by any unauthorized person it will take up the following process. Amount of fuel that will be stolen and the unauthorized access of the vehicle, will be sent as notification from the auditing software.

4.2 Objective of the Project

The project is to determine the amount of fuel that has been stolen and also it determines vehicle that has been accessed by any unauthorized person. It helps to predict the inaccurate refilling and improper engine fuel consumption in the vehicle. The techniques minimize the time for an efficient output and minimize the theft. This technique will help us to provide solutions for the existing issues related to fuel theft and the unauthorized access of the vehicle.

4.3 Existing System

The system actually determines the fuel level using the PIC Microcontroller. It uses mechanically float level sensor to calculate the fuel level in the fuel tank. It send the fuel level during the fuelling of vehicle and it also send SMS when there is any drastic change in the fuel tank. But the question here is make it unnecessary message to the concerned authorities that does not really efficient in implementation. This technique is to improve in need of the level of usability to the owner and the driver. Therefore, the system is enhanced by the required hardware.

Customer Issues

- Lack of Accurate results because there may be fuel loss during certain circumstances. Unnecessary intimation to the Authorities through SMS
- Poor Efficiency

4.4 Proposed System

The proposed system is to determine the amount of fuel that has been stolen and also to determine whether the vehicle has been accessed by any unauthorized person using the technologies like GSM, Float level sensor and Wireless device with GPS Sensor. The float level sensor is used to calculate the height of the tank up to which the fuel is available. Based on height it is possible to calculate the amount of fuel. The GSM provides the periodic information about the fuel level. A password is provided to access the fuel tank lever and this is authenticated only by the driver and the owner. Once if the fuel tank is opened an alert is sent to owner through a SMS including the timing details.

4.5 Scope of the Product

The techniques that are to be proposed will provide an efficient output. This project helps to overcome the theft and hence to put forth fuel economy. This project will retrieve the amount of fuel in the vehicle efficiently. The output is the amount of fuel that will be stolen and the unauthorized access of the vehicle, will be sent as notification from the third party software.

4.6 Architecture

1) *Global Positioning System Sensor:* The Application of this sensor enables the effective data retrieval pertaining to the device's current geographical location. Along with this the GPS sensor outputs the current Coordinates of the location in terms of Longitudes and Latitudes. Utilizing this sensor the location of the vehicle in its current transit can be found which enables the proprietor of the vehicle to monitor the real time monitoring of the location.

2) *Weight Sensor:* The Essence of the weight sensor is used for the calculation of the fuel level in the vehicle's tank dynamically during filling as well as during various point of time during the travel. This enables the owners to be devoid of the fraudulent information provided by the driver of the vehicle. Hence the proprietor can ensure the correctness of the information provided.

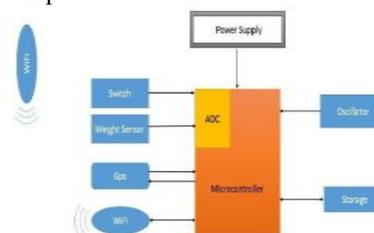


Figure 2 Schematic Representation of the system

3) *MAX232 CPE:* This IC chip effectively assists in the conversion to Compatible TTL devices for PC serial port. Additionally the voltage level is pumped to meet the required level and it needs a +5 volt supply with an output of +7.5 volts.



Figure 3 MAX232CPE

4) *Switch*: The Primary operation of the switch is to block the electron flow in a given circuit. This acts as a controller for allowing the electric current to be passed through it. The Pushbutton switch is adopted for the momentary operation.

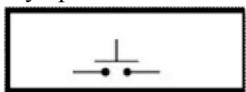


Figure 4 Pushbutton Switch

It incorporates a button that can be pressed and released which is executed by an internal spring that enables the “on” and “off” states during the Push of the button.

5) *Power Supply*

The Power Supply comprises of a +5v Supply of a DC Current. This acts as the initiator where the entire operations start with the application of the power supply to the designated sections of the circuit.

5. SYSTEM DESIGN

5.1 *Measuring The Fuel Level In The Fuel Tank*

For measuring the fuel level, a Float level sensor is used. The sensor is used to obtain the level in the fuel tank. The sensor consists of a potentiometer and a float capsule along with a rod. The fuel when filled in the tank the level increases, the transmitting unit with the float capsule which rotates according to the movement of the rod. The rotational movement of the capsule is transferred to the induction potentiometer via a gear mechanism so that the change in the liquid level is converted into DC signal to an indicator, receiver or computer. The capsule rotates in proportion to the change in the liquid level. The rotational speed is increased or decreased by the gear mechanism and is transferred to the induction potentiometer.



Figure 5 Float Level Sensors –Potentiometer

The potentiometer reads the value and pass the input to the Analog to Digital converter. The A/D converter gives the 8-bit numeric data in accordance with the fuel level in the fuel tank. For the fuel level measurement PIC18f4550 microcontroller is used. Timer 1 is interfaced with the controller so that it will enables the controller to read the data in the data bus at a particular time interval. Then read data is stored in the Accumulator.

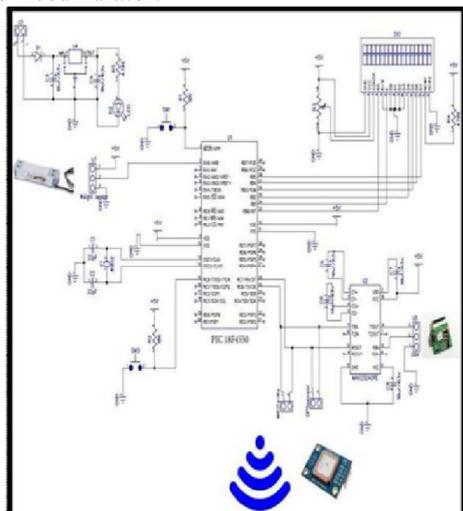


Figure 6 Float Level Sensor –Potentiometer

5.2 *Computing the Fuel Level Deviation*

For computing the fuel level deviation is carried out with help of some predefined analytical data. The analytical data is actually computed with help of physical tests carried on different kind of heavy vehicle in different situation. The data is varied according to some of the factors which may influence the fuel consumption for example

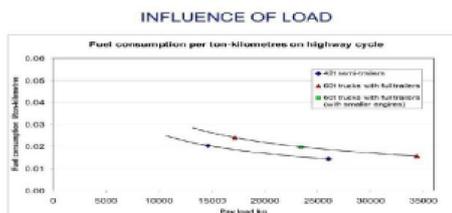
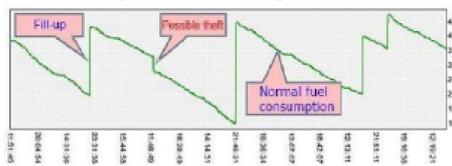


Figure 7 Fuel Consumption vs Payload

Load, Weather, Machinery conditions and so on. The table below shows that the analytical data of the fuel usage by different types of vehicles.

6. IMPLEMENTATION PLAN

6.1 *Implementation Plan*



Figure 8 Implementation Plan

- 1) *Float level sensor*: Get fuel level in the fuel tank. The detection unit uses the potentiometer and a float capsule together with a rod. It uses the floating capsule, to calculate the amount of fuel in the tank. Based on the height of the fuel quantity is calculated. Do not use abbreviations in the title or heads when they are unavoidable.
- 2) *Numeric lock it is set with the fuel opening lever for authentication purposes*: Only the driver can open and close the tank. When the driver opens and closes the fuel tank sending SMS to the driver and the owner at the time.
- 3) *Fuel level Deviation- Obtain the difference in fuel Level*: The level is calculated using the sensor should be compared with the pre-defined analytical data.

7. CONCLUSION

The proposed system will help us to fuel theft and unauthorized access of the vehicle to solve problem. Our system will periodically inform and vehicle access information on the fuel level. Hence the larceners results rather than the fuel or to the vehicle theft by chance in the situation and provide the overall protection. The messages are provided to the owner in relation to the fuel level in the vehicle in periodic manner. The proposed rule also avoids the other way to fuel theft of fuel tank fault detection system. The numeric lock system is to open authentication for the fuel in the vehicle fuel tank. Finally the system at any time. The wireless technology will enable the vehicle owner, the vehicle with the mobile phone of monitor anywhere, anytime.

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