

Automated Fuel Filling Station and Vehicle Monitoring

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Abstract

Nowadays, almost all petrol pumps have a micro controller to control the electrical pump, drive the display, determine the flow & accordingly turn OFF the electric pump. But a person is still required to collect the money. Our project is intended to eliminate this human interaction so that there is no need of workers to fill up the petrol. In this project petrol bunks are using the petro card system for filling petrol in every vehicle. In this system every user is provided with a smart petro card, with which individual can access petrol at the petrol bunks. Ahead of using this card, we have to recharge it. Whenever we want to fill the tank, then we have to lay the Petro card in the card reader, which is interfaced to the microcontroller with serial interfacing. The microcontroller reads the data from the smart card reader and asks how many liters you need, which will be displayed on the LCD screen. Then we have to enter the requisite number of liters of petrol through keypad which act as an input to the microcontroller. After interpreting this value the micro controller will check for the existing balance in the smart card, if it is adequate then the petrol filling process will be started. After filling the essential quantity, a buzzer will indicate the process of completion. In our project another one feature is vehicle monitoring. Using this facility we can monitor the vehicles. Each Petrol bunk contains RFID reader which is continuously reads the number plate (RFID Tag) of the all vehicles. If anyone of the vehicle is related to crime events this system automatically sends the information to the nearest police station via SMS. Before that, Crime activity information about the particular vehicle is pre stored in the system using GSM Communication.

Keywords

Fuel station, RFID Technology, Automation, GSM Technology, Electronic Devices, Petrol cards and Monitoring the Vehicle.

Introduction

The central idea of the project is to automate the fuel filling station and monitoring the vehicles. The tags carrying electronically stored information are to be placed in all the vehicles and filling stations are provided with the RFID readers. The reader reads the tag that contains the customer id and sends to the server with GSM modem. After the transaction is performed by the customer, the transaction details will be sent to customer's mobile number and also be stored in database for fuel station owner's view. The RFID reader and RFID tags constitute the RFID technology. RFID reader is a device that will emit radio signals if it is powered. The emission of signals helps in the identification of the tag. The two types of tags that are generally used are active and passive tags. The passive RFID tags are used in this project that depends on

The radio frequency energy that is transferred from reader to the tag to power the tag. Using this facility, we can also monitor the vehicles that are involved in illegal activities.

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I. EXISTING SYSTEM

The statistics suggest that about 40,700 filling stations present in India depends upon the labor's works. In the present filling station environment, all the process is performed through laborer and the transaction process is also done either cards or cash. Depending upon the laborer for the entire process will lead to more time consumption and unmoral activities can also be increased. There is a possibility of occurrence of human error and signatures/pin is still required for credit and debit card transactions.

II. PROPOSED SYSTEM

The designed proposed system will overcome the limitations of the existing system. It has two units namely fuel dispenser unit and monitoring unit. This system has two RFID tags used as prepaid card and another one for vehicle monitoring. The RFID tag contains the information of the card holder and the vehicle details (chase & vehicle number). When the vehicles enter the fuel station, RFID reader reads the tag and access the information. Using the prepaid card, the user can fill the fuel according to the requirement. If card doesn't have sufficient balance to fill the fuel, it is indicated by buzzer which gives beep sound. The transaction details will be sent to respective card holder using GSM. GSM is used to establish the communication between the fuel filling station and monitoring unit. The information of vehicle involved in illegal activities will be sent to fuel filling station from monitoring unit using GSM. If the illegal activity information matches with the particular vehicle that fills fuel in the fuel station, then it can be immediately informed to the monitoring unit using GSM.

III. METHODOLOGY

The system uses PIC16F877A microcontroller with LCD, keyboard and buzzer interfaced with the microcontroller. UART is used to interface the RFID reader and GSM. DC motor is interfaced with

microcontroller using motor driver. RFID reader reads the RFID tag and user provide the input through keyboard for the required amount of fuel. If the card doesn't

Transponders (tags) can be classified in to two categories namely active tags and Passive tags. Passive tags are used in this system that does not have their own power supply. The minute

have sufficient balance, it is indicated by the buzzer. The transaction details will be sent to cardholder using GSM. The RFID reader reads the RFID tag which is placed in each vehicle that contains the information of the particular vehicle. The information about the vehicle that are involved in illegal activities are send to the fuel filling station from control unit. If the illegal activity information matches with any vehicle, it is informed to the monitoring unit using GSM. The passive RFID tags are used in this project which is cheap and highly effective.

IV. AUTOMATION REQUIREMENTS

A. RFID

RFID is Radio Frequency Identification Device. It is a fast, low cost and automatic identification technology that uses radio frequency (RF) to transfer data between a RFID reader and a RFID tag. An RFID tag is a small object, such as an adhesive sticker, that can be incorporated into a product. RFID tags contain antennae to enable them to receive and respond to radio-frequency queries from the interrogator. The tag is generally made of an IC. The IC will include memory and some form of processing capability. The memory may be read only or read/write, the type selected will depend on the application.

electrical current induced in the antenna by the incoming radio-frequency scan provides adequate power for the tag to send a response. Due to power and cost concerns, the response of a passive RFID tag is essentially brief, typically just an ID number (GUID). Passive tags have practical read ranges that vary from about 10 mm up to about 5 meters. This system also communicates through a reader which broadcasts a signal through an antenna. When a transponder enters the antenna field, it receives the signal and energy from the reader. The tag is charged with enough power to send back a unique ID to the reader.

B. GSM

The GSM makes use of narrowband Time Division Multiple Access (TDMA) technique for transmitting signals. A GSM digitizes and compresses data, then sends it down through a channel with two other streams of user data, each in its own time slot. It functions at either the 900 MHz or 1,800 MHz frequency band. Global System for Mobile Communication and is an open, digital cellular technology used for transmitting mobile voice and data services. It has an Uplink frequency band of about 933-960Mhz and Downlink frequency band

of about 890-915Mhz. GSM is a digital system with an over-the-air bit rate of 270 kbps. The SIM900 is a Complete Quad band GSM/GPRS Solution in a SMT module which can be embedded in the customer applications. In our system we are using a GSM module in order to send

messages. The main specification is that it offers point to point communication.

C. MOTOR DRIVER

The L293D motor driver is designed to provide bidirectional drive currents of up to 600-mA at voltages from 4.5 V to 36 V. devices are designed to drive inductive loads such as relays, solenoids, dc and bipolar stepping motors, as well as other high-current/high-voltage loads in positive-supply applications. All inputs are TTL compatible. Each output is a complete totem-pole drive circuit, with a Darlington transistor sink and a pseudo-Darlington source. Drivers are enabled in pairs, with drivers 1 and 2 enabled by 1,2EN and drivers 3 and 4 enabled by 3,4EN. When an enable input is high, the associated drivers are enabled, and their outputs are active and in phase with their inputs, when the enable input is low, those drivers are disabled, and their outputs are off and in the high-impedance state. With the proper data inputs, each pair of drivers forms a full-H (or bridge) reversible drive suitable for solenoid or motor applications. The Device is a monolithic integrated high voltage, high current four channel driver designed to

accept standard DTL or TTL logic levels and drive inductive loads (such as relays solenoids, DC and stepping motors) and switching power transistors. To simplify use as two bridges each pair of channels is equipped with an enable input. A separate supply input is provided for the logic, allowing operation at a lower voltage and internal clamp diodes are

included. This device is suitable for use in switching applications at frequencies up to 5 kHz. The L293D is assembled in a 16 lead plastic package which has 4 center pins connected together and used for heat sinking. The L293DD is assembled in a 20 lead surface mount which has 8 center pins connected together and used for heat sinking.

D. BUZZER

A buzzer or beeper is an indicating device, usually electronic, typically used in automobiles, household appliances such as a microwave oven, or shows. In this system buzzer is used to indicate the low balance in the petrol card. It most commonly consists of a number of switches or sensors linked to a control unit that determines if and which button was pushed or a preset time has lapsed, and usually illuminates a light on the suitable button or control panel, and sounds a caution in the form of a continuous or intermittent buzzing or beeping sound. Operating frequency is 3 kHz, operating voltage is 3-20vdc, operating temperature is 30 to -85 C, current consumption is 14ma, sound pressure level

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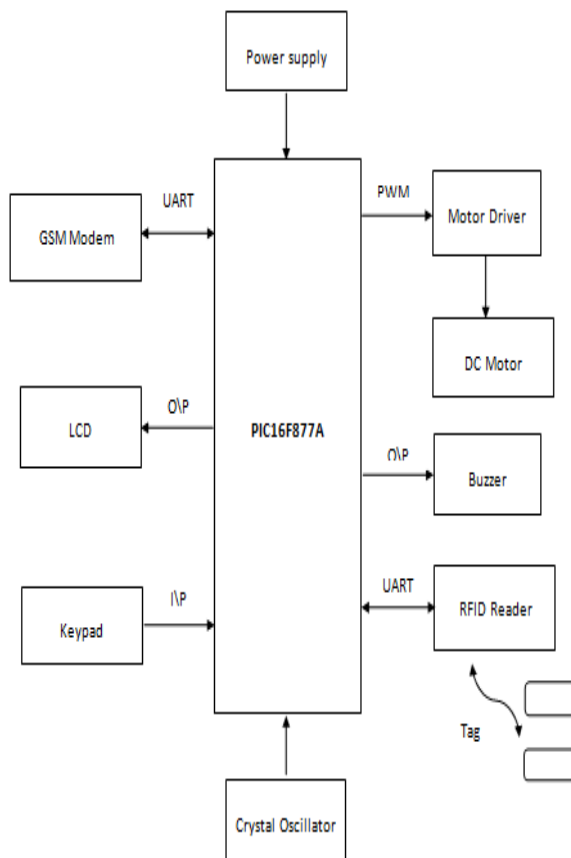
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is 73db and rated voltage is 12vdc. The material used in buzzer is ABS UL-94 1/16" high heat (black) and its weight is 4.5g

At the fuel station, the RFID reader reads the amount in the card and will display it on the LCD. The quantity of petrol that has to be filled using a keypad. The corresponding amount is calculated & deducted from the petro card. The electrical pump is then turned ON according to the entered amount, fills the tank and automatically turns OFF. The transaction detail is sent to the card holder's mobile number. With this project, the fuel filling station is automated and reduces man power requirement. Further,

the vehicles involved in illegal activities can be monitored with this system.

SYSTEM ARCHITECTURE



CONCLUSION

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