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SMART PETROL PUMP USING RFID & GSM TECHNOLOGY

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(1,2,3,4,5,6)

Abstract: This paper talks about fuel dispensing system and on details of how a user makes use of RFID technology in current day fuel usage. The proposed system ensures the fueling process by making it easier and secure. The system uses a petrol bank card just like our available debit cards, the customer can swipe the card in the bunk and if they haven't reached their monthly limit, the refilling will be successful, else an error message is sent to the customer mobile. It uses ELA816B RFID reader and it has passive tags.

RFID is commonly known as identification of Radio Frequency. In this paper work, RFID system is a microcontroller-based system which reduces the power of mankind and the system dispense amount of fuel with accurate. In RFID Based Petrol Pump it reduces work of humans and it is to implement the task sequentially with the help with RFID technology. Through this project we can achieve the dream of digital petrol pump station, by this we can give protection and security for the customers at the time of filling the petrol at the Petrol stations, it avoids the involvement of workers, hence it reduces risk of carrying money and fear of money theft at stations.

RFID technology it can be developed and it is used in many areas; It is flexible, It is reliable and it is cheap. Petrol pump has a smart card write/reader then the customer swaps the cards and the amount will be displayed. The technology has the both software and hardware design RFID development kit used for design of the fuel recognition system is ELA816B with the passive tags

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1.INTRODUCTION

In this Smart petrol pump using RFID, it provides the security for the customers in filling fuel in filling fuel at petrol pump. petroleum products are the rarest and most valuable creations added to nature. The petroleum products are most widely used commodity today, to

survive these petroleum products we have to use it properly. It is the important task. A petrol station is a facility that sells lubricants and fuel with the help of bowsers. They are used to fill the petrol, gasoline, petrol into the vehicles. For our regular basis we use vehicles. Due to this, the vehicles are increasing rapidly.

Present days, the petrol bunks need an operator for filling the fuel. In petrol bunk the customer need a operator so, that he can fill the fuel in the customers vehicles and for the pay transactions. Most of the fuel stations are operated manually, for the operation at the bunk they need more man power and it is time consuming. If you place a petrol pump station manually at distant area or at a hilly place. It is difficult to provide a very good facility in filling the fuel for the consumers. The worker or attendant who are works at the hilly places keeps inhaling the vapors of petrol and diesel. Diesel or petrol vapors will effect the respiratory system and it is dangerous for the attendant. There is a chance of robbery due to the bulk amount of direct cash transaction in the bunk.

All the disadvantages of current system is to overcome with this proposed project. PF-cards are given for customers. It eliminates help of attendant at station, now the dealing is with PF-card reader with the customer. The PF-card gives instruction to the customers, These PF-cards works on RFID technology. With this process all the issues faced with the bunk attendant are resolved. In this RFID tags, GSM module, RFID readers, LED sensors, relays, level sensors, smoke sensors and many components are used in this project. This project will helpful in the reduction of hard labor system, enhanced visibility, user friendly.

RFID reader:

RFID means Radio Frequency Identification, It is defined as the method of transferring of data through wireless by the usage of electromagnetic fields. It is also used to gather information from RFID tags. It uses digital data in RFID tag. Which is useful in tracking individual objects. RFID uses in many applications which includes in Home appliances, Toll booth passes, Operation of spacecraft and satellites, passport and so on.

Applications

- It is helpful in Access control system.
- It is used in Attendee tracking.
- It is used in Item Level Inventory Tracking
- It is used in race timing

- It is useful in Automatic Billing System
- It is helpful in IT Asset tracking and Tool Tracking
- We used in Library System.

Smoke sensors:

Smoke detector is a sensor which senses smoke or useful in the indication of fire. In this project, we placed the smoke detector with buzzer alarm. whenever in case of any fire or smoke, the smoke sensor helps to activate the buzzer alarm and it sends an “SMS” for the customers mobile.

GSM Module:

The GSM Stands for the Global Service for the Mobile Communication. The Module GSM is also called as Call Controller and it contains a SIM 900D which is a Power-Full Module for the SMS. The GSM Contains the Four Network features that specify the Frequency levels. The GSM Modules contains the Bandwidth ranges from the 900 MHz or 1800 MHz bands. The maximum range from 900 to 1800 MHz is a fixed bands for some locations like India, Europe, America and it is allotted that much range only not more than that and few of the World places it arranged up-to 450 MHz bands. These Frequencies are used as the First-Era-Structures in the GSM module. For the Calling and Receiving/sending the Messages we use the Module consists of SIM 900A. More than 150 countries rapidly shared the estimated market percentage is 92%. We use Relays to control the Circuit, LED of 2x16 display information, Voltage of 3.3v of a Power Supply. Module connects with the Chip or else with the IC that uses the Network of a SIM.



GSM module permits user to retain or hold information or data after they switch handsets. User also has had a choice of changing of operators at the time of retaining by changing the SIM. The frequency of the GSM network id 900MHz or 1800Mhz bands. In this project SIM 900 is inserted so it sends the messages and calling .SMS send the signals to the GSM modem. The microcontroller checks whether the RFID has the balance amount or not. when it has the balance amount it will directly sends to the RFID card to the costumer mobile phone using the GSM module.

LED status indicator

LED Status Indicator: For this LED Indicator has a top right side at the SIM800L Cellular Module. It Indicates the LED cellular network status. It will Blinks the various side to show the LED status indicator.



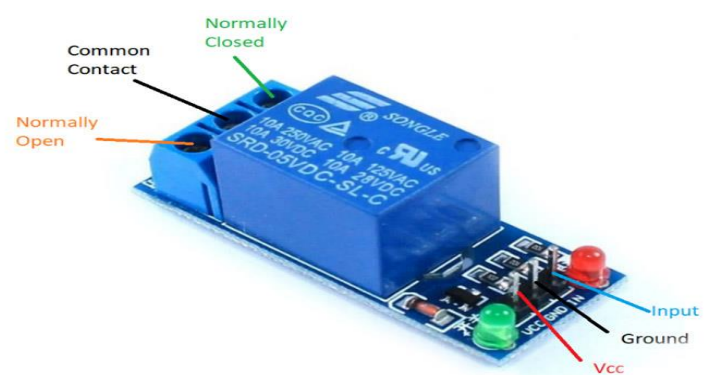
For every Blink 1's: This module has a Running Phase but there is no connection to the cellular network.

For every Blink 2's: The Connection of GPRS are in Active Mode.

For every Blink 3's: This Module is connect with the Cellular Networks and it can Receives, Sends the Voice and gets the SMS information Contact.

LCD Module Description: LCD stands for a liquid-crystal display. LCD is an Electronic device with Display Module that uses in a Liquid Crystals which shows the image is Visible or Produce the image. It contains the 16x2 LCD Module that commonly used in a circuit. For every two lines 16x2 bit module displays the 16 characters. It contains the Flat panel to display the uses of a light modulating properties of a liquid crystals combined with the Polarizers. LCD do not emits the direct light to the liquid crystals. It can Produce in a Colour or Monochrome by using the backlight and the reflector. LCD's consume the less power than the LED's. The LCD's display the light by using the Blocking of a Light.

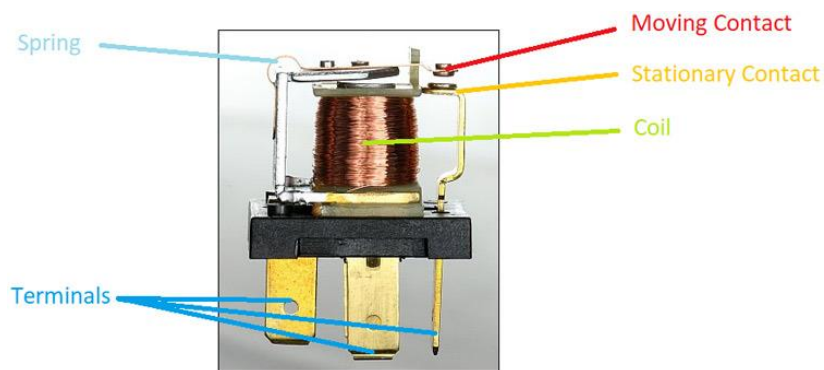
RELAY: Relays are switch that open and close circuits electromechanically. A plane relay is little bit than single-channel relay module, the components of this relay make easy for connection and switching and also it acts as indicators which shows the module is in active state and the power through it is on, as well as it also describes us that the relay is in off/on state.



Single-Channel Relay Module Specifications

- It contains 3.75 to 6 volts of supply voltage.
- It contains about 2mA of Quiescent current.
- If the relay is active it contains current about 70mA
- Relay has the maximum contact of voltage – 250Volts AC or 30Volts DC
- It contains relay maximum current of 10A

How Does A Relay Work?



Relay is used as switch to on and off the circuit or current flow in them. Relay had a presence of coil which attracts and gives contact to them to get activate, when the coil is not energized the spring separates them.

It has two advantages – First one is, it activates the relay, smaller current is needed it can be switched to required energy source.

Second one is that the contacts and coils both are galvanized and isolated each other, thus gives no electrical contact of those.

Mini Micro Submersible Water Pump



It is submersible water pump that works on DC power supply of 3 to 6V. We need to dip the pipe in water and should be connected with water pipe on outlet side to pump water also with power supply to the pump.

The motor is light weight as well as tiny. It is controlled by microcontroller/ Arduino by the DC motor drives 5V power supply is used to run the pump.

MOTIVATION

India is a developing country and Indian government is working hard to make India as digital India. This scheme of SMART PETROL STATION USING RFID, comes under as a part of digital India.

By this the physical power will get reduced and the system power will come into the progress. This will help us to create a several jobs at backend of the program as a service support management.

The main motto of this project is to avoid several accidents and malpractices that occur in the fueling stations intentionally or may not.

By this project fueling does not require much human work so that the costs on the working wages will be reduced.

CONTRIBUTION

Through this project we can decrease the time consuming at the fueling stations as they will be modified as a self-served systems.

By including RFID and GSM model in this project we can provide lot of jobs at the backend of this system who are educated and eligible for the roles.

TYPES OF FAULTS

It has a very large infrastructure investments, it requires large capital at beginning as both practical and financial.

As it is software based running program, if the software crash occurs, whole system will be gets pause.

Implementation and Methodology

Every customer will be going to allot a PF-card known as petrol fuelling card, which he or she has to swipe at the petrol fuelling stations when the enters petrol station. At the fuelling point there will be a PF-card reader which will helps the customers to display initializations through LCD and GSM Units. If all the steps appear and goes as follow customer can come to know the system is in working mode. Even the system provides a message display on the LCD that "Sorry. Please Move Next" on LCD screen. Then the customer is ready to swipe the PF-card. Now the customer will be asked to enter his password that holds for the PF-card. Now the password cross check will be done here, if he/she enter wrong password a message will be going to display on the LCD that is "WRONG PASSWORD". Then the customer must re-enter the correct password that he posse, if the password entered is correct the system will move for further steps that LCD gives a message "ENTER THE LITERS IN NUMBER". After entering the correct numbers/ digits, PF-card amount balance will be checked, if the card has sufficient amount for the number of litres they are opting for fuel is pumped and the amount will be debited form the card, this will be charged according to the petrol prices of present day. Then the customer can be informed that how much balance he/she has after fuelling, this will be displayed on the LCD screen and in the form of message to the customer registered mobile number by the use of GSM. After sending the message to the customer the motor pump gets start and starts to fuel the vehicle through the pipe or gun connect to the pump when the motor reaches to the number of litres which entered by the customer the pump which is connected to motor gets automatically gets off and the petrol/diesel through pipe gets off flowing. When the balance of the PF-card is low or not meet to required amount that entered for the number of litres then LCD displays a message "LOW BALANCE, PLEASE RECHARGE CARD" along with this it sends a message to mobile phone also as we are using a GSM technology. If customer recharges the card he get a message to his phone that his "RECHARGE IS SUCCESSFUL". Along with this system also has the extent features like smoke sensor, Level sensor and Buzzer alarm. This smoke sensor will help us to detect

any fire operations are accidents as it is sensing the smoke. When there is any smoke this smoke sensor will activate the buzzer and gives us an alarm and sends a message to the service centre that "SMOKE IS DETECTED". In this project we used a ARM-7 Controller<LPC-2148>,2*16 LCD's, Keypad, RFID reader. RFID technology we introduced in this project plays a key role in the functioning of the PF-card.

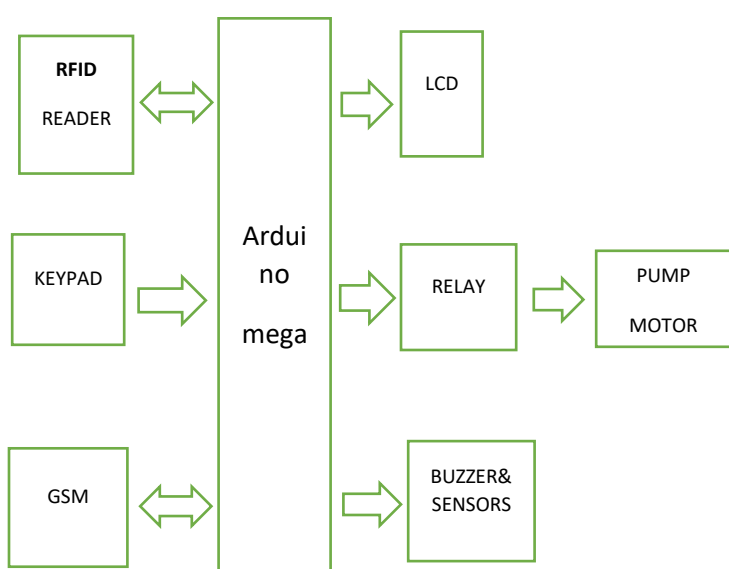
Every RFID card which we called PF-card has embedded a specific and unique magnetic number. RFID reader creates magnetic signals which will help us to analyse the information on the PF-card when the customer swipes it on RFID reader. Then the antenna which is used for scanning and scans for the data of the card and the data present gets analysed in the tag and compares both by the help of the controller.

When the data gets matched then the corresponding signals will be sent to the ARM7 controller. This ARM7 controller will be ready and had programmed in code of embedded C to perform the transactions stepwise. For debugging Kiel 5 is used in this project and Flash Magic software tools also used. Simulating and evaluating and synthesizing the code at the controller unit. The components like LCD, RFID Reader, Keypad, Relay, Smoke sensor, GSM Module, Level sensor and Buzzer alarm these all are connected to the Controller.

ARM7 is the complete control unit of the system. The GSM module we used will give us the information by sending transaction data through SMS to the registered customer phones.

GSM modules act as a bridge between the system and the customer. As we used the level sensors when the tank goes less than the 5 litres, "FUEL IS LOW IN TANK" message will be displayed on the LCD screen.

Block diagram



Conclusion

Now a days everything has been changed and urbanized. Due to the changing technology, the existing things are also changed. And we can do anything in a fraction of seconds. The motto of this project is that to make things easier than before. In the past days if we want to fill the petrol or diesel in a vehicle it needs a person to enter the quantity petrol and also to fill the petrol in the tank. But now it is done in

an easiest way, that everything is done in a digital way by using RFID bases systems. With this project we are going to convey a system with automation without any man power to fill the fuel in fuel station. By using RFID card which the customer having by reading it and entering the password and amount the fuel is filled. As we can observe that now a days when we enter the fuel station it takes more time to fill fuel when there is more vehicles. Other-wise the process is done quickly. Also some of clashes will occur with the customers some times. We can also see that more man power is wasted. Sometimes we cannot treat the customers in a good way. It designs a specified card for the petrol bunks and to dispense petrol using RFID technology.

Uses:

Here we can make the filling process easier secure and also reliable. We can also prevent unauthorized filling by making entry only to the PF-card users to avoid fraud. So that only the PF-card users can enter the fuel station.

Advantages:

- Reduces human work.
- Less time consuming and reliable process.
- It takes humans safer also no chance of fraud.

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