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Multipurpose Self -Fuel Dispensing Automated Framework Utilizing RFID Prepaid Cards

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Abstract - *Petrol pumps are operated manually making fuel dispensing and filling, a time-consuming procedure. This we actualized automated petroleum pump by utilizing GSM and RFID. This framework can enhance the filling procedure so as to keep it simpler, solid and secure. Here non- permitted users and clients with traffic violation records would not be provided with fuel. In this framework, all users have a specific card called petro-card which can be energized by a few focuses. The petrol station is outfitted with a smart card reader which detects the amount in the card along with all the security details and will show it on the LCD. The designated amount of fuel will be dispensed according to the amount entered.*

Key Words: **RFID module, GSM, LCD.**

1. INTRODUCTION

It says about the implementation of the "Automation" of the filling fuel at petrol bunk using RFID and GSM technology. The transactions are made customer friendly i.e., it has the ease of operation at customer's fingertips with customer's smart phone. For automating this process, each customer is provided with a Petro-card just like a debit card. A Petro-card reader is installed at the bunk. The Petro-card is swiped on the Petro-card reader provided. On swiping, the information is prompted at each step, like password and quantity of petrol in litres. The authentication of the password and checking for sufficiency of balance available for payment is done. If both are fine, the fuel filling gets initiated automatically through the fuel pipe connected to the pump. After the exact quantity of fuel, that is entered by the customer is reached, the pumping of fuel gets stopped. In case of wrong password, error message is thrown. Petro-card is recharged with money just like SIM card. In case of low balance amount in the card, online recharge facility is provided to customer, through his smart phone, by just sending SMS to the recharge centre GSM module at the bunk. In addition to automated fuel filling, level and smoke detection are also done in this proposed project. A level senor is used to detect the fuel level in the petrol tank and "Low Fuel Level" message is sent to the bunk owner's cell phone. A smoke senor along with buzzer alarm is installed at the bunk, to detect accidental fire. An "smoke detected" alert message is sent to bunk owner's smart phone.

2. RELATED WORKS

In [1] Author speaks about "Automation" of the filling fuel at petrol bunk using RFID and GSM technology. The transactions are made customer friendly i.e., it has the ease of operation at customer's fingertips with customer's smart phone. For automating this process, each customer is provided with a Petro card just like a debit card. A Petro card reader is installed at the bunk. The Petro-card is swiped on the Petro-card reader provided. On swiping, the information is prompted at each step, like password and quantity of petrol in litres. The authentication of the password and checking for sufficiency of balance available for payment is done. If both are fine, the fuel filling gets initiated automatically through the fuel pipe connected to the pump. After the exact quantity of fuel, which is entered by the customer, is reached, the pumping of fuel gets stopped.

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In[2] The main aim of the project is to design a system which is capable of automatically deducting the amount of petrol dispensed from user card based on RFID technology. Liquid dispensing systems are quite commonly found in our daily life in different places like offices, Bus stands, Railway stations, Petrol pumps.Here we are going to present modern era petrol dispensing +system which is meant to be operated with prepaid card using RFID technology. The project mainly aims in designing a prepaid card for petrol bunk system and also petrol dispensing system using RFID technology. In current days the petrol stations are operated manually. These petrol pumps are time consuming and require more man power. To place petrol stations in distant area is very costly to provide excellent facility to the consumers. All these problems are sorted out by the use of unmanned power pump which requires less time to operate and it is effective and can be installed anywhere. The customer self-going to

avail the service has to done the payment by electronic clearing system.

In[3] In the current scenario, replacing the human efforts into automated digitalized mechanism has become a vast growing factor. Human race has become far more independent than they were in the past. Every field has reached their goal of user friendly, in which the actions of a person are controlled by software. However, this is not applied in most of the petrol bunks. Normally in petrol bunks there is a Human to Human interaction. Our project is to overcome this phenomenon by bringing the interaction between Human and Software. By following this mechanism, we can avoid all the errors that a human does and also avoid the cheating activities that a culprit labourer performs in his work. Our project idea is to make the entire process performed by human labourer in a Filling Station into automated digitalized mechanism to avoid small errors and cheats that can be performed by the labourer to their owners. Our system consists of RFID READER to be placed in the Filling Station and all the vehicles must be provided with RFID TAGS.

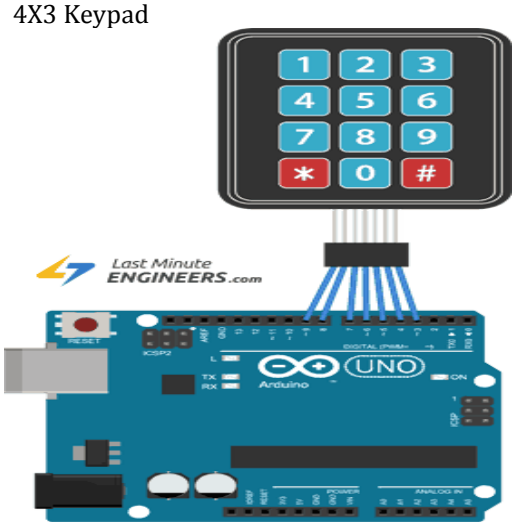
In[4] The security challenges being encountered in many places today require electronic means of controlling access to secured premises in addition to the available security personnel. Various technologies were used in different forms to solve these challenges. The Radio Frequency Identification (RFID) Based Access Control Security system with GSM technology presented in this work helps to prevent unauthorized access to controlled environments (secured premises). This is achieved mainly through the use of a Radio Frequency Identification System with operating frequency of 125 KHz, Microcontroller programmed to send control signals, DC motor, relay, buzzer, Liquid Crystal Display (LCD) and GSM/GPRS Modem. Once the RFID tag which contains the user's unique information is scan by the RFID reader and confirmed match with the information stored in the microcontroller, the microcontroller is instructed to turn ON the DC motor through L293D driver, display "USER NUMBER and CARD NUMBER" on the LCD and activates the GSM/GPRS modem to send SMS alert "AUTHORIZED, valid RFID card shown, User is allowed to enter, user number" to security personnel. Else, the DC Motor remained OFF, LCD displays "READ RFID CARD NOT VALID", buzzer turns ON for about 5seconds and GSM/GPRS modem activated to send "UNAUTHORIZED, invalid RFID card is used to access the security system" to the security personnel. The electronic circuit was implemented, the codes for microcontroller were written in assembly language, debugged and compiled using the KEIL Micro vision 4 integrated development environment. The resultant Hex files were programmed into the memories of the microcontrollers with the aid of a universal programmer. Hardware simulation was carried out using the Proteus Virtual System Modelling (VSM) version 8.0. An importation implication of this paper is that the system is cheaper to maintain and more efficient in comparison with a manually operated type or key lock system. The RFID based access control system can be useful in providing security for homes, organizations, and automobile terminals to increase the level of security.

3. Hardware Requirements

- Arduino UNO

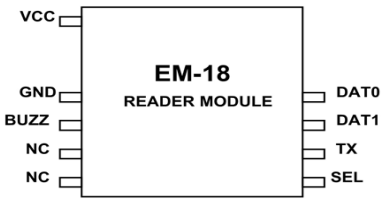
- 16X212c LCD Module

- 4X3 Keypad

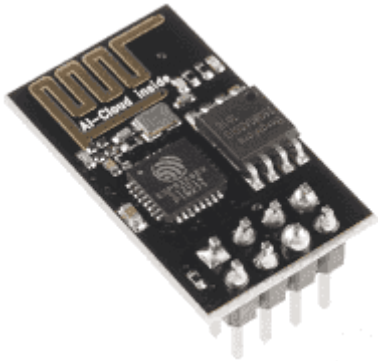


- DC Submersible Water pump

- EM-18 RFID Reader Module



- ESP8266 Wi-Fi Module



- MQ Smoke Sensor
- MQ Smoke Sensor

- Android phone

4. PROPOSED SYSTEM

A petro-card is provided to each customer. When customer drives in to a petrol pump and swipes the card on the Petro-card reader installed at the bunk, it shows the initializations of LCD and GSM units. From this, the customer can infer the system is working properly. Once authenticated by customer, the LCD prompts the user to enter the amount of petrol in litres. Once number of litres is entered, the balance amount in the card is checked. If balance is sufficient, the fuel is filled for the entered number of litres. In this project, for every 100ml of petrol, amount charged is Rs.7. So, based on the number of litres, the total ml of petrol is calculated and corresponding amount to be deducted is calculated. Once the number of litres is entered, the motor pump starts running and fuel starts flowing out of the pipe connected to motor. As soon as the entered litres is reached, the pump turns off and the fuel stops flowing out of the pipe. The transactions details of the quantity of fuel filled, amount deducted and remaining balance is displayed in the LCD as well sent as SMS to customer's smart phone.

If balance is insufficient, it shows "Low Balance, recharge your card" message on LCD as well as sends it as SMS to the smart phone. Recharge option is made available via user smart phone. The customer sends the recharge amount as SMS, e.g. (types 1000 and sends SMS). "Recharge Successful for Rs.1000" is sent to the customer's smart phone as well as displayed on LCD. Now, the customer can continue with the transaction of

fuel filling. Along with this automation process, the enhancements to the system are level senor and smoke sensor .Whenever there is accidental fire in the bunk, the smoke sensor will actuate and send an SMS "Smoke Detected" to customer's smart phone.

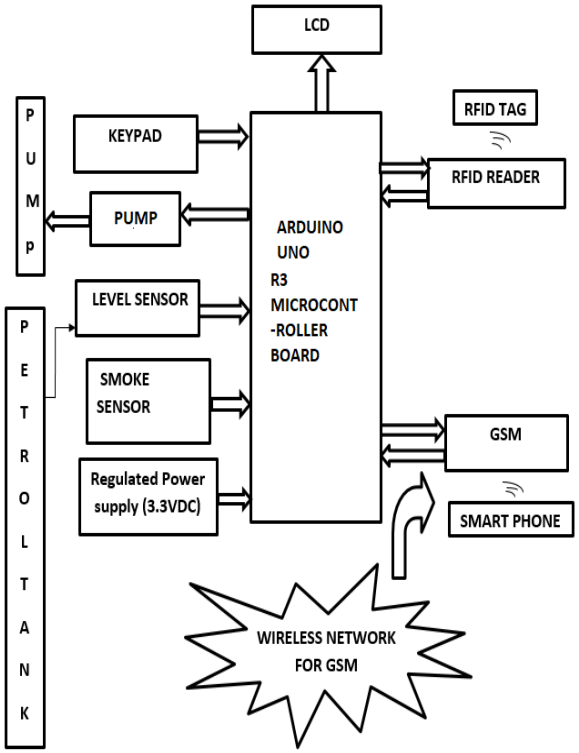


Fig-3: System Architecture

5. RESULTS AND SNAPSHOTS

5.1Model results

Fig: 5.1.1 Display part along with RFID scanner and keypad

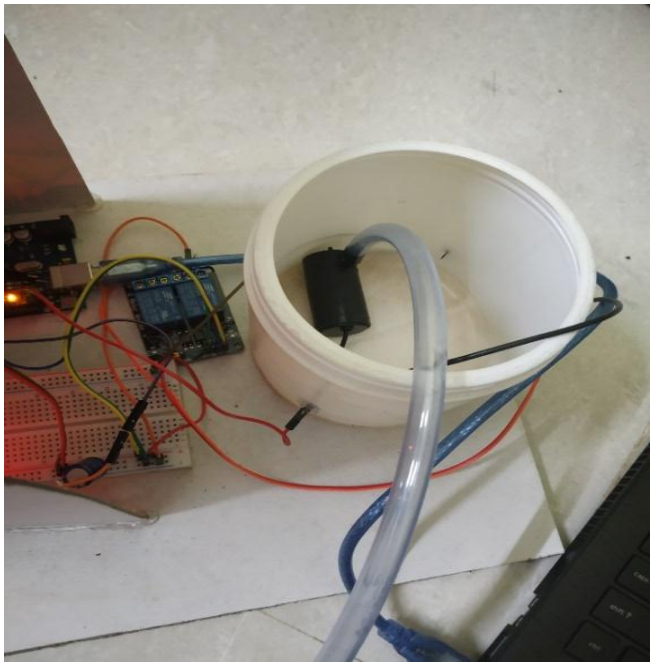


Fig: 5.1.2 Fuel dispensing part along with submerged pump

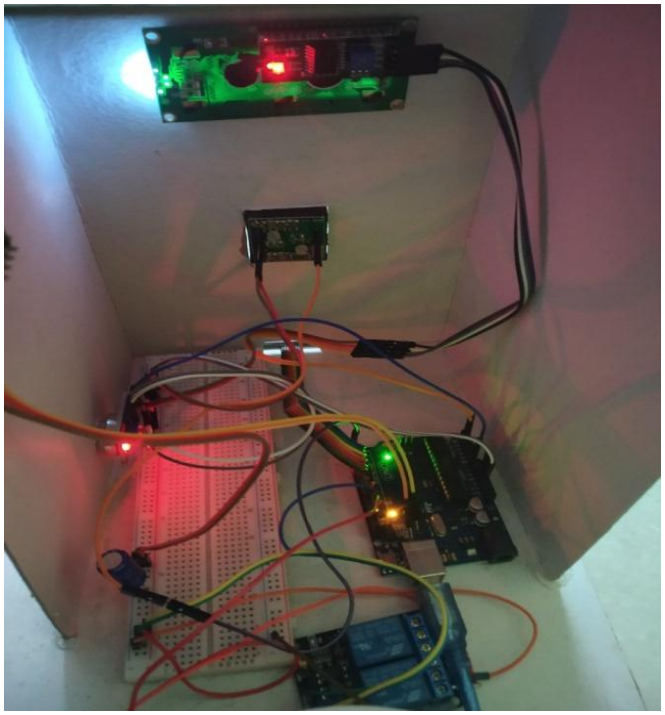


Fig: 5.1.3 Arduino connections

Fig: 5.1.4 Back view (connections and fuel tank)

5.2. Results shown in Arduino IDE

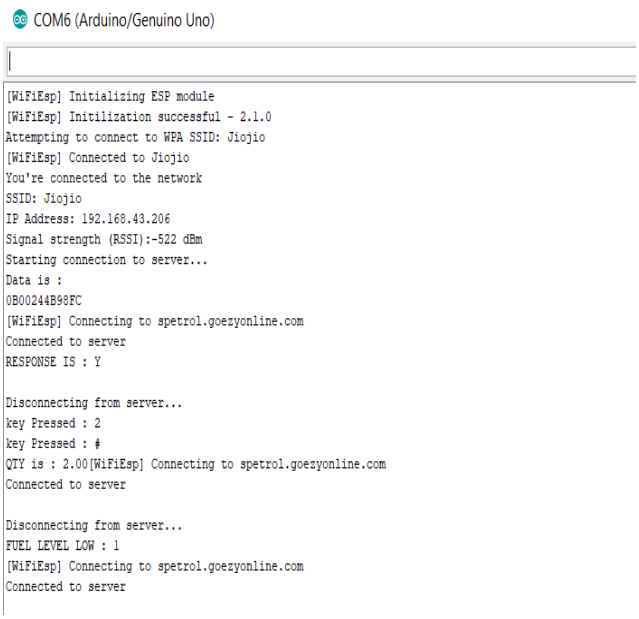


Fig: 5.2.1 Fuel level detection

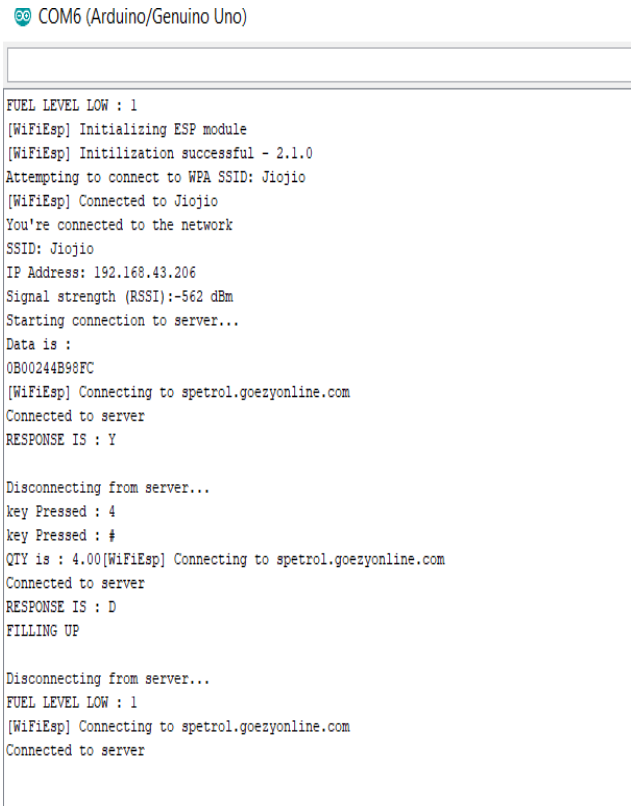


Fig: 5.2.2 RFID authentication and fuel filling notification

5.3. Android Notification

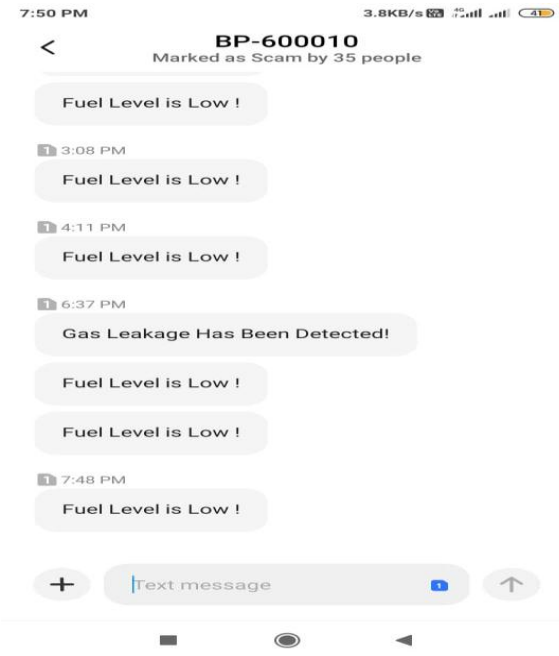


Fig 5.3.1. Android notification

The advantages are:

- Man power is decreased in light of mechanized self benefit.
- Due to utilization of RFID framework theft of the fuel is maintained.
- The time is spared.
- Low power utilization.
- Accuracy in the measure of petroleum administered.
- Fast response.
- Prevention of fire threats by intimating the owner during fire accidents.
- Prevention of corruption and malpractices.
- Cashless transaction

5. CONCLUSION

Implementing the project is very much customer friendly, easy operation at finger tips using smart phone which is a must and should of current lifestyle. Use of RFID technology makes the system secure as it gives unique identification to the customer. Once after installing, maintenance is very easy. Long queues, time and efforts is saved. The main aim of the project is to give the business, substantial savings in labour, time and staff training costs. The software coding in Embedded C code gives the required flexibility to design the transactions as per customer's requirement and convenience. Due to automation, fraudulent transactions are eliminated. Future enhancements would be automatic billing, enables swiping of credit/debit cards on the fuel counter itself. It can be designed to give the information of the density of the fuel on real-time basis. Back office data received from the new machines can be used to generate bonus points to reward the customers on the loyalty front. Touch Screen technology may also be used instead of keypad. I-Button may be used instead of RFID card.

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