

# AUTOMATED PETROL PUMP USING RFID TECHNOLOGY

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**Abstract** – In Today's world almost all the sectors and industries have been automated. Petroleum industries are not an exception to that. Petrol pumps have been very much automated, they have microcontrollers to monitor the outlet of petrol and display the appropriate amount to the customer. Even though everything is automated, customers have to collect the money and there is a high possibility of human error while handling hard cash. Our Project is designed in such a way that the person need not worry about carrying the cash with himself/herself. A Smart card, which contains an RFID tag is given to the customers and the petrol pump will have an RFID Reader and payment can be made through the RFID Technology without any hard cash or Human interaction. In this way, human errors in calculation can be saved and efficient transactions can be carried out. These types of cards have been used in lots of applications including attendance management and employee registration systems in schools, workplaces, and large industries. The Smart card contains an AT89C51 Microcontroller, a voltage regulator, serial cable connections and an LED connection. LED works when information are been passed from the microcontroller when the RFID card is been scanned

**Keywords:** AT89C51 Microcontroller, MAX232 IC, RFID Card, RFID Reader

## 1. INTRODUCTION

Uncontrolled increase in the vehicle population in the world is giving an alarming threat to fuel resources. Dispensing fuels at the fuel stations to the large amount of customers has caused a lot of complication .The Petrol is one of the most important resource in the world. Not only the Proper use of these products, but also the effective utilization of these products are very much important . A fuel station is a facility which sells fuel and lubricants via fuel dispensers which pump fuels into vehicles and calculate the financial cost of the product thus dispensed It is important that we find some important methods to dispense the fuel wisely and efficiently. In the existing systems, every petrol pumps have a single unit that is responsible for controlling the whole process of filling the petrol. This process involves tasks like displaying the amount and quantity of petrol, electrical pump driving and turning ON and OFF of petrol pump accordingly. An important drawback here is that there are a lot of petrol theft in recent times. A secure system is needed to

dispense one of the most important fuel source like Petroleum. A recent research study states that 30ml of every 1000ml is being stolen from customers.

## 2. LITERATURE SURVEY

**A. Monitoring Customer data using web server :** According to Fawzi Mohammed Munir and Mohannad M Hasan (2015) : In this study, a RFID based fuel dispensing System was proposed which involved controlling the customer database using web server. Here a database created using MYSQL contains all datas of the customers. Customers using this system for the first time has to create an account where the admin has to store the datas of customer including the Vehicle Id , Customer name and their unique id which will later be utilized by RFID reader in bunks.

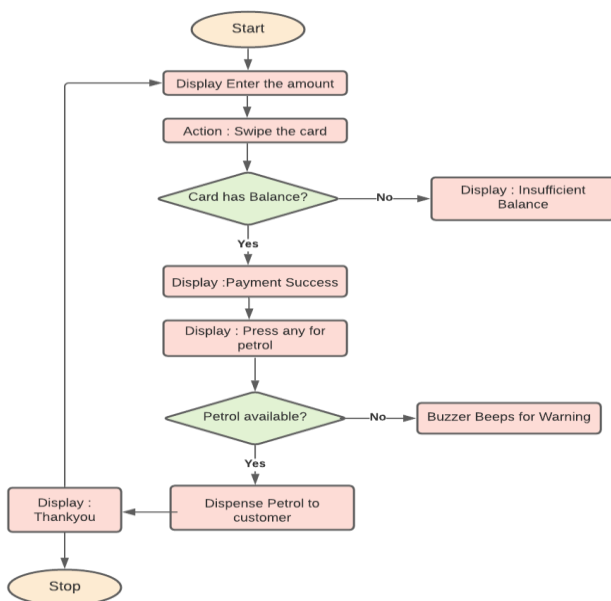
**B. Fingerprint based RFID :** According to Anjali et al. (2020) : In this Study , Self-service petrol bunk with a Fingerprint based RFID technology was proposed . Here the customer has to set the fingerprint on the module , after that complete identity of the person is stored in database along with his/her fingerprint as unique identity. So unauthorized personals can be ceased from usage also the amount of petrol inlet and outlet along with money can managed.

**C. RFID & GSM Technology system :** According to Naresh Jogi et al. (2012) : In this Study , a smart petrol pump which uses RFID and GSM technology was proposed. Here every customer will be given a PF Card called Petrol Filling card , they have to swipe that card inorder to proceed further . The incorporated LCD Display will prompt the user for password . If user enters wrong password , "WRONG PASSWORD" will be displayed else LCD will prompt the user for amount . If there is low balance in cards , "LOW BALANCE " text will be displayed on LCD.

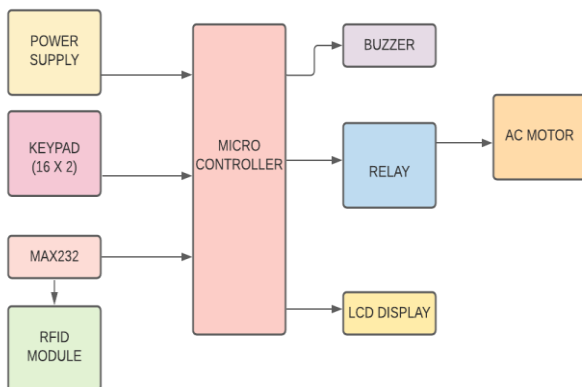
**4. Automated petrol pumps using Node MCU and Arduino Mega:** According R.Deepa et al. (2019)In this study, a RFID based petrol pump involving , arduino mega and Node MCU was proposed. In this Project , IOT technology is used to monitor the petrol and maintain them.

### 3. METHODOLOGY

The below flowchart describes the working of our project. The user scans their RFID card through the RFID reader. If the card doesn't have required amount, the message stating, "Insufficient balance" will be displayed and the buzzer blows. Else if the payment is successful, it prompts for the user input. If the required petrol is available in the tank, it dispenses the petrol to the customer and the cycle repeats.



### 4. BLOCK DIAGRAM:



The Proposed block diagram has three parts namely :

**Block A:** RFID Module , MAX232, Power supply, Keypad

**Block B:** Microcontroller

**Block C:** Relays and Output

Block A of the diagram is the input part, where the user interacts with the system. That is , the user enters the amount details, passwords through the keypad, after scanning their RFID card through tag Reader. Block B is the Brain of the system, that is the microcontroller part. The inputs entered by the user are processed by the microcontroller and conveyed to the output part, which is Block C. Block C is the output part of the system. The information processed by the microcontroller is conveyed to the output part

### 5. HARDWARE

#### 5.1. 8051 Microcontroller :

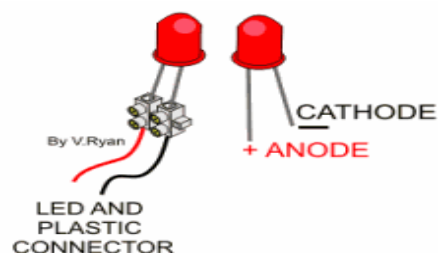


The 8051 is a family of microcontrollers. The microcontrollers which we've used in our design is the AT89S52 microcontroller which belongs to the 8051 family of microcontrollers. These are manufactured by ATMEL. The AT89S52 is an 8- bit microcontroller. It's a low-power, high-performance CMOS. This device is compatible with the assiduity-standard 80C51 instruction set and pinout 9843. These microcontrollers are manufactured using Atmel's high-viscosity non-volatile memory technology

#### FEATURES

- 256 bytes of RAM
- 8K bytes of Flash
- two data pointers,
- 32 I/O lines,
- Watchdog timer
- three 16-bit timer/counters
- a six-vector two-level interrupt architectures clock circuitry

#### 5.2. LIGHT EMITTING DIODE :



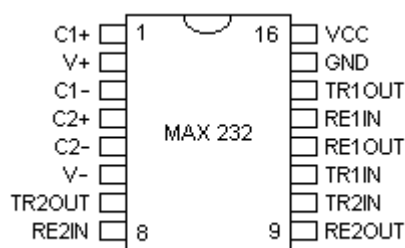
A light-emitting diode (LED) is a semiconductor diode that emits incoherent slim spectrum light when electrically biased in the forward direction of the PN-junction, as in the common LED circuit. This impact is a form of electroluminescence. While sending a message in the structure of bits such as 1, the information is dispatched to the receiver aspect correspondingly the LED glows representing the statistics are being obtained concurrently, the LED blows off when data is sent as 8

### 5.3 RELAY MODULE :



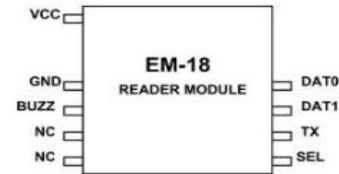
A relay is an electrically operated switch used to isolate one electrical circuit from another. A relay consists of a coil used as an electromagnet to open and close switch contacts. Since the two circuits are removed from one another, a low voltage circuit can be used to time out a relay, which will manage a separate circuit that requires a higher voltage or amperage. Relays can be discovered in early cellphone change equipment, in industrial control circuits, in auto audio systems, in automobiles, on water pumps, in high-power audio amplifiers, and as protection devices.

### 5.4 MAX232 IC:



The RS232 is not compatible with TTL. Therefore MAX232 chip, a line driver is required to convert RS232 voltage levels to TTL Levels. The 8051 microcontrollers have two pins called TXD and RXD, that are mainly used for transmitting and receiving the data serially. These pins are part of port 3 group that is, pins (P3.0, P3.1). Pin 11 of 8051 microcontrollers is TxD and pin 10 is RxD. As they are TTL Compatible they require an RS232 line driver to

make them RS232 Compatible. These line drivers are called MAX232. These require 4 capacitors ranging from 1 to 22nf.



### 5.5 EM-18 RFID READER MODULE

#### SPECIFICATION OF EM18:

Define Operating voltage of EM-18	+4.5V to +5.5V
Current consumption	50mA
Power operation	LOW power
Operating temperature	0°C to +80°C
Operating frequency	125KHz
Communication parameter	9600bps
Integrated Antennae	

## 6. SIMULATION AND RESULTS :

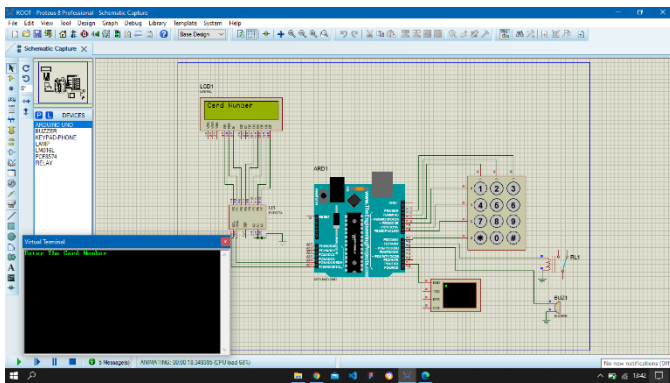
### 6.1 SIMULATION DESIGN :

Arduino UNO is used as a microcontroller for the simulation process. Pin A4, A5 (SDA and SCL) is connected to pin A4, A5 (SDA and SCL) of PCF8574 (I2C Chip). LCD supports only parallel communication, but in this simulation, we are using serial communication. So to convert serial to parallel communication we have used I2C Chip. Arduino supports both serial and parallel communication, for ease of work we have used serial communication. We have used a matrix keypad in simulation, which is used by users to enter card numbers, passwords, and amounts. Pin 7,8,9,10 of Arduino UNO is connected to rows A,B,C,D of matrix keypad and pins 11,12,13 is connected to columns 1,2,3 of matrix keypad. Pin 5 of Arduino UNO is connected to the buzzer and pin 6 is connected to the relay. The transmitter (TxD) pin of Arduino UNO is connected to the receiver (Rx) pin of the serial monitor which transmits the user input to the microcontroller

### 6.2 SIMULATION PROCESS:

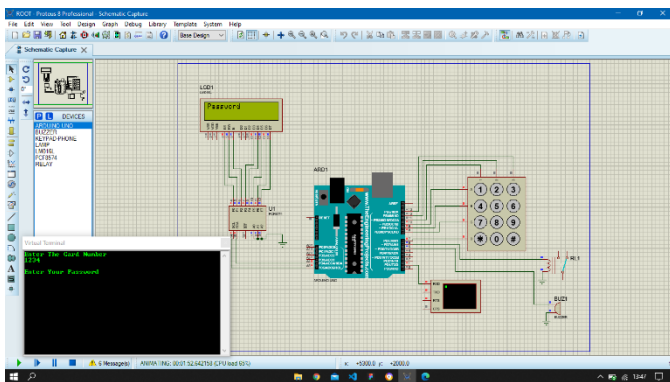
#### STEP-1:

The user enters the unique card number through the Keypad.

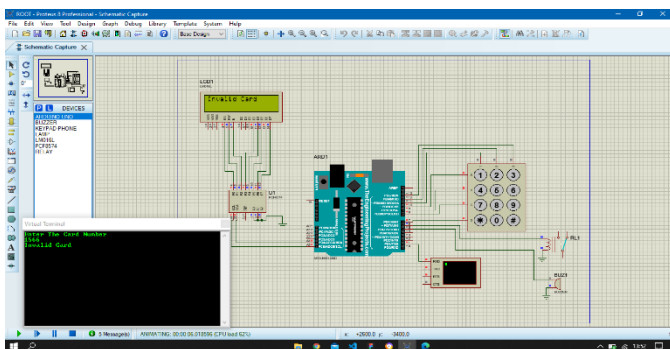


**STEP-2 :**

**A)** If the card number is correct, the user will be asked to enter the password of their card.

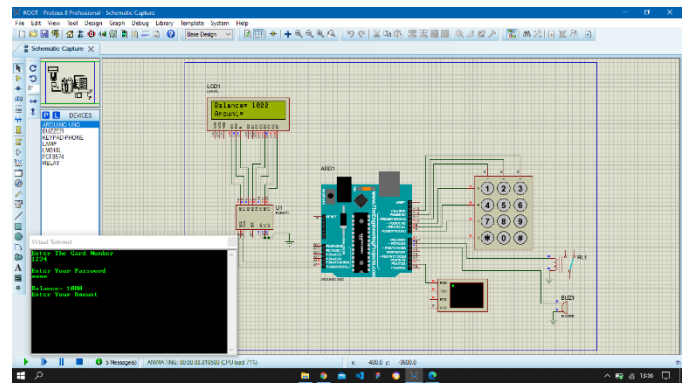


**B)** Else a message stating "Invalid card" will be displayed in 16x2 LCD Display and buzzer blows

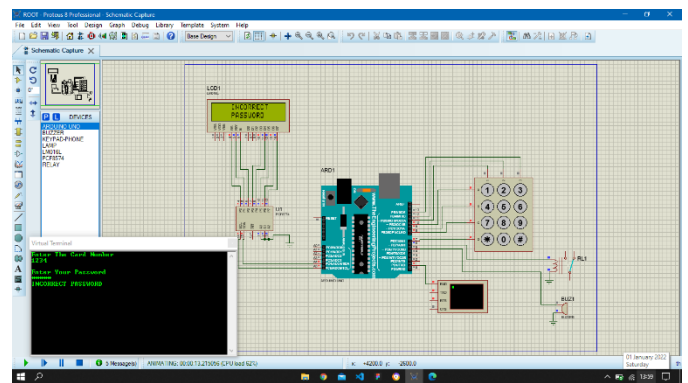


**STEP -3 :**

a) If the password is correct, the balance on the card will be displayed and the user will be asked to enter the amount, for which he/she needs the petrol.



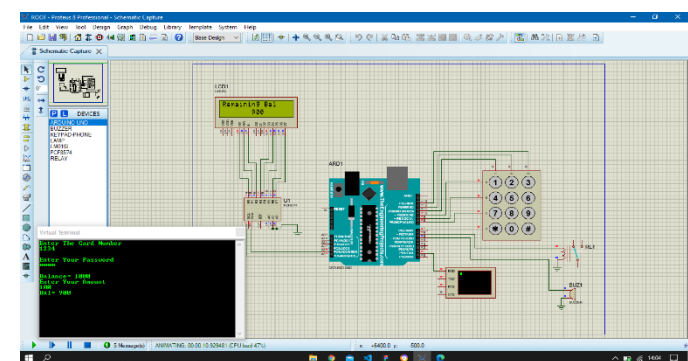
**B)** Else if the password is incorrect a message stating "Incorrect password" will be displayed in 16x2 LCD Display and buzzer blows.



**STEP: 4**

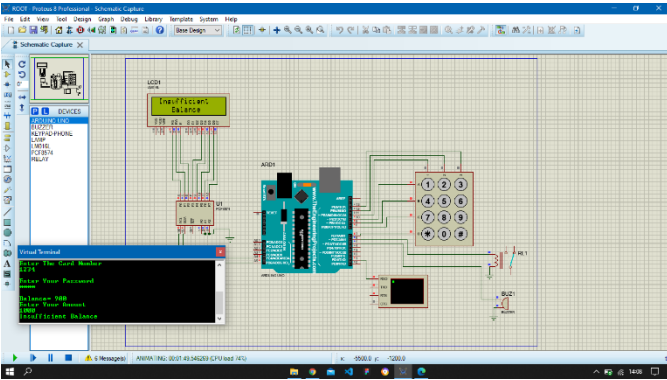
**A)** If a Sufficient balance is present on the user's card, the relay starts and petrol proceeds to fill, and appropriate funds get deducted from the card and a new balance will be displayed.

**B)** Else if there are insufficient funds, a message stating "Insufficient funds" will be displayed in 16x2 LCD Display, and buzzer blows



**STEP : 5**

After petrol gets filled, this process is repeated again

**7. CONCLUSION :**

RFID systems dispenses accurate amount of fuel as required by the user. In this way the efficiency is maintained. Also as everything is automated, the labour pressure is reduced. Also as only authorized users may enter or leave the system, this system is more secure than present ones. To make this system more efficient, greater quality of RFID cards must be produced. Thus the design and simulation part of our project is complete in the first phase of the project. In the second phase, we aim to work on the hardware design of our project and implement everything we discussed in the report so far.

**8. FUTURE SCOPE :**

1. Automation plays a vital role in the future. This type of automated petrol pump proves effective considering the present system.
2. It is considered efficient since there is no cash involved in the whole process and can reduce fuel theft and money theft.
3. Further, this system can be improvised by involving a biometric system to authorize the customers. so only unauthorized personals may be ceased from using it.
4. Since everything is digitalized, each transaction is recorded and any suspicious activity may be detected easily which makes it more secure and we can keep a track of every process.

**9. REFERENCES**

[1]. O. O. Edward, "A research using remote monitoring technology for pump output monitoring in distributed fuel stations in Nigeria," International Journal of Advances in

Engineering & Technology, vol. 6, no. 6, pp. 2408-2415, January 2014.

[2]. Fawzi Mohammed Munir Al-Naima and Mohannad M Hasan, "Design and implementation of RFID Based fuel dispensing system", Research gate publication, September 2015.

[3]. P. Anjali, G. Navya Jyothi, and Yalabaka Srikanth, "Self Service Automated Petrol Pump Using Fingerprint Based RFID Technology", Journal of Mechanics of continua and mathematical sciences", Vol.-15, No.-6, June (2020) pp 82-88.

[4]. S. Ponmalar, K. Bhuvaneshwari, and S. Preethi, "RFID based Petrol Pump Automation System, International Research Journal of Engineering and Technology (IRJET), Volume: 07 Issue: 02 | Feb 2020.

[5]. R Deepa, Roshni A Ramesan, Navya V, Rajesh Kumar Choudhary, Vivek Hegde, "Automated Petrol Bunk", JETIR May 2019, Volume 6, Issue 5, 2019

[6]. Sudeshna Dutta, Smarajit Pal, Subhankar Majumder, and Mrs.Pratyusha Biswas Deb, "SELF SERVICE PETROL PUMP USING AUTOMATION TECHNOLOGY", I3SET2K19: INTERNATIONAL CONFERENCE ON INDUSTRY INTERACTIVE INNOVATIONS IN SCIENCE, ENGINEERING, AND TECHNOLOGY 3.

[7]. Estherkani, "Slideshare", July 2012.

[8]. Shaanu Shaan, "SCRIBD", March 25, 2012.

[9]. Gandha Dhairya P, Dr. Tejas, V.Shah, and Dr. Deepali H. shah, "RFID based fuel station using Arduino UNO", International journal of creative research thoughts, Vol 8, Issue 10, October 10, 2020.