Smart Automatized IoT based E-Petrol Pump

Prof. R.B. Rathod[1], Ashish Gole[2], Roshan Navale[3], Asmita Patil[4], Swapnil Pati[5]

---***---

ABSTRACT: In this project we are going to built automated petrol pumps systems for remote areas. With this smart petrol pumps there were no need to put physical person for distribution of petrol. This petrol pumps works with the IoT connectivity so that owner of Petrol pump will have overall control of this petrol station. When user needs fill the petrol in his bike firstly he checks for pricing online in that specific portal designed for this petrol station. Then he will select the nearby stations and pay for petrol amount after that he needs to go there for filling purpose. In the console of pump, he needs to put the OTP received via SMS in this petrol pump console. After that pump motor starts for appropriate time and user will get the petrol

Key Words:: Arduino Mega 2560 Microcontroller, Fuel Dispensing System, GSM Module, Level Sensor, RFID Based Prepaid system, Web Server and Wi-Fi Module.

INTRODUCTION: In this project we are going to built automated petrol pumps systems for remote areas. With this smart petrol pumps there were no need to put physical person for distribution of petrol. This petrol pumps works with the IoT connectivity so that owner of Petrol pump will have overall control of this petrol station. When user needs fill the petrol in his bike firstly he checks for pricing online in that specific portal designed for this petrol station. Then he will select the nearby stations and pay for petrol amount after that he needs to go there for filling purpose.

In the console of pump, he needs to put the OTP received via SMS in this petrol pump console. After that pump motor starts for appropriate time and user will get the petrol. At the dashboard portal user owner can get all the information about sales and daily station reports.

LITERATURE SURVEY:

Robert H. et.al [1] Chen First of all the petrol pump with our technology can be possible to operate all the time without help of manpower, In this project there will be a centralized server having the database of the customer like Customer Name, Card No, After paying the cash the balance can be increased and depending upon the use of the card for purchase of petrol the balance will be deducted.

D. Calcutta, Frederick Cowan [2] Hassan Parchizadeh,"ESP32 Microcontrollers Petrol pump with our technology can be possible to operate all the time without help of manpower, In this project there will be a centralized server having the database of the customer like Customer Name, Card No, After paying the cash the petrol balance can be increased and depend upon the use

of the card for purchase of petrol the petrol balance will be deducted

Stephen B.Miles, Sanjay E Sharma, John R.Williams[3] The natural resources are all significant basic needs for all living beings. This research work has the objective of establishing a flexible, economical system with the facility of easy configuration and providing a solution to the problem of liquid loss. This system uses inexpensive RF components. This is the key point that helps cost reduction and work efficiency, sans any loss. This research can therefore, help getting substantial benefit in the matter of management of liquid natural resources, providing an efficient and effective method for managing and monitoring liquid storage systems both large and small.

In current days fuel stations are operated manually. These fuel pumps are time- consuming and require more manpower. To place fuel stations in distant area it very costly to provide excellent facility to the consumers all these problem are sorted out by the use of unmanned petrol pump which requires less time to operate and it is effective and can be installed anywhere the customer self-going to avail the services the payment is done by electronic clearing system. The simple and proper use of microcontroller and GSM technology provides a total security and atomization in the distribution of fuel. It has easy operated mobile phone system and graphics user interface (GUI).

It interfaces with high-speed fuel dispenser which is convenient for the consumer to operate. In our system the password will be provided to the user and customer has to enter this password on the LCD provided by the fuel station which will help the petrol company to create authentication for the user also the distribution of the fuel is not possible until it gets verified by the database.

In short, we provide a secure system for fuel distribution. The advancement of this project can help industry financially keywords: GSM, LCD, GUI, Atomization. First of all the petrol pump with our technology can be possible to operate all the time without help of manpower, In this project there will be a centralized server having the database of the customer like Customer Name, Card No, After paying the cash the petrol balance can be increased and depending upon the use of the card for purchase of petrol the petrol balance will be deducted.

1. HARDWARE REQUIREMENTS

- Arduino Mega 2560 microcontroller.

- Passive RFID card and EM-18 RFID reader.

- Piezo buzzer.

- 4x4 Keypad.

- Liquid crystal display (LCD).

- Fuel dispensing system (consists of SPDT relay switch and pump motor).

- Level sensor (i.e., FC-28 soil moisture sensor).

- SIM 800 GSM module.

- Node MCU ESP8255 Wi-Fi module

2. SOFTWARE REQUIREMENTS
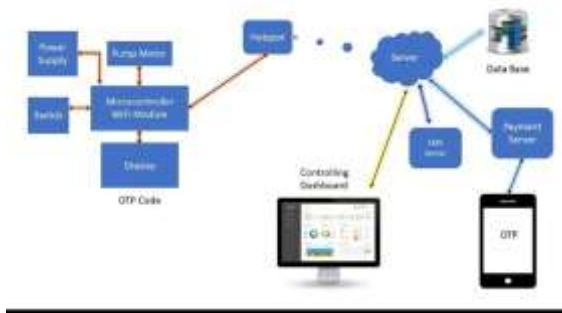
- Arduino IDE.

3. PROPOSED DESIGN

Fig -1: Block Diagram

- When RFID card or tag comes in the range of RFID reader, the RFID reader reads the ID number of the RFID card and sends to the Arduino Mega 2560 microcontroller. Where we are already stored the ID numbers of the RFID cards in the microcontroller. The microcontroller verifies whether this RFID card is authorized or not. If RFID card is authorized than microcontroller displays RFID card is authorized on the LCD screen, otherwise it displays RFID card is unauthorized and initiates the buzzer.

- If RFID card is authorized than microcontroller gives the access to the customer to enter the amount of the petrol using keypad and it is displayed on the LCD screen. Then microcontroller checks whether the available balance of the RFID card is more than the entered amount. If it is more than microcontroller turns ON the pump motor through relay switch for a particular time period and then pump motor automatically turns OFF. After completion of

petrol filling process, the information of the petrol dispensed amount and remaining balance of the RFID card is send to the costumer mobile phone using

- GSM module (i.e., SIM800) and also sends to the web server using Wi-Fi module (i.e.,

- NodeMCU ESP8266). In web server we are maintaining the petrol dispensed amount of the costumers and this web server access is secured by a password and that password is only known to the petrol companies.

- Suppose if available balance is less than the entered amount than microcontroller tells the customer to recharge the RFID card. Here, RFID card works as a prepaid card and it is recharged at the petrol station itself. Also here, we are using Level sensor to sense the level of the fuel in the tank and the buzzer is activated, if the fuel level is low.
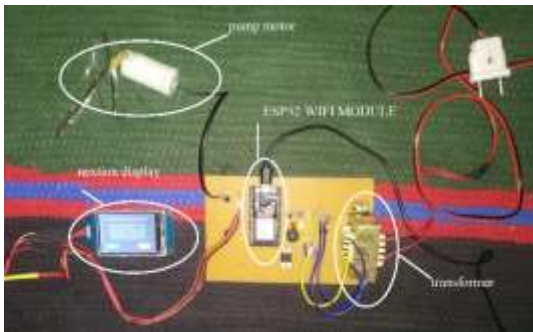
4. SYSTEM FLOW CHART
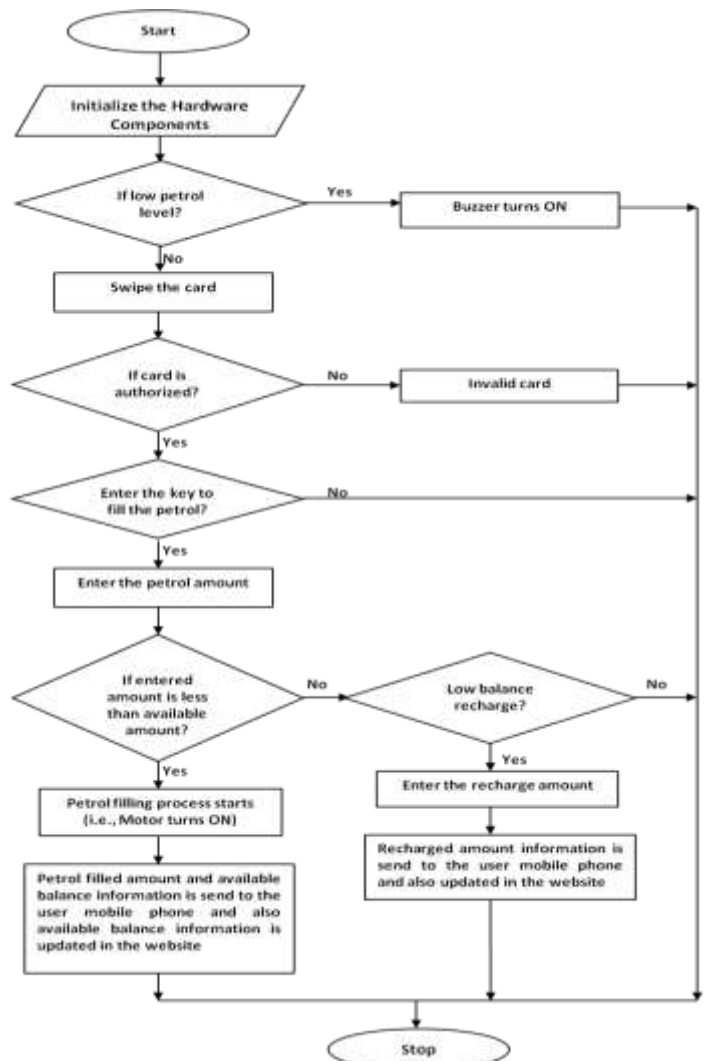
5. EXPERIMENTAL SETUP
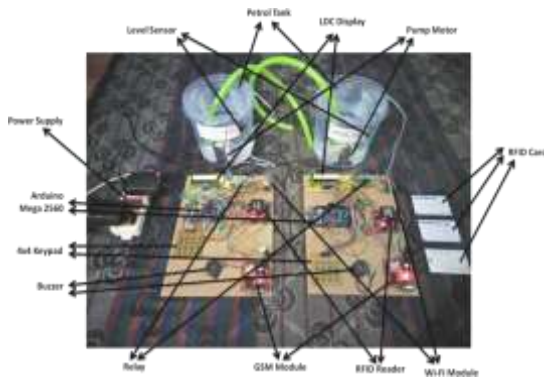
6. ADVANTAGES

- Man power is reduced due to automated self-service.

- Due to use of RFID technology robbery of the fuel is prevented.

- Accuracy in the amount of petrol filling.

- Benefit to the petrol companies by maintaining the data of the costumers as well as the petrol consumption.

7. RESULT

Petrol pump with our technology can be possible to operate all the time without help of manpower, In this project there will be a centralized server having the database of the customer like Customer Name, Card No, After paying the cash the petrol balance can be increased and depend upon the use of the card for purchase of petrol the petrol balance will be deducte

7.1 ESP32 WIFI MODULE

The ESP32 chip comes with 48 pins with multiple functions. Not all pins are exposed in all ESP32 development boards, and there are some pins that cannot be used. There are many questions on how to use the ESP32 GPIOs. What pins should you use? What pins should you avoid using in your projects? This post aims to be a simple and easy to follow reference guide for the ESP32 GPIOs

Not all GPIOs are accessible in all development boards, but each specific GPIO works in the same way regardless of the developme0nt board you're using. The ADC (analog to digital converter) and DAC (digital to analog converter) features are assigned to specific static pins. However, you can decide which pins are UART, I2C, SPI, PWM, etc – you just need to assign them in the code. This is possible due to the ESP32 chip's multiplexing feature. The ADC input channels have a 12 bit resolution. This means that you can get analog readings ranging from 0 to 4095, in which 0 corresponds to 0V and 4095 to 3.3V.

You also have the ability to set the resolution of your channels on the code, as well as the ADC range. The ESP32 ADC pins don't have a linear behavior. You'll probably won't be able to distinguish between 0 and 0.1V, or between 3.2 and 3.3V. You need to keep that in mind when using the ADC pins.

7.2 Nextion Touch Screen Display

Nextion is a Human Machine Interface (HMI) solution. Nextion displays are resistive touchscreens that makes it easy to build a Graphical User Interface (GUI). It is a great solution to monitor and control processes, being mainly applied to IoT applications. There are several Nextion display modules, with sizes ranging from 2.4" to 7".The Nextion has a built-in ARM microcontroller that controls the display, for example it takes care of generating the buttons, creating text, store images or change the background. The Nextion communicates with any microcontroller using serial communication at a 9600 baud rate.

7.3 Steps of Petrol Fill:

7.3.1   if you have a OTP To Select OTP Option

7.3.2   Customer Vehicles Information.

7.3.3   After Getting The Information Now Selet Start To Fill Petrol

7.3.4   Petrol Filling Start

7.3.5   submersible mini water pump

Micro DC 3-6V Micro Submersible Pump Mini water pump For Fountain Garden Mini water circulation System DIY project. This is a low cost, small size Submersible Pump Motor which can be operated from a 3 ~ 6V power supply. It can take up to 120 liters per hour with very low current consumption of 220mA. Just connect tube pipe to the motor outlet, submerge it in water and power it. Make sure that the water level is always higher than the motor. Dry run may damage the motor due to heating and it will also produce noise.

8.   SPECIFICATION

Operating Voltage: 3 ~ 6V

Operating Current: 130 ~ 220mA

Flow Rate: 80 ~ 120 L/H

Maximum Lift: 40 ~ 110 mm

Continuous Working Life: 500 hours

Driving Mode: DC, Magnetic Driving

Material: Engineering Plastic

Outlet outside Diameter: 7.5 mm

Outlet inside Diameter: 5 mm

9.   REFERENCES

1. G.Janani — Petrol Bunk Automation with Prepaid Card using GSM Identification (IJRASET) Volume 06 Issue 02, February 2018 | ISSN:0 2321-9653.M. Young, The Technical Writer's Handbook. Mill Valley, CA: University Science, 1989.

2. Priyanka A.Gaikwad[1], Shubhangi S.Wanare[2], Pallavi S.Sonone[3], Pratibha K. Bahekar[4], I.Y.Sheikh[5] — Automation in Petrol Bunk using RFID and GSM (IJRAT) Special Issue National Conference "CONVERGENCE 2017", 9th April 2017 | E-ISSN: 2321-9637.

3. Wavekar Asrar A[1], Patel Tosif N[2], Pathan

4. saddam I[3], Pawar H P[4] — RFID Based Automated Petrol Pump (IJSRD) Volume 4, Issue 01, 2016 | ISSN: 2321-0613.

All Authors

   Ashish Shrirang Gole

   Roshan Mhasku Navale

   Asmita Vilas Patil

   Swapnil Anil Patil

   Prof. R.B. Rathod