Automatized IoT based E-Petrol Pump

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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.

1. 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.

2. 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.
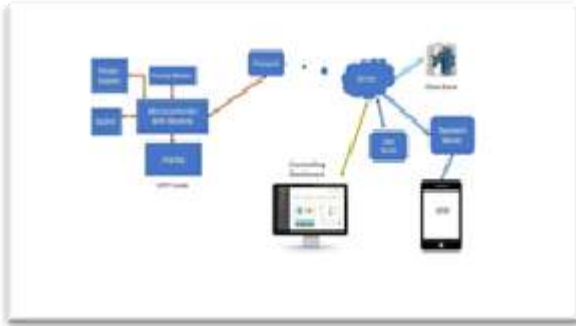
3. Proposed Methodology:

Fig. System Architecture

This system architecture is designed for the automated petrol pumps systems for the remote locations. This system helps to avoid manpower to dispense the petrol. This architecture is based on the IoT connectivity and hence, the owner of this system will have the control over the remote locations. When user needs to fill the petrol in his/her vehicle, user will search for the fuel stations nearby and check for the online pricing in the portal designed for the remote location. User needs to pay for petrol amount and needs to fill the petrol manually once he/she finished with the entire process.

In console screen of the petrol station, user needs to enter the OTP received on his/her phone. If the entered OTP is correct then pump motor starts for designed time period, in that duration user gets the petrol. User can view information like sales and daily station reports at dashboard portal.

In above system architecture, we have used following modules,

WiFi Module & SMS Server: We are using the WiFi module and SMS Server in this architecture to receive the OTP and to send the information of the petrol dispensed amount and remaining balance to the user on his/her mobile phone via SMS Server and Web server via WiFi module.

Firstly, user needs to enter the OTP on console screen and microcontroller checks for the available balance in user account. If the user account has the balance more than amount entered by the user then microcontroller turns on the pump motor through relay switch for designed time period and turns off automatically after dispensing of petrol done and finally using SMS Server system sends the petrol dispensed amount and remaining balance of the account on to the users mobile phone and same information updated in web server.

Buzzer: We are using the Buzzer module in architecture to initiate buzzer on unsuccessful attempts of OTP entered by the user and after successful completion of the transaction.

Pump Motor: In this system architecture, we have used the Pump Motor module to dispense the petrol to the user. When user enters OTP on console screen, system asks user to enter the amount of petrol. User enters the amount of petrol on screen using keypad and system verifies the user account balance to amount entered by the user. If the amount is less than account balance then microcontroller enables the Pump Motor using relay switch for a particular time period then Pump Motor automatically goes OFF.

Display: Display is used for User Interface to the system. User can enters the OTP on screen, Account balance and account information displays on screen.

Power Supply: To make the system work we need power supply. Input voltage limit of the system is in between 7 to 20 Volts.

Arduino Microcontroller: We have used the Arduino Microcontroller as the heart of this architecture. Arduino microcontroller is used to program the system. Arduino microcontroller is used for managing all information of the system like RFID card number, user data, and account information. Arduino microcontroller controls the system at own and make the system automatic.

The Arduino is an open source microcontroller based on the Microchip ATmega328P microcontroller.

Payment Server: User can add the money in his/her account using mobile app of this system using the payment gateway server. Payment server is used to manage account balance of the user. When user fills petrol at the time, particular amount of the petrol is deducted and update the information in respective remote location server using payment server.

4. Experimental Setup:

➢ **Petrol Pump WebPage**

▪ This is our webpage where new user will create account.

➢ **Petrol Station Booking Data**

- This is booking data store on admin page
- After users new signup user's info stores here

➢ **Signup & first payment**

- This is signup page
  - Content:
  - Name
  - Email ID
  - Mobile no
  - Vehicle
  - Etc

➢ **About us**

- This page shows the information and details about petrol pump owner

➢ **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.

➢ **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.
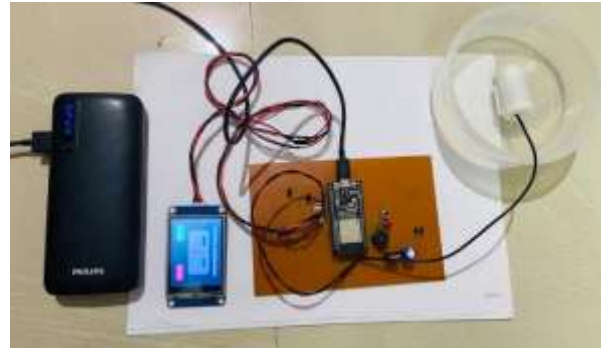
➢ **Power Bank**

- Here we have used the Philips power bank to supply a power to all system
- And this we have connected via USB

➢ **Water Motor**

- In actual project as a petrol pump motor we have used water motor
- This motor has one input for water insertion and one output point for filling

➢ **Whole Project**

1. 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,

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5. RESULT:

Petrol pump with our technology can be possible to operate all the time without manpower.

Our system provides a corruption free efficient fuel pumping system. We are dealing with secure and fast transaction.

In this project there is centralized server having the database of customer like Customer Name, OTP, etc. After recharging the account for filling the petrol balance can be increased and depending upon the use, the fuel balance is deducted after purchasing the fuel.

6. DISUSSION:

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.

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A key facet of the technology-driven project, coming as it does after various measures dependent on manual intervention, is to introduce an electronic locking system for tanker-trucks transporting the fuel, and at select petrol pumps. Apart from making it more difficult for fuel adulterators, the companies are confident of offering improved customer service and enjoying greater control over the retail outlets.

According to a BPCL official, the electronic locking system on tanker-trucks and underground tanks would be linked to a central computer system. It would help the company monitor sales and stocks.

The automation covers various aspects of the outlets, including level gauges in underground tanks and gauges to check quality parameters of the fuel. Every time fuel is dispensed, a bill, giving details of the date, time, quantity of the purchase, the pump and the attendant who delivered the product, will be generated automatically. Automation of pumps will give oil companies accurate data on sales and control over any adulteration, which might happen at the retail end. These benefits will also flow to the customer.

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