

Iot Based Petrol Bunk Management for Self-Operation Using Rfid and Raspberry Pi

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ABSTRACT

This paper emphasis on designing a system which can spontaneously dispense the fuel and deduct the amount from prepaid RFID card. Here, all users will have their own RFID cards which are recharged by prepaid amounts. The dispenser in the fuel station is installed with RFID reader which reads the RFID card and displays the available balance on LCD display unit. The user will enter the desired amount of fuel using the keypad,the system will calculate the time of operation for the electrical fuel pump and initiates the operation of fuel dispensing. The system will automatically shuts down the pump after reaching the user's desired value. It is combined with raspberry pi module which sends notification to the user through mobile application. Added to that, this system has fire sensor to detect fire accidents and purity sensor to check the purity of the fuel. Hence this work will make the petrol bunk management system with no boundaries and reduced manpower.

Keywords: *Raspberry Pi controller, RFID reader, keypad, relays, purity sensor, LCD display, power supply, WIFI modem, fire sensor, web app.*

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I. INTRODUCTION

Based on RFID technology and system automation technology we aim to electronically upgrade the traditional fuel stations. Petrol pumps nowadays generally have a microcontroller unit which controls the electrical pump operation, display unit and the keypad unit. The microcontroller unit controls the measuring by operating the pump for precise amount of time but still we need worker to enter the amount and collect money. Our proposed system is fully automated so that there is no manpower required to maintain the pump. Ease of transaction, transparency and safety is assured to the users too.

Our aim is to reduce the working manpower and to upgrade the current fuel stations to a whole new level using technologies. The RFID cards will be given to the customers, now the whole process of fuel dispensing is done by the user itself with the help of automated system for refueling. The system is fully automated and system-user interaction is kept simple for the ease of operation. The LCD display unit will show the values that are entered through keypad which will help the user to confirm his inputs. The system is well programmed that it automatically calculate the precise amount of fuel for entered amount and runs the pump for the accurate calculated time interval, hence it reduces the cheating in fuel stations. Next generation petrol bunk management for self-operation uses raspberry pi module as the central controller unit, which co-ordinate with RFID card, electric motor, LCD display and Wi-Fi modem. It can offer number of advantages to users. Our work has some most countable features like automatic transmission petrol can be filled into the tank without human interference. This system also offers us facility to recharge our RFID card onsite. One of the major fascinating thing about this work is that it reduces human intervention and prevents illegal trade of petrol. Raspberry pi module acts as the central controller device and other peripherals co-ordinates with the Raspberry pi module. After a transaction is completed, amount is deducted from RFID card and the remaining balance is displayed on screen. If the balance is low the transaction is terminated and the same message is displayed on the screen. The confidentiality and security of data is maintained very well by the system. Power management is very easy. Power disconnection-reconnection won't affect the operation.

II. METHODOLOGY

Below figure 1 shows the flow chart of next generation petrol bunk. Specification consists of raspberry pi, power supply.

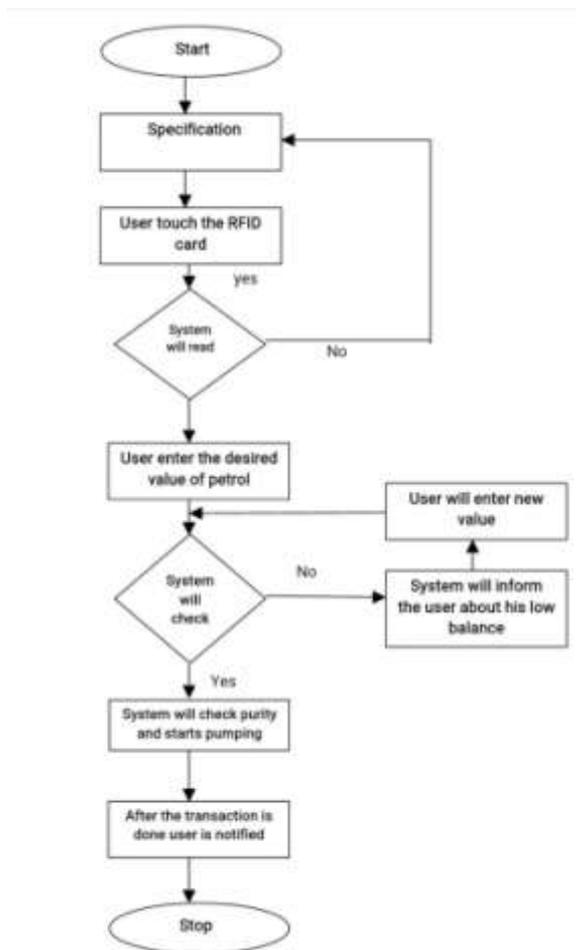


Figure: 1 Flow chart of next generation petrol bunk

User will touch the RFID card the system will read the information about the user. If the information is true the user should enter the desired value of fuel needed, if not it will go to specification .Next the system will check the balance in RFID. If there is insufficient amount the system will inform the user that the balance is not enough for transaction, then user enter the new value. The system will check the purity of the fuel and start operating. After the transaction will do the user is notified through web app. The server database stores all the data, the record of all transactions from previous and current month is stored in the server database and can be accessed by the mobile application. Hence to avoid damages to the working components voltage controlling method can be implemented.

III. BLOCK DIAGRAM

The customer will his own RFID card with all his details installed in it, The RFID reader will read the data present in the card and authenticate the user. The user authentication is done by Raspberry pi module by using the data in RFID card.

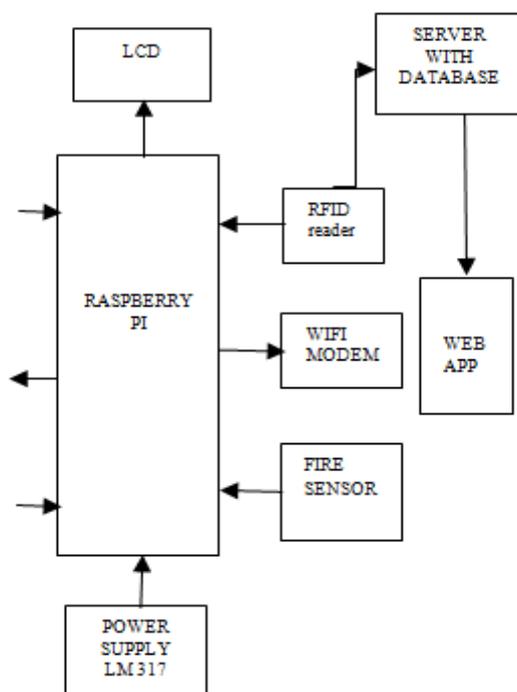


Figure: 2 overall block diagram of next generation petrol bunk

If valid user is confirmed the corresponding details is displayed on the LCD display. The amount of fuel required is entered in through the keypad. Raspberry Pi is efficiently programmed for precise motor operation. When the user enters the amount of fuel, the Raspberry Pi activates the relay drive. Relay's output is connected directly to the raspberry pi module which processes the data for further operations. Further operation involves operation of pump, bill generation, purity check, safety and updating the details of transaction on mobile app.

IV. RESULTS

The below figure-3 shows hardware connection. In this work we will be connecting USB, mouse, keyboard and HDMI cable. This cable comes from the monitor side, one end is connected to converter and another end is connected to monitor, we will be connecting HDMI cable to raspberry pi and keyboard and mouse to raspberry pi. Power supply is given for hardware and raspberry pi. Then raspberry pi is turning on and we have to set the IP address using the application name FING. Now Wi-Fi is automatically connected through our hotspot then we should go to the file manager to see the code. To run the code we should go to the command window it will update the values of fire and turbidity. When we swipe the RFID card it will check the balance of the card connected to server then it will ask for selection of petrol or diesel option 1 is for petrol and the left button is for diesel then it will ask for the amount, so relay will turn on according to the amount entered using keypad and updated balance will be shown in LCD.



Figure: 3 hardware connection of automation petrol pump

V. CONCLUSION

The application of the work is very much user friendly, access through Smartphone will make this work more beneficial. Security is ensured to users as RFID technology gives unique proof of identity to each user. Maintenance of this system is very easy. This implementation reduces the time and efforts that was wasted in conventional fuel stations. The main goal of this to upgrade the conventional petrol pump by reducing man

power, labor and enabling smart transaction. The software programming is done in Embedded C which is a user friendly language to fulfill user's need. Due to up gradation to smart transaction cheating in fuel station is minimized. In future enhancement the system can be installed with a bill printer, density checker, and touch screen display can be installed to give the user a smart interface. I-Button may be used instead of RFID card.

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