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Automated Fuel Station with user security

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***Abstract*— Presently, all fuel stations are operated manually. They required more manpower and time. The technology provides simplicity and comfort yet in addition brings a major worry for security. To put fuel station in particular region it is expensive to give office to the customers, all these problems are dealt with the utilization of automated fuel station which require less time to work and it is successful and can be introduced anywhere. The proposed system help customers that means they need not carry money with them. The straightforward and legitimate utilization of RFID and GSM innovation gives an aggregate security and atomization of conveyance of fuel. The system is easily operated on mobile phone. In this proposed system the OTP is provided to the customer by the fuel station through GSM technology, then OTP is entered by the customer on LCD with the help of keypad. Thus authentication is created by fuel industry with the help of OTP. The appropriation of fuel is not dispensed until the OTP gets confirmed on the basis of information stored in the system. In fact a proposed system provides security for fuel distribution.**

Keywords—*RFID technology, GSM, authentication, raspberry pi, automation, fuel station.*

I. INTRODUCTION

The modern world is known as the web age on account of expanding utilization of web in everyday actions. The applications like online banking, cash management, automated fuel station, medical field are based on modern technology. In case of automated fuel station all data is being inserted by using computers. However to the extent security of the fuel station is considered, there is not much progress. The authentication is provided to the customer is the aim of the system. Today's fuel stations have some disadvantages like robbery of petrol, illegal selling of petrol and excess of man force. To overcome these problems we are attempting to build up the new proper security system to acquire our design [1]. The automatic petrol pump utilizing GSM is a case of the new innovation which gives the base to the security of distribution of fuel and to keep information utilizing database.

The main objectives of the proposed system is to bring the system into automation .To provide right approach towards security and economical need of business. The system provides easy access and also save time . The customer should have RFID card, on scratching it with RFID reader, it shows that the card is authorized or not based on the information saved in the database of the system. If the card is valid then an OTP sent to the customer mobile phone through GSM. By entering this OTP, a specified amount of fuel is dispensed in the tank. In this way the system works in general form.

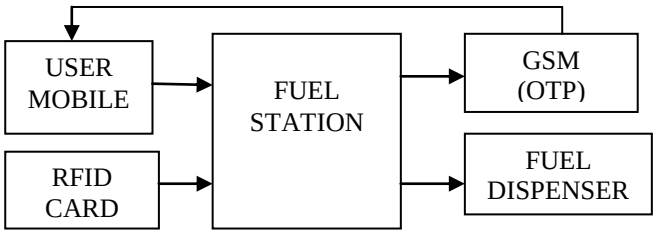

Fig1. General system diagram

The paper is organized by the following way as: A rigorous literature survey is given in section II. Complete methodology for the system is explained in section III. The section IV covers result part. At last, the paper is concluded and future aspects are given in section V.

II. LITERATURE SURVEY

Oil based goods are one of the unique manifestation of the environment. The power utilize and dispersion is an essential undertaking to survive Diesel, kerosene, gasoline and so forth into vehicles and to figure the money related cost of the items in this way administered [2].The crisis in the technology of radio frequency has been changed the conventional strategy for information accumulation. Contrasted with the conventional standardized identification, attractive card and IC cards RFID labels have the highlights of non-contact, perusing speed, no wear, long life, easy to understand and the security work [3].The utilization of RFID for vehicle distinguishing proof, toll collection traffic administration have just been tried different things with broadly [4]. RFID based automated fuel station is used to diminish and build up an auto-guided mechanism and to execute the task sequentially by utilizing RFID technology. These systems are profoundly dependable and less tedious devices [5]. Presently a day, most of the fuel stations were physically worked which requires many labor and are tedious.

For putting fuel stations in a remote region, it is so hard. Mass travel organizations center to incorporate characteristics and most recent innovations in their system meaning to decrease the administration labor. Presentation of innovation in conveying the administration has changed the conveyance benefit plan. This incorporates self-benefit innovations like self-benefit fuel distributors. This has been made conceivable by utilizing PC and most recent innovations [6]. More seasoned petrol pumps were not sufficiently solid. For instance, in system with paper energizes, there might be utilization of false coupons that are fundamentally the same as to the unique one. Once more, We don't have the genuine computations or the measure of petroleum that is apportioned on every day or month to month premise neither what number of paper revive are coursing. The main aim of the project is to give approval to the client and naturally direct the startup and Stopping of the tank valve as per the sum asked [7]. In the year 1883, S. F. Bowser invented idea drawn water from a well by utilizing a wooden plunger. Around 1885, he utilized this thought if there should arise an occurrence of petroleum pump and wound up author of S.F. Bowser Pump Company. At begin the unit was little comprising of capacity barrel, the plunger, a hand lever and an upright spigot lever. This station got gigantic achievement and soon it turned into a "filling station"[8]. At the point when some other oil organization issued mapped Gulf was the just a single organization that issued the guide. After this different advancements made and the cutting edge petroleum pump are produced which are treading now a day. Apart from this we have included some new highlights into the current framework, for example, smoke recognition, programmed installment utilizing Smart card, sign of fuel level and so on. Henceforth this framework is more effective than the current once. Client can revive these card at energize focuses. At the point when client scratches the card through RFID per user, he will get his sum subtle elements on LCD screen then he needs to enter the measure of petroleum which needs to top off in rupees [9].

III. METHODOLOGY

The customers carry the RFID card. The reader reads the specified number on the card shown by the customer and gives the equivalent signal to Raspberry Pi which has been already programmed. So, the number is checked and verified that the card is authorized or not and the analogous information is which then displayed on the screen of the LCD. The amount in rupees is entered with the help of keypad. When the user enters the desired amount on keypad the relay driver gets activated by Raspberry Pi for specific time. Relays are turned ON and OFF by the driver circuit. The relay is used as an electromagnetic switch for both pump and motor. The output of relay gets connected to the fuel pump. As the desired amount is entered on keypad, the petrol is dispensed in the tank. GSM module is used for the connection of SIM and the Raspberry Pi.

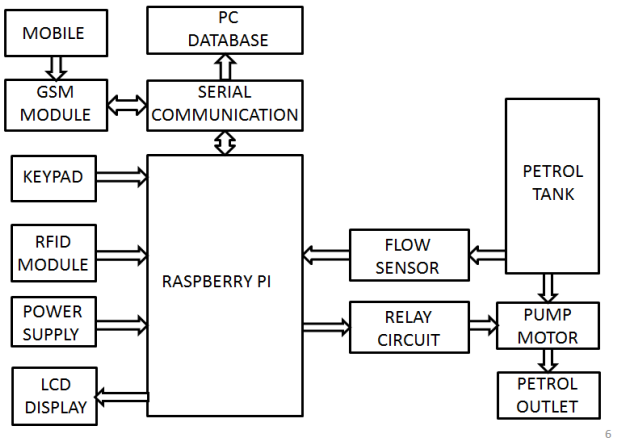

Fig2. Block diagram

UART stands for universal asynchronous receiver transmitter used to connect the GSM module and Raspberry Pi. The RFID reader peruses the confirmation code of the fuel station by swapping the buyers tag over the RFID labeled at the fuel station and send it to the control unit to refresh the database and in addition to validate the client who is approving the petroleum.

The block diagram consists of various blocks such as RFID module,GSM module, Flow sensor, Raspberry Pi, LCD, Keypad. All these module are connected to each other via raspberry pi 3. There are some module consisted as follows:

Raspberry pi is a series of small single board computer. It is based on linux operating system. Python is used for programming the raspberry pi.

LCD we are using a 16x2 pin LCD. RS,R/W, VCC, VSS and VEE are pins. +5V and ground is provided by VCC and VEE pins respectively, and LCD contrast is controlled by VEE.

RFID module consist of RFID tags and RFID Reader EM18**,** the reader decodes the RFID tags which are with the vehicle.

GSM module is used to send the OTP generated to user's mobile phone. GSM Sim900 provides features to send or receive the message . It is compatible with AT cellular commands. IT has built in simcard holder.

Keypad is used as an input device to read the key pressed by user and to process it. We are using 4x4 keypad . Switches are placed between the rows and columns.

Software design

This system follows the step given below: Initially for implementing the system the information of customer is stored in the database. The customer shows the tag to the reader and it gets authentication if the card is valid.Then OTP received by customer which is send by the system. After entering this OTP and amount of fuel required ,fuel is dispensed in vehicle.

Flow of the system is given as:

- Start the system.
- The status of GSM modem is checked with the help of AT Commands.
- Then the status of RFID reader is checked.
- The RFID tag is swapped against the reader and corresponding ID is displayed.
- The ID is send to the central unit.
- The response is checked by the central unit.
- Then open the valve of relay.
- The fuel gets dispensed.
- The relay valve is then closed.
- The remaining amount is displayed on LCD.
- The customer receives a message.
- Stop the system.

IV. RESULT

The model for fuel station system is based on authentication. In fig.4 we interface the RFID module with raspberry pi. As shown in fig5 GSM module is interfaced with Raspberry Pi. If the number matches then OTP will be sent. Then user has to enter the OTP.

Fig4. Interfacing RFID module with Raspberry Pi

Fig5. Interfacing GSM module with Raspberry Pi

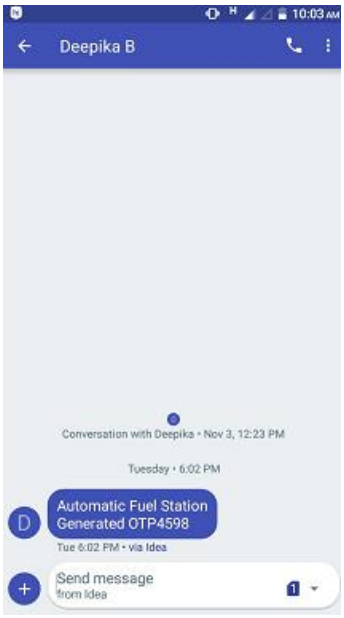

Fig6. Generation of OTP

V. CONCLUSION

The proposed system will help to bring the system into automation which could give fuel to clients even at odd hours of night. The aggregate focal access of every one of these exercises gives the right approach towards security and sparing need of the industries. In the realm of equipment it is basic to develop up the new advancement to make secure the scattering of fuel and keeping record of a comparative fuel with endorsement of customer.

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