



# Design And Implementation Of Smart Petrol Filling Station Using IoT

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**Abstract-** In past decade the automobile production industries have seen a lot of highs and lows in the production environment based on the needs for the automobile in every region of different parts of the world. Though the fossil fuel consumption vehicles are produced in lot, in the modern technological world. Fuel needs are also increasing day by day and fuel station provides gas for those vehicles and more consumers are considering it as a time-consuming process. In this proposed methodology the fueling station is fully automated to provide consumer greater benefit in these stations. It also has an impact in the economic status of the country, and also eliminates the corruption that are all taken place in the petrol station to achieve this goal in with greater time beneficial. It will also have an impact on the growth in the sales in petrol station because of the automated system.

**Keywords:** UPI Id, Gsm, Electro-Magnetic Pulse, Secure Socket Layer, Ccp, Rfid, Pir, Uart, Sim

## I. INTRODUCTION

The distribution system of the fuel station remains the same and being controlled by the manpower. Even though mankind has achieved a technological advancement in all the fields of automation by using the machine learning methods. In many countries across the globe are having trouble in the fuel distribution system, industries are moving towards the advanced technology and customers customer choice is also an automated system to reduce the unauthorized petrol selling and petrol stealing are the disadvantage most of people complaining about the fueling stations. To avoid these situations the system is entirely designed to be used by the customer itself, so customers' satisfaction is fulfilled by this manner [1]. Our 21st century is known as an internet age all our data are being transmitted and saved through the cloud data connection. For example, online banking, cash management and tax filling all these processes are automated to avoid the wastage of time consumed by millions of the customer. But in fuel station it remains the same as previous. The main objective is to implement the automated fuel transferring to the vehicle by the customer itself [2]. It helps to improve the theft being made in the stations and also encourage digitalized process corresponding the advancement. Security is also a considerable one in this management process; it helps us to be more secure in the transaction process on the payment process being made to agent we are getting the fuel from the particular petrol station.

## II. PROJECT DESCRIPTION

The proposed system is used to introduce automation in the petrol station without the need of external human power to run manually, the fueling process handle by the user to take care of petrol convention [3]and also to reduce the risk of petrol theft in our society by reducing the manpower the cost associated with them is also reduced then time consumption for filling process is also eliminated it provide the entire day service to run the petrol station efficiently so people can use it by any mean time for the vehicles all the above mentioned process are take in account in the proposed method to get more productivity for the consumer and the seller [4]. The Payment methods are all handled by the UPI handlers for the security reasons and to eliminate the responsive delay time happens in the server-side database connection as fraud transaction [5].

## III. PROJECTOBJECTIVES

In our method the process of design thinking was implemented so here are five steps are taken part to produce the final prototype. First stage is to get better understanding the problems from the source to handle the problem efficiently it is well structured to get substantial amount of information. Second stage is

“defined” part the gathered problems are put together to get great ideas to use them effectively. It leads to the third stage of thinking progress [6]. Then, “Ideate” stage help the thinkers to solve the problem out of the box were the information’s are collected in the previous step end of this stage, few ideas to solve the problem may arise. Prototype stage includes the different prototypes engaged together to explore more related problem stuffs. There are several prototypes are being used in this stage, so the devices are inherently used for the better usage. Fifth and final stage is to test the prototypes arrived in the previous the outcomes are most essential for the better products to get achieved.

#### IV. EXISTING SYSTEM

Today all our petrol pumps are operated manually certain techniques are presented like automating the fueling system and one is the RFID reader that has certain database setup present for the fueling system connection were the microcontroller controls the reading of the tag and operating the motor in the petrol pump RFID reader uses a smart card for placing the payment transaction. The Figure 1 in Existing system block diagram

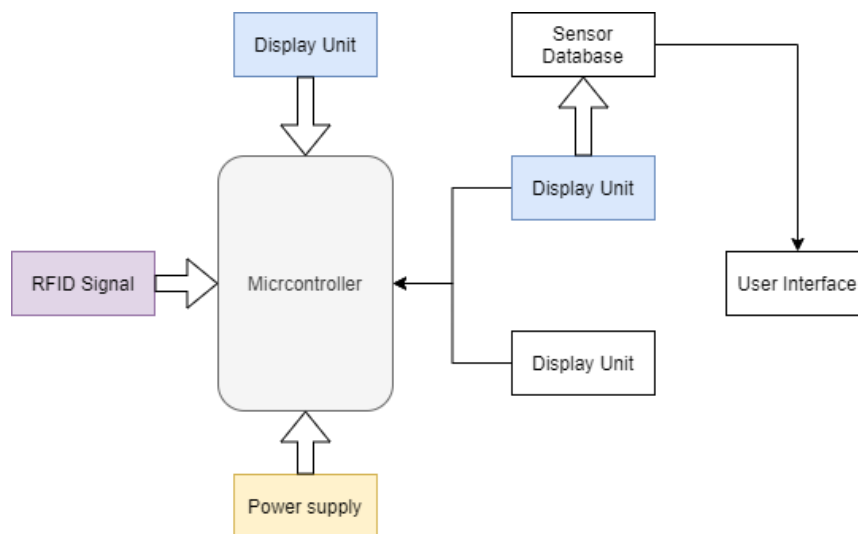


Figure 1. Existing system block diagram

This method of smart card has a unique method for doing transaction in a separate set of database instructions thus it allow vulnerabilities of some malicious tool enter into their database structure, it like reinventing the wheel without any security measurements are made periodically [7]. Here the user to have an account to the account can be accessed by the administrator, where the user’s privacy is not accountable [8].

In this system the RFID signal is transmitted to the microcontroller for the further process the RFID reader receives the signal and checks if the account exists or not and also check for the balance remaining in the account and sends the receive back signal to microcontroller and verified user redirected to the fueling process[9]. This entire system is based on the RFID signal which is used to send the signal it not an accurate one if the tag is damaged as slightly it will show an error. And also, it not an entirely automated process that we require to enter the PIN manually for transaction of amount [10].

This system comprised of Atmega328 microcontroller and RFID module as the basic working components at this end of the existing system the process of the user needs and the problems are explored it so the process of empathize and define are completed [11]. Shown in Figure 2 proposed system block diagram

## V. PROPOSED SYSTEM

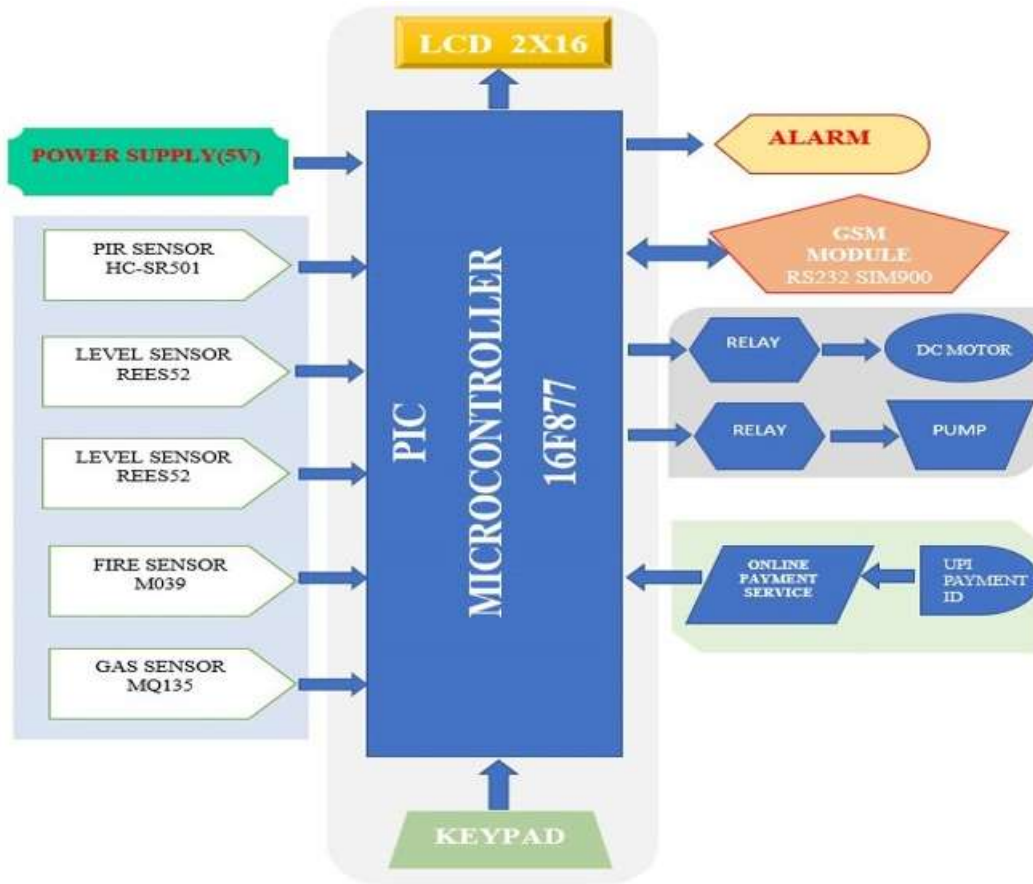


Figure 2. Proposed system block diagram

The process starts from the user move in the petrol station the system goes into the initialization state where all the connected peripherals checked for the error detection occurs in the system [12]. It reduces the unwanted system failure in processing time. Then, the user has to scan their UPI ID so the person has to pay the bill, the system sends the processing request for payment if the process has successful then it processes the further automated process failure request returns to stop the fuel processing and engage the system for the next payment process. Sensors are equipped with the proposed method and to handle emergency situations like fire sensor and gas sensor will eliminate the risk situations [8]. In order to update the petrol price by timely manner the GSM module is used to track the live change in the petrol price stacks. Display unit attached to the microcontroller display all the user information by the user inputs such as the process status, example the event handling for UPI method has successful.

Level sensors are mounted to get the accurate amount of petrol to get dispensed from the fuel tank. It will keep track of petrol present in the fueling station. These sensors are connected to the pumping motor that draws the petrol out to the user vehicle [13]. When the process starts the relay start to motor to eject the petrol out and the motor stops at certain time of user enter amount of petrol has been dispensed.

## VI. LEVEL MEASUREMENT

Float is the traditional type of transducer which is used to measure the fuel level in the tank. The float position changes the sensor resistance value depending on the fuel level. The level measurement circuit is shown in the Figure 3, whose output voltage is directly proportional to the sensor resistance. It consist of two stages of operational amplifier, the first stage uses voltage follower and buffer followed with the inverting gain amplifier.

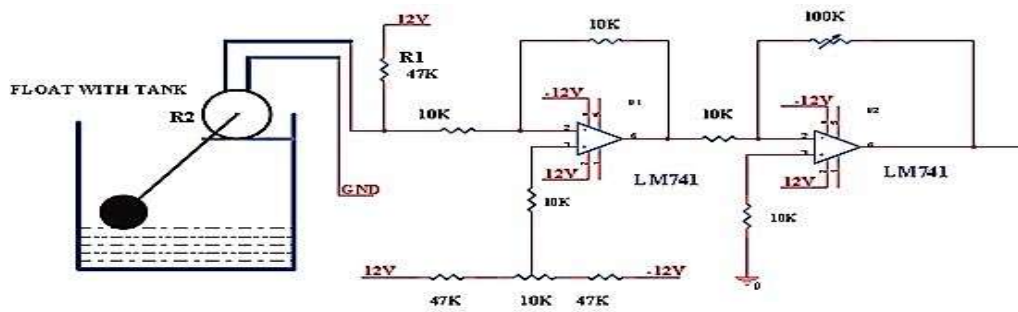


Figure 3. Level measurement Circuit

### VII. GSM TRANSMISSION

GSM modem is interfaced to the microcontroller through the signal conditioning IC Max232. The activated GSM modem will receive digit command in the form of SMS from user mobile phone and transfers that data to the microcontroller through serial communication. Upon the execution of the program, the GSM modem receives command 'STOP' to develop an output at the microcontroller which is used to disable the ignition switch [14]. The communication process is depicted in Figure 4.

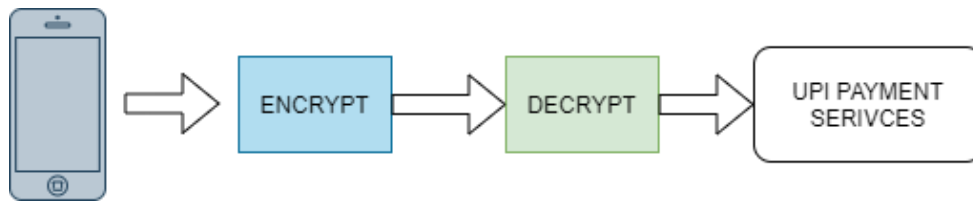


Figure 4. GSM Transmitting signal

This handles the entire process of the custom signal process with the service the transmitting signal has to be in the encrypted form so the user's authentication can't be revealed to third party services to make the wrong connection between the server and the authenticated user.

### VIII. TRANSACTION SET PROCESSING

The scanned user id which has a virtual address associated with it. Banking services create these virtual addresses for separate users, the UPI implementation is a simplified and it provides a single interface across all systems. It includes a second factor authentication process such four or six-digit numeric process. Certain restrictions are made in the transaction limit a user can make up to Rs.20, 000 per day. Several bank accounts are linked with same UPI application. It results in the result in dependability of cash or even net banking. The Figure 5 in Flow of Transaction Processing

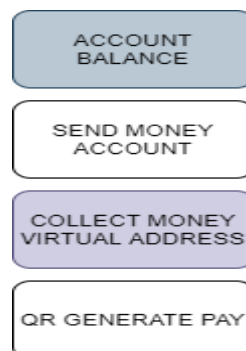


Figure 5. Flow of Transaction Processing

## IX. RESULT AND DISCUSSION

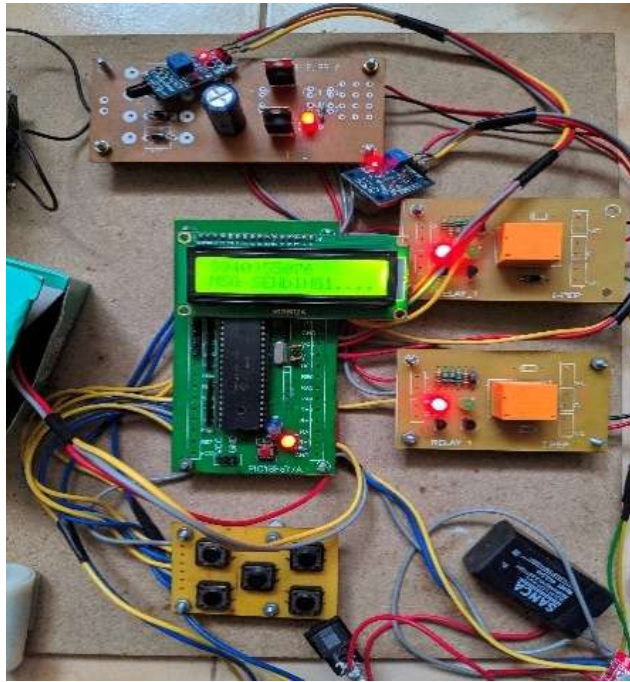


Figure 6. Result

As shown in figure 6 result, this setup shows the configuration of the proposed method these PIC microcontroller and the sensors are all interconnected with the configuration board. The main device which will carry out the initializing process for all the peripherals are working properly in the system then it steps the function operation of the network that have to carried on the dispensation process. PIR sensor connected with the base of microcontroller it will acts as a switch for turning the system on for the particular time of user interaction by implementing this it can save lot of power for operating the system in future purpose. When the person came near to the filling pump it will turn on the system and set it to initialization state.



Figure 7. System Initialization

Addition feature to this flame sensor will alert the system in early occurrence of the critical condition in the filling station. Then the user will scan the payment code placed for the payment process. When the user scans the code with their smart phone the controller sends and encrypted form of message to payment service method the transaction process will be directly linked with the bank account it will detect the user will have to have an balance to pay the bill no extra amount will get deducted from the account.

The system asking for the input, the user needs to enter the amount in rupees so that it will calculate the amount of petrol in liters and then it will proceed to the transaction process. Then the transaction has been successfully the system starts the relay motor function and to indicate the user a message has been sent to the user number where the transaction has been taken process and also to the vendor to indicate the user has filled the petrol in your petrol station for the particular time. The Figure 7 shows the message sending process. If the transaction has any error the user has notified with the text message that the process has stopped and the relays remains stopped for the purpose of transaction to get failed. Then system returns back to its original state of the initialization and again ask the user to repeat the process.

The figure 8 The main user of the message service to the user is to take in control of the petrol fueling to their vehicle the amount and the liter of petrol has been consumed by the user the certain filling station, and also now a days there are corruption in the petrol filling station so by sending to these to vendor he/she will directly able view the all transaction has been done up to date by the users from where ever he/she wanted to.



Figure 8. Messaging Process

In the process of process of fueling the vehicle, there is limit indicator when the user filled their petrol up to 90% the user will be notified that fueling process is almost done.

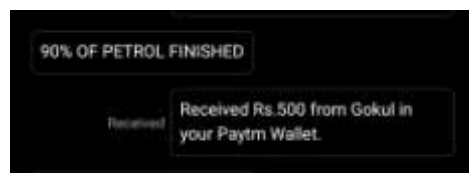


Figure 9. Notifying User

The figure 9 in notifying user, System testing is the compliance about the specific requirements; the functionalities of the system are tested form an end-to-end perspective. This is essentially helpful in the development team to measure the quality of the system in an unbiased condition. It includes both functional and the non-functional progress.

In testing process all the initialize values are check an measure the startup time taken to start the process and macro-droid will help to keep track this service that carried out in the controller unit the logs are keeping updated in the controlled dump unit where all the process from the top to bottom are written to get note of the small programmatic errors. By implementing this error can be easily eliminated more often the time consuming is also avoided by these log file. The future updates are all also submitted in the file.

## X. CONCLUSION

Interaction with the micro controller for the billing process is user friendly this can be accessed by any devices that work with the UPI service configured, most of the user identity kept between the user and the admin of the authorizer no third-party application can able to steal the user's information its entirely secured service. The old conventional petrol system is replaced with the automated which will avoid the unwanted fear of petrol stealing and fraud money transferring to the filling station. It easier to connect the system to printer and other billing service equipment for authorization process.

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