

# LITERATURE SURVEY ON PETROL PUMP MANAGEMENT SYSTEMS

**T N L Ruthvik<sup>1</sup>, Santosh Hegde<sup>2</sup>, Suhas M Gowda<sup>3</sup>, Prashanth S K<sup>4</sup>**

Student, ECE, KSIT, Bengaluru, India<sup>1-4</sup>

**Abstract:** Recently, fuel stations have been manually controlled. These fuel stations take more time to operate and require more manpower. The number of vehicles and machines on the road is rapidly increasing. In today's advanced and automated world. Fuel consumption is also increasing as vehicles and machines become more reliant on it. When there is a rush at the fuel station, customers must wait in line. Our country's fuel stations are more time-consuming, resulting in time waste. In this paper, we developed an automated fuel station management system to address the shortcomings of the current system. This methodology's output prioritizes authenticated systems and cashless transactions. It will have a positive impact on our nation's financial situation. Additionally, it will aid in reducing fuel station corruption and could make fuelling quicker and less time-consuming.

**Keywords:** Arduino, Microcontroller, Petrol bunk, RFID Card, RFID Reader.

## I. INTRODUCTION

Petrol pump management is done manually which is a difficult process and manual management is leading to many problems like maintaining data, petrol theft, and many other problems. Now fast development in vehicle quantities and machines has increased the need for mechanized systems. The requirement for fuel is likewise expanding step by step given vehicles and machines thoroughly rely upon fuel. Customers need to stand in line as there is a surge at the petrol station. Therefore, GSM technology and other technologies are used in this project to completely mechanize the current petrol pump management system. Nowadays, there is rapid growth in the advancement of industries and they are thinking more toward consumer satisfaction. For the secure distribution of products, these industries are trying to develop a new advanced security system to achieve their goals efficiently. However, in today's petrol distribution system, there are some disadvantages related to stealing of petrol, unauthorized petrol selling, and wastage of man power etc.

The 21st century is known as the internet age as there is an increase the in use of the internet in our day-to-day activities. Examples of these applications include online banking and brokerage, cash management, tax filing, computerized petrol pump, and the medical field. But, computerized petrol pump is concerned, many modifications have been already done. All the related data of consumers are efficiently inserted with the help of computers. But, as far as safety is concerned, we are still behind. The main objective of this system is to provide authentication to the consumer and control the opening or closing of the tank valve according to the amount mentioned by the consumer. We will use GSM technology for this purpose.

## II. LITERATURE REVIEW

[1] In this paper, they are using 2 units that are placed in the petrol stations that will take care of the end user needs and continuously monitors the fuel level, fuel temperature, or any other accidents occurring at the petrol station. Another system that takes care of the databases like customer's id, passwords, and account balance. The link between the customer and the petrol industry is taken care of by the GSM module. The software part takes care of the security and manages the data. There is a provision fingerprint scanner that provides security. The scanned finger impression is compared with that of the data stored in the PC if there is a match the authentication process is successful. Once the authentication phase is successful the customer has to enter the amount as per the requirement of the fuel to be injected into the vehicle

[2] RFID cards are used this card is scanned and it is enabled by the ID detector. When the proximity sensors confirm the presence of the vehicle the customer may proceed to enter the password and the price and other details are displayed. There is a provision for prepaid cards for money transactions. The required quantity of petrol is filled in the vehicle when the nozzle is inserted .

[3] The automated petrol pumps make use of embedded system units such as the microcontroller that has been used to monitor the outlet of the petrol and display it regularly. The regular intervention of humans may lead to discrepancies in the amount charged and the quantity dispensed. These errors can be overcome by utilizing a special card called the RFID

smart card which is capable of storing and managing databases effectively. The use of RFID cards can be further monitored by the use of fingerprints where every individual can set his or her fingerprint on the module after the complete identity of the person has been stored along with a unique identity. Hence unauthorized personnel can be ceased from usage along with the amount of petrol inlet outlet with money that can be managed.

[4] The amount of data that has been collected transaction-wise. Another work illustrates the use of a fuel dispenser by a computer interfacing that is responsible for automatic refuelling and management. This work can accept inputs from the dispenser with the help of a parallel port interfacing and printing the receipt automatically after each transaction and can generate a yearly business report in Report.

[5] The internet of things (popularly known as the IoT) facilitates the user by making the fuel retail outlet owners that make service easier and helps to take a look at the current status, past sales records, stock of fuels, and sales per day. As the user's login, it provides access to the current temperature of the liquid /fuel. The service level reduces fuel theft from the consumer. The security level has been increased by the OTP verification method

[6] This research paper discusses the potential benefits of introducing an automated fuel-filling system. This system would involve using microcontrollers and RFID equipment to deduct the money from the user's card upon fuel dispensing. It would reduce the need for manpower working in fuel-filling stations, making it more cost-effective. Additionally, it would require less time to operate and be more efficient than existing systems, while also preventing fuel theft.

[7] The research paper is about an automated fuel station management system that will reduce the amount of time and manpower needed to operate fuel stations. This system will use cashless transactions and authentication, and it will help reduce corruption and make fuel stations faster and more efficient. This system will use two units at the fuel station, one to take care of customer needs and monitor the fuel level and temperature, and the other to keep track of customer IDs, passwords, and account balances. It will also use a GSM module to link customers to the petroleum industry, and a fingerprint scanner to authenticate customers. Finally, the software part of the project will keep track of all the data .

[8] The main idea of this research paper describes the use of digital technologies to provide a secure and efficient fuelling experience at a petrol station. This system would include an RFID (Radio-Frequency Identification) tag with a customer ID, which would be read by an RFID reader. The reader would then communicate with the main server using a GSM (Global System for Mobile Communications) modem to verify the customer's ID and password. The server would also store all the transaction details of the customer and the total fuel amount dispensed from the filling station. Finally, the customer would be notified about the ID details and total fuel amount dispensed through an SMS and the data would be stored in a separate database for the filling station authority's view. This feature helps to reduce manual processes and avoid corruption.

[9] This system is made up using Arduino that controls the complete system components i.e., RFID card, relay, and motor. It also provides the facility of onsite recharge. The significant component of these comes is that it takes out human connection and maintains a strategic distance from the situation of dark advertising without administration man. On the fulfillment of the gathering activity, cash is withdrawn from the card and the equilibrium is shown again on the LCD. When the equilibrium in the client's account is low, the cycle won't be administrated and the message will be shown as "Low equilibrium". Every one of the subtleties of date time and measure of petroleum will be put away inside the data set when the fuel is circulated.

[10] In this project, one customer having the and smart card enters the petrol pump; the reader at the pump unit reads the RFID information including vehicle number, user phone number, password, and balance amount, which will be processed by the microcontroller. When the RFID reader, reads the unique card it asks for the 3-digit password. Once the driver enters the password in the keypad and if it is the wrong password an alarm will be turned ON. If it is right, a welcome message will be displayed on the LCD along with the balance on the prepaid card. Then the user can enter the amount through the keypad. Once the amount is entered it will be processed by the microcontroller and the microcontroller controls the petrol dispensing pump through a driver circuit, by the amount. The user can start the fuelling by pressing the start switch. Then the motor starts and the petrol gets filled in the petrol tank from the fuel dispenser. After fuel dispensing the bill amount will be sent to the user's mobile number through IoT Communication. The amount will be automatically reduced from the prepaid RFID card. As a security temperature sensor is used to detect Fire in the petrol pump. A camera is used to detect the Helmet of two-wheelers so that only by entering the petrol pump wearing a helmet will activate the automatic petrol unit for two-wheelers .

[11] This system is using RFID technology where each user will be having a rechargeable RFID card. These cards consist of RFID tags having unique verification codes. The RFID reader captures the digital data encoded in these tags. When a customer brings the card close to the reader, it captures the data and then sends the corresponding signal to the microcontroller. The microcontroller stores details of various cards and thus compares the information captured to check if both the details match or not. If it matches then according to the amount entered by the user, the microcontroller activates the relay driver for that particular amount of time and the desired amount is dispensed into the tank. And therefore, the amount is deducted from the user's card. The proposed idea consists of certain goals like ensuring the right amount of fuel dispensing, removing human errors by the use of RFID cards, and ensuring customers' trust for a fair sale of the product.

[12] Users must scan the RFID card to the petrol pump before refuelling. If RFID is authorized/valid, then the user will be asked for a password. If the password matches, then the quantity of fuel will be asked. If the entered amount of fuel & sufficient balance is available then the pump's motor will start dispensing fuel. The motor will stop automatically once the required amount of fuel is dispensed. After that, the user will be notified by SMS. This system includes a mobile application and an automated fuel disposal pump with RFID technology which makes the system more efficient, secure, and user-friendly. But this proposed design gives real-time notification as well as reduces human interactions in the refuelling process which means low labour costs in the refuelling business for the station owners. The system can be implemented in every country for helping people to trace the quantity of fuel they are buying and the number of transactions they are doing, this data may help to know about the economy of a country. This system will ensure the accuracy of fuel disposal and also will be able to stop system loss, which causes a great loss for both users and owners of the pump. So, therefore this system can make a great change in the social and economic sectors of a country.

[13] To implement a security system for filling petrol at the Petrol bunks by avoiding the involvement of human beings. RFID smart card avoids the risk of carrying money every time and also provides the feature of prepaid recharge. In this system, every user is provided with a smart petrol card, with which one can access petrol at the petrol bunks. Before using this card, we have to recharge it. Whenever we want to fill the tank then we have to place the Petro card in the card reader, which is interfaced with the microcontroller with serial interfacing. The microcontroller reads the data from the smartcard reader and asks how many litres you require, which will be displayed on the LCD screen. Then we have to enter the required number of litres of petrol through a keypad which acts as an input to the microcontroller. After reading this value the microcontroller will check for the available balance in the smart card, if it is sufficient then the petrol filling process will be started. The proposed work automatic fuel station eliminates the involvement of any human operator at the petrol pumps for payment transactions and avoids any manual operation at the pumping system settings. The only requirement is each of the customers has to initially get registered with the online payment system and save his identity in the form of face detection. The system can be efficiently implemented in both urban areas by reducing time consumption as well as in rural areas by decreasing the cost of the system.

[14] In this paper, they have designed a system that automates the dispensing of fuel by eliminating the Workers From the equation. They have used Arduino Mega 2560 for designing their system, other components used in their system are an RF tag, buzzers, LCD Display, and keypads for their user interface. Their system displays a welcome message at the very beginning and asks for RFID, a buzzer is turned on which indicates a successful Identification of the User. Now the user has to input the fuel amount to be put into the tank of his vehicle via the keypad. After the fuel has been dispensed successfully, the process ends which is shown by the glowing LED is turned off and the account is logged out, now the system is ready for another transaction and goes back to the welcome Display on the LCD screen. Thus automation of the petrol bunk is done by this system which is moderately cost-effective By utilizing Mega 2560 Board for their system. This system also helps the users know when the process ends by indicating it through an LED and buzzer combination. A smoke sensor could be used to increase the safety of the users present in the bunk by warning them about fires and smokes in the bunk.

[15] They have proposed a system for the automation of petrol bunk and it also uses a fingerprint scanner for checking the user's details. The proposed system helps the traffic police check for the driving license of the user and also verify its expiry date. The user also need not carry a license since just his/ her fingerprint is enough for getting his/her details. The system architecture is built in such a way that, it checks for the nearest Petrol pump location and the location of the user, using this data the user's mobile phone is switched on/off, When the user is in the petrol bunk he/she has to input the amount of fuel to be dispensed into the tank and his/her fingerprint needs to be scanned to verify that he/she is the genuine user. The amount entered then will be deducted from the user's account and the corresponding fuel will be put into the tank. The fingerprint used will also help check all the documentation details of the user and if any license or any other document like insurance is expired, they will automatically get a fine and an alert to renew the documentation. Therefore this Survey is very useful for finding out and utilizing different methods of user identification and documentation retrieval thereby making things easier for both the user and the officials to carry out their respective duties.

[16] The primary goal of the research is to use RFID technology to create a smart fuel bunk system and fuel dispensing system. It worked in conjunction with secure payment and exit gate control. In this case, the Microcontroller includes a 4x4 matrix keypad, LCD, RFID reader, and GSM module for a secure payment system and transaction confirmation. The pump motor has controlled the relay after receiving a command from the microcontroller. Furthermore, this motor has been used to supply oil to a dispenser. Following that, the exit gate was controlled by a servo motor, a photodiode, and an infrared sensor. As a result, the exit gate control has made secure bill payment possible. As a result, reducing the misuse of fuel, time, and the employer is a benefit of the system. So, this fuel station is more advanced.

[17]. In this article, the fuel dispensing system is discussed, along with possible RFID applications for modern fuel usage. The suggested strategy ensures that the fuelling process is straightforward and secure. The process uses a fuel bank card that the customer can scan in the bunk and, if they haven't reached their monthly limit, the refilling will be successful; otherwise, an error notification will be sent to the customer's mobile phone. This card is comparable to our current debit cards. It has an ELA816B RFID reader and a passive tag. With the aid of RFID technology in RFID Based Petrol Pumps, it is to implement the work sequentially, reducing the labour of people. This project will enable us to carry out our goal of digitizing the petrol pump for providing the utmost safety to the customers while filling their tanks at gas stations. This will help to overcome multiple frauds also.

[18] This research paper is about designing a new type of automated petrol dispensing system that uses RFID technology. This system will replace traditional manual petrol pumps, which are time-consuming and require more manpower. It will also provide customers with prepaid cards to use at the petrol bunk. The major components of the system are an ATMEGA8A-PU microcontroller, RFID tags, a power supply, a motor driver, an LED display, and an RFID reader. The main advantage of this system is that it is more efficient, cost-effective, and time-saving compared to manual petrol pumps. Additionally, RFID tags can be read automatically, which eliminates the need for manual scanning and allows for real-time tracking.

[19] This is about a computerized system for managing a petrol pump. This computerized system would enable the petrol pump manager to make decisions quickly and efficiently. It would be able to track the number of different types of fuel (petrol, diesel, etc.) that is imported, the sales of petrol, and the wastage of impurities during the refining process. It would also be able to track the employee details, including their name, address, phone number, attendance, and salary payments. Additionally, the system would be able to generate reports about the sold petrol and employee details, as well as keep track of any credit sales and their payments. Finally, the system will be developed with the help of programming languages like ASP.net, and be able to limit access from different users.

[20] This research paper is describing the need to create an automated petrol dispensing system. This system would be controlled by a programmable logic controller (PLC) and RFID technology. The goal is to reduce the amount of time it takes for people to fill up their vehicles with petrol. The system would include a Human Machine Interface (HMI) where users can enter the amount of money they want to spend and the system will dispense the required amount of fuel. The PLC and RFID would be used to control the process, with the PLC controlling the process functions and the RFID used for authentication and data capture. The proposed system would reduce the amount of time it takes to fill up a car and would reduce the need for manual operation of the petrol dispensing process.

### **III. CONCLUSION**

This is an automated fuel station management system that can reduce the amount of time and manpower needed to operate fuel stations. It suggests using microcontrollers and RFID equipment to deduct the money from the user's card upon fuel dispensing, which would reduce the need for manual operation of the petrol dispensing process, making it more cost-effective and efficient than existing systems. Additionally, it would provide customers with prepaid cards to use, help reduce corruption and make fuel stations faster and more efficient. It would also use two units at the fuel station, one to take care of customer needs and monitor the fuel level and temperature, and the other to keep track of customer IDs, passwords, and account balances. It would also use a GSM module to link customers to the petroleum industry, and a fingerprint scanner to authenticate customers. Finally, the software part of the project would keep track of all the data.

### **REFERENCES**

- [1]. Kaushik, P. A. R., Kori Preeti Omprakash, and Kedare Monika Gautam, "Automated Fuel Station", Journal of Electronics and Communication Engineering, pp- 27-29, (2017).
- [2]. Benjamin, Ruth Moly, Sahana Kannan, Greeshma K. Gopi, and Reuben George Benjamin, "Automated Petrol Pump", Journal of Student Research (2017).



- [3]. Rohith. S, Akilan .K, Murali Krishna. M, Dr.Kandasamy .V, "Automated Petro Pump using RFID Technology", International Research Journal of Engineering and Technology (IRJET),e-ISSN: 2395-0056, Vol: 09, no. 05, (May 2022).
- [4]. Bahar, Ali, Nazrul Islam, Shougat Hossain, and Ruhul Sujon, "A new automation approach for fuel station management system", Nevşehir Bilim ve Teknoloji Dergisi 4, no. 2, (2015).
- [5]. Kumaresan. P, Y. Babu Sundaresan, "IoT based retail automation of fuel station and alert system", In IOP Conference Series: Materials Science and Engineering, vol. 263, no. 4, p. 042072. IOP Publishing, (2017).
- [6]. Tamilarasu. P, V. Kumaresan, T. Gunasekar, T. Logeswaran, and M. Suresh, "Design of an Automated Smart Vehicle Fueling System" ,International Journal of Recent Technology and Engineering (IJRTE), (2019).
- [7]. Kaushik, P. A. R., Kori Preeti Omprakash, and Kedare Monika Gautam , "Automated Fuel Station." Journal of Electronics and Communication Engineering, pp-27-29, (2017).
- [8]. Thangadharsni, I., D. Deepa, B. Deepashree, N. Deepu, and R. P. Divya, "Multipurpose Self Fuel Dispensing Automated Framework Utilizing RFID Prepaid Cards", International Conference on Design Innovations for 3Cs Compute Communicate Control (ICDI3C), pp. 69-74. IEEE, (2018).
- [9]. Sahana S Rao, V. Siddeshwara Prasad, "Centralized automation of petrol bunk management and safety using RFID and GSM technology", International Conference on Intelligent Computing and Control (I2C2), pp. 1-5. IEEE, 2017.
- [10]. Paul, Ann Mariya and V. Viswanathan, "Smart Automated Petrol Pump System Using RFID Prepaid Card, IoT Billing and Machine Learning Based Security", International Journal of Innovative Research in Science, Engineering and Technology (IJIRSET), Vol: 10, no. 6, (June 2021).
- [11]. Arpita Nayal, Mahima Gaur, Tanisha Kashyap, Vartika Shukla, "Petrol pump Automation System", International Journal of Engineering Applied Sciences and Technology, Vol. 5, no.1, (2020).
- [12]. Pranto, Md Badiuzzaman, and Md Mahidur Rahman, "Vehicle Fuel Monitoring and Management using RFID authentication and Telematics Notification: An automated petrol refueling & notifying system", International Conference on Advanced Computer Science and Information Systems (ICACISIS), pp. 477-482. IEEE, (2019).
- [13]. Chandana, K. N., M. V. Chirag, Pradeep Kumar K. Burugupalli, Anil Kumar SV, and J. Akarsh, "Raspberry Pi Based RFID Smart Card Refuelling System", Perspectives in Communication, Embedded-systems and Signal-processing-PiCES 2, no. 6 (2018).
- [14]. Dutta, Sudeshna, Smarajit Pal, Subhankar Majumder, and Pratyusha Biswas Deb, "Self Service Petrol Pump Using Automation Technology", Proceedings of Industry Interactive Innovations in Science, Engineering & Technology (I3SET2K19), (2020).
- [15]. Zar, Sakshi, Shubhangi Nawale, Sukriti Chettri, Vaibhav Shinde, and M. K. Kumbhar, "SURVEY ON AUTOMATED FUEL STATIONS USING FINGERPRINT", Open Access International Journal Of Science and Engineering, Vol:04, no. 10, (October 2019).
- [16]. Khan, F. Sh, M. Sh Hossen, N. Islam, Md Kosar, and M. R. Hasan, "Smart Fuel Station Controlling System", IOP Conference Series: Earth and Environmental Science, vol. 614, no. 1, pp. 012030. IOP Publishing, (2020).
- [17]. Naresh, Jogi, Bille Naresh, Golla Ramakanth Yadav, Gaduputi Janardhan Naidu, Adigarla Mahesh Raja, and Manoj Sindhvani. "Smart Petrol Pump using RFID & GSM Technology." Futuristic Sustainable Energy and Technology, pp. 119-127. CRC Press,( 2022).
- [18]. Tandon, Ankush, Tanishk Jharwal, Vibhor Sharma, Vyom Sharma, and Yash Kumar Sharma, "Rfid Based Automation Of Petrol Pump", International Research Journal of Modernization in Engineering Technology and Science(IRJMET), Vol. 04, no. 06, (June 2022).
- [19]. Kranthi, Kurla Kumar, "A Comprehensive Development of the Computerized System for Maintaining the Regular Records and Activities in the Petrol Bunk." International Research Journal of Innovations in Engineering and Technology 3, no. 11, (2019).
- [20]. Shreedhar, M. B., and B. S. Shivashankara, "Plc Based Automatic Fuel Dispensing System Using Rfid Technology", International Journal of Engineering Applied Sciences and Technology, Vol. 4, no.1, Pp. 54-57, (2019).