

Raspberry Pi Based RFID Smart Card Refuelling System

Chandana K N¹, Chirag M V², Pradeep Kumar K Burugupalli³,
Anil Kumar S V⁴, Akarsh J⁵

- ^{1.} Professor Dept. of ECE, K.N.S.I.T, Bangalore, India, chandu.naveen.21@gmail.com
- ^{2.} Under graduate Dept. of ECE, K.N.S.I.T, Bangalore, India, mvchirag1994@gmail.com
- ^{3.} Under graduate Dept. of ECE, K.N.S.I.T, Bangalore, India, pradeepkumarbdeepu@gmail.com
- ^{4.} Under graduate Dept. of ECE, K.N.S.I.T, Bangalore, India, anilkumarsv95@gmail.com
- ^{5.} Under graduate Dept. of ECE, K.N.S.I.T, Bangalore, India, akarsha000@gmail.com

Abstract: The simple and advancement in the microcontroller Raspberry-Pi and RFID smart card technology provides a total security and automation in distribution of fuel [1]. It is interface with high speed fuel dispenser which is convenient for consumer to operate. In our system the password and IRIS detection will be provided to the user for secure transaction. The customer has to wave the smart card at the reader which has account details displayed on the LCD provided by the fuel station which will help the fuel company to create authentication for user also the distribution of the fuel, this fuel dispense is not possible until it gets verified by the database. In short we provide secure system for fuel distribution. The advancement of this project can help industry financially.

Keywords: Raspberry-Pi, RFID, Password, IRIS, LCD.

I. INTRODUCTION

The main aim of this project is to implement the 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 [1].

Now-a-days many petrol bunks are using the petro card system for filling petrol in any vehicle. In this system every user is provided with a smart petro 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 to the microcontroller with serial interfacing [2]. The microcontroller reads the data from the smartcard reader and asks how many liters you require, which will be displayed on the LCD screen. Then we have to enter the required number of liters of petrol through keypad which act 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.

II. LITERATURE

In beginning days the petroleum commercial enterprises were conveying petrol using tankers to separate petrol pumps; which were unremarkably manual appropriation and was perfectly relies on upon man staunchness that was doing this employment. Presently a day industry are turning out to be extremely reliable about these things and attempting to midway control all the engenderment and circulation of items. For the safe dissemination of items, businesses attempting to add to the nascent development security framework to accomplish their objective [2]. However today petrol conveyance framework is has a few burdens in regards to with stilling of petrol, unapproved petrol offering by merchant, commixing of polluted and confused things in petrol and other items.

III. BLOCK DIAGRAM

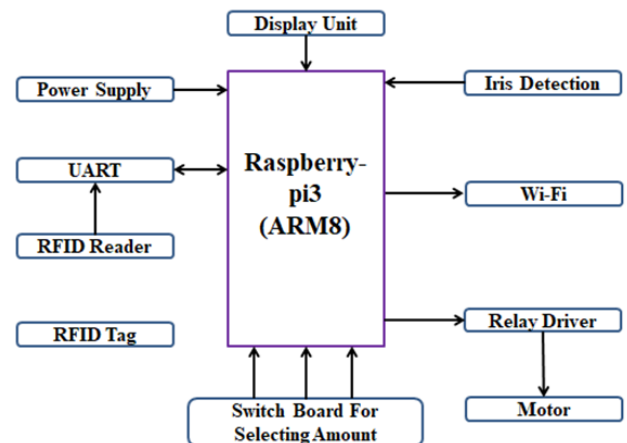


Fig 1. Bunk Unit

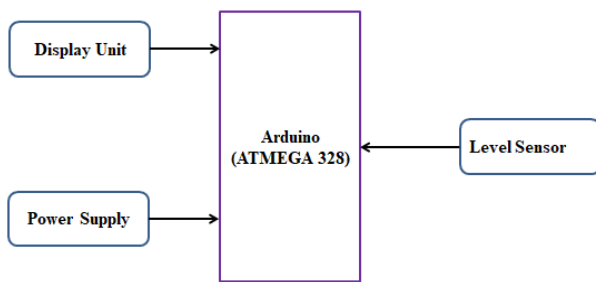


Fig 2. Vehicle Unit

IV. BLOCK DIAGRAM EXPLANATION

A. Bunk Unit

- The microcontroller Raspberry-Pi is a 40pin IC which controls the entire operation of the system in the fuel bunk.
- The LCD display unit is used to display the relevant information to the user.
- The RFID module acts as a prepaid card which holds the user information and balance details to provide access to refill petrol into the vehicle.
- The RFID data is transferred and received through UART communication [4].
- The iris detector will serve the iris of consumer for authentication, suppose if the iris detection isn't authenticated then directly the user will be asked for the unique password to access for the refuelling and a message stating the unauthorized access will be intimated to the card holder to his registered contact number[5] [6].
- When the consumer is authenticated, he will gain access to keypad through which the user can refuel the required quantity upon giving the inputs and the fuel dispensing can be controlled by the relay driver from the valve.
- The fuel dispensing is done through hose pipe[7].

B. Vehicle Unit

- The microcontroller Arduino is a 28pin IC which controls the entire operation of the system in the vehicle tank.
- The LCD display unit is used to display the relevant information to the user such as quantity available in the fuel tank of the vehicle.
- Here we are using hydraulic level sensor which works on the pressure, that is it detects and shows the level of the liquid available or immersed [6].
- The total quantity of the fuel in the tank can be measured by the level indicator and displayed on the display unit of the vehicle.

- 5v power supply is applied as an input to the microcontroller to operate it.

V. FLOWCHART OF THE SYSTEM

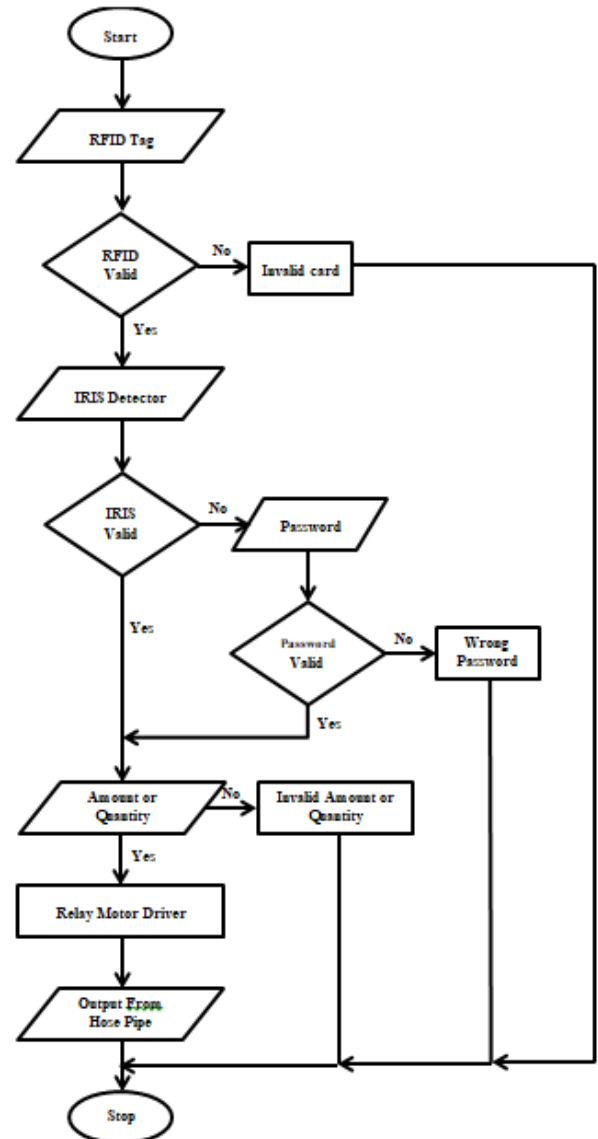


Fig 3. Flowchart of System

VI. ALGORITHM

- STEP 1: RFID tag with RFID reader.
 STEP 2: RFID Validation
 If Valid-STEP 3.
 If not Valid-STEP 10.
 STEP 3: Starts detecting IRIS and sends back capture data.
 STEP 4: Data will be verify with stored data base.
 If Valid-STEP 6.
 If Not Valid-STEP 5.

STEP 5: Give input password

If Valid-STEP 6.

If Not Valid-STEP 10.

STEP 6: Input Quantity or Amount.

STEP 7: Relay starts to pump fuel through pump motor from fuel tank and dispatch petrol.

STEP 8: Once dispatch is done, it terminate it with message transaction complete.

STEP 9: Transaction Details is stored in web can later check in TCP/IP App.

STEP 10: STOP.

VII. PROBLEM STATEMENT

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 smart card system.

VIII. APPLICATIONS

This technology can be enhanced to implement the same system for milk processing industries while distributing the milk and its products to the market. In day to day life we can see that water distribution in summer is also one of the problems in front of India. So it is possible to keep control on water distribution in particular area. The rationing products like vegetable oil as well as kerosene and its sub products may be securely distributed to the customers using the same system we proposed. Also it is possible to keep record of the distributed products in market which is commercially most important for industries.

A. CORE APPLICATION

Fuel Bunks- The whole concept can be implement in any fuel bunks for dispensing, such as

- Petrol
- Diesel
- LPG

B. CONCEPT APPLICATION

Food Sector-The dispensing concept with IRIS and Password security system can be implement in following,

- Milk
- Water
- Grocery
- Beverages

Bank Sector - Security system and IOT concept can be implement in bank sector for,

- ATM
- Pass Book Entry

Company Sector - This concept can be implement for signing -in and signing- off in company or in institutions,

- Employee
- Student

IX. RESULT

In this system we have used Raspberry-Pi which is the fastest processor available in today's market, which makes our project work with more efficiency and less time consumption compare with other processors. RFID reader is used to read the details of the waved RFID card. We have used LCD display for displaying the amount and for typing amount and pin we have used keypad, relay driver with motor helps to dispense the fuel from the fuel tank. Fuel bunks 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 fuel, the prepaid balance will be deducted.

X. CONCLUSION

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. 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 the time consumption as well as in rural areas by decreasing the cost of the system.

ACKNOWLEDGMENT

We are grateful to the Chairman, **Mr. C. K. Jaffer Sharief(KNSIT)**, for having provided us with excellent facilities in the college during the course to emerge as responsible citizen with Professional Engineering Skills and moral ethics.

We thank our Principal, **Dr. S. M Prakash (KNSIT)**, for facilitating a congenial academic environment in the College.

We are Indebted to our HOD, **Dr. Aijaz Ali Khan (ECE,KNSIT)**, for his kind support, guidance and motivation during the B.E Degree Course and especially during the Course of our project work.

We thank our Guide **Mrs. CHANDANA K N (KNSIT)**, for her valuable guidance, Suggestions and Encouragement throughout our project work.

We are also thankful to all the **staff members of the Department of Electronics and Communication Engineering KNSIT** and all those who have directly or indirectly helped with their valuable suggestions in the successful completion of this project paper.

REFERENCES

- [1] Aishwarya Jadhav, Lajari Patil, Leena Patil, A.D.Sonawane. "Smart Automatic Petrol Pump System". vol.no.6,issue no.04,April 2017.
- [2] P.Senthil Raja, Dr.B.G.Geetha. "Detection Of Fuel Theft In Heavy Vehicle". International Journal of Advanced Engineering Technology E-ISSN 0976-3945 Int J AdvEngg Tech/Vol. VII/Issue II/April-June,2016/757-765
- [3] C. R. Dongarsane, Pooja Dalavi, Sunaina Golandag, Snehal Powar, "Self-Operated Petrol Pump". International Journal of Advance Research, Ideas and Innovations in Technology. Vol.no.3, issue 2, 2017.
- [4] Akarsh Goyal "IoT Based Smart Petrol Pump Finder" Vol. 4, Issue 6, June 2016.
- [5] G.Anilkumar, S.Sridhar, Ch.Manojkumar, B.Jayakrishna, B. Kusuma Harinadh, "Design of Unmanned Petrol Bunk System Using RFID Technology". IJESC Volume6, Issue no.4, 2016.
- [6] Ms.Priyanka A.Gaikwad, Ms.Shubhangi, S.Wanare, Ms.Pallavi, S.Sonone, Ms.Pratibha, K. Bahekar, Prof.I.Y.Sheikh. Automation in Petrol Bunk using RFID and GSM International Journal of Research in Advent Technology (IJRAT) (E-ISSN: 2321-9637) Special Issue National Conference "CONVERGENCE 2017", 09th April 2017.
- [7] Susanta Kumar Behera Automobile Fuel Pump Control System Using Embedded System (IJCTEE) Volume 3, Issue 2, April 2013.