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Petrol Bunk Automation with Prepaid Card using GSM Identification

G.Janani¹

¹B.E-Electronics and Communication Engineering, A.V.C. College of Engineering, Mannanmpandal

Abstract: In current days fuel stations are operated manually. These fuel pumps are time consuming and require more manpower. The simple and proper use of PIC microcontroller and GSM technology provides a total security and atomization in distribution of fuel. This makes the consumers know the exact quantity of petrol that has to be filled in. The traditional archaic pumps have now been replaced by more advanced EMP petrol pumps for proper filling of fuel. This not only ensures accuracy, but also saves a lot of time for consumers and avoids misconceptions and arguments.

Keywords: GSM, LCD, PIC microcontroller, RFID reader, Keypad.

I. INTRODUCTION

The 21st century is aptly known as internet age because of the increasing the use of internet in the day to day activities. Examples of these applications include online banking, cash management, tax filling, computerized petrol pump, medical field. The aim of the system is to provide an authentication to the user & control the opening or closing of the tank valve according to litres demanded. Now one can get updated details on the mobile using the cutting edge GSM Technology. GSM is an open , digital cellular technology used for transmitting mobile data services.GSM differs from first generation wireless systems in that it uses digital technology and Time Division Multiple Access transmission method .It is microcontroller based project which controls whole assembly i.e. prepaid card, motor, relay. Basically it includes mathematical calculations which decides motor ON & OFF period. It also provides onsite recharge facility. The main attraction of this project is that it eliminates human interaction (serviceman) & avoids situation of black selling as there is no serviceman. In this microcontroller acts as master device while prepaid card acts as slave device. This card is common for Bharat petroleum, Hindus than petroleum and reliance petroleum. On completion of transaction balance (money) is deducted from card and updated balance is shown again on the LCD display. While in case of low balance transaction cannot complete and respective message is shown on display. Every time fuel is dispensed, a message is send to the consumer's mobile phone showing the details of the date, time, quantity of the purchase will be generated automatically

II. EXISTING SYSTEM

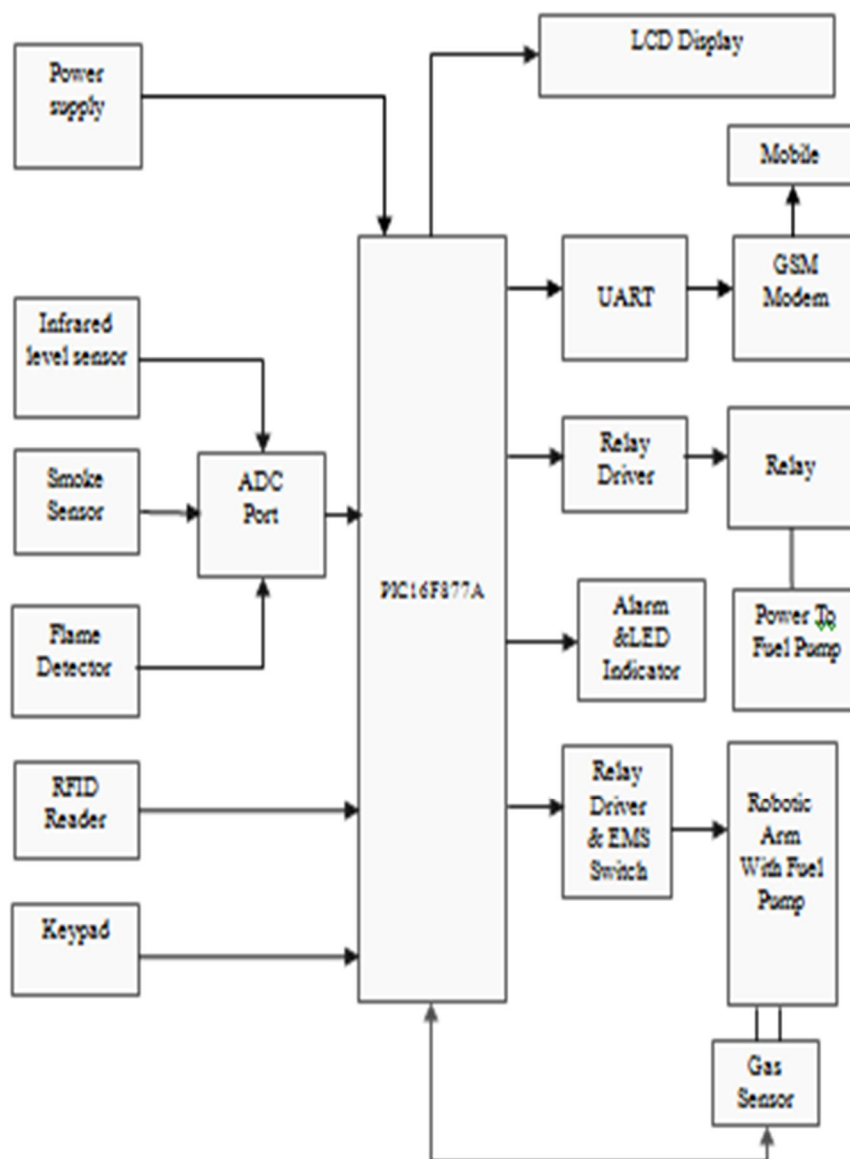
In existing system almost all petrol pumps have a controlling unit to perform the tasks like managing the electrical pump, drive the display, measure the flow & accordingly turn OFF the electrical pump. But still a person is required to collect the money and there is a possibilities of human error.



III. PROPOSED SYSTEM

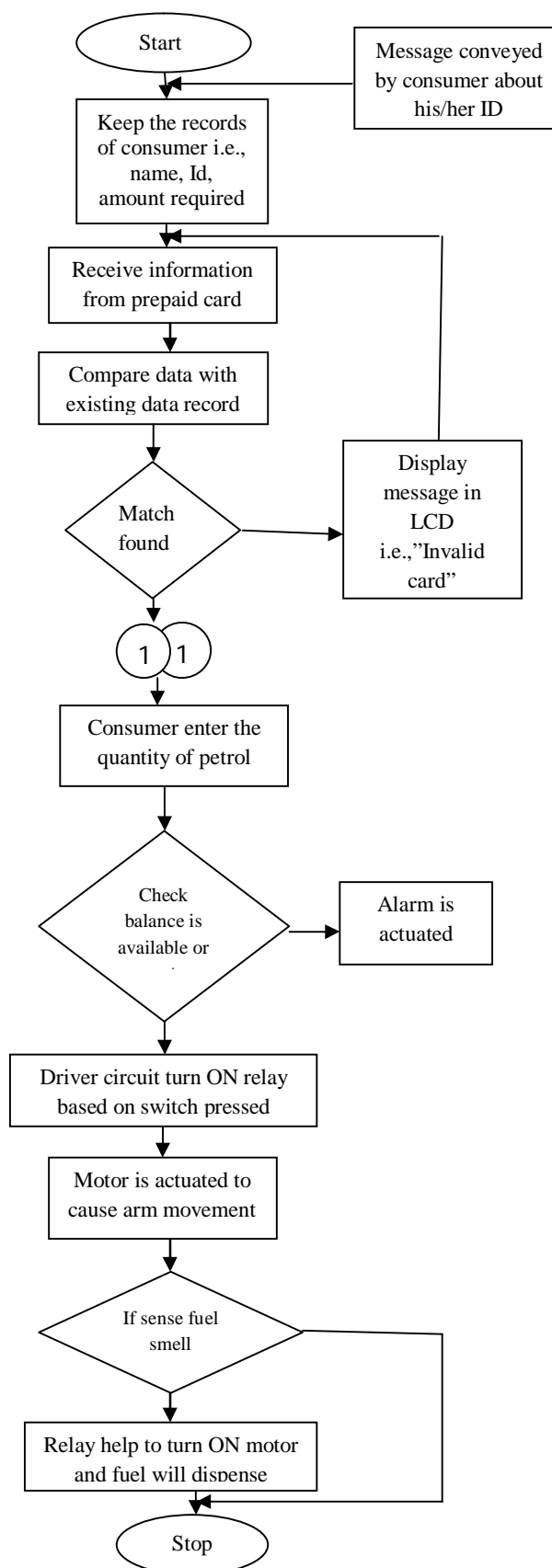
In this proposed system we will explain the system architecture and working mechanism.

A. System Architecture



In the proposed system, the consumer having the prepaid card with unique number. When the consumer show the card on the RFID reader, the reader read the corresponding number and give the corresponding signal to the microcontroller. In microcontroller, we have already programmed. So it checks the number whether it is correct or not and display the information like balance amount available on the card. The keypad is used to enter the quantity of petrol. In microcontroller we already set time for liters. When we enter the desired quantity on the keypad, microcontroller activate the relay driver for particular time period. It also check whether the user has entered a valid data i.e., the amount should not exceed the balance available in the card. If the balance is not available the alarm is actuated. The driver circuit is used to turn ON, turn OFF the relays. Relay output is directly connected to petrol pump. A movable arm is attached to the petrol tank. This arm carry the fuel pump. At the end of the fuel pump has gasoline sensor. When it senses the smell of the fuel it activate the relay and automatically fuel will dispense into the vehicle. Once this is done, the information such as available balance , date, time, quantity of purchase is sent to the user`s mobile using the GSM technology.

B. Working Mechanism



In this system, the PIC microcontroller place a major role. When the consumer shows the prepaid card on the RFID reader. The respective details are shown on the LCD display. In the prepaid card, if the balance is low, the alarm is actuated to

denote the invalid card. If the card is valid, the microcontroller moves to the next operation. According to the type of vehicle, the consumer has to press the switch either BIG or MED. Then the driver drives the circuit to activate the relays. In this process we are using three relays r1, r2 and r3. For arm movement and fuel dispensing two motors are used. Relay r1 is used for downward movement of arm. Relay r2 is used for upward movement of arm. Relay r3 is used for fuel dispensing. If the vehicle is BIG, the relay r1 is activated to drive the motor and the arm moves downward with given delay. Then the gasoline sensor senses the fuel smell, the relay r3 is activated to dispense the fuel into the vehicle. Using the relay r2, the arm moves to the upward direction and attain its original position with the same delay.

IV. HARDWARE DESCRIPTION

In this hardware description we will explain the each block .

A. Pic Microcontroller

The PIC16F877A features 256 bytes of EEPROM data memory, self programming, an ICD, 2-comparators, 8-channels of 10 bit Analog to Digital Convertors, 2 capture/compare/PWM functions, the synchronous serial port can be configured as either 3-wire serial peripheral interface or the 2-wire Inter-Integrated circuits bus and a Universal Asynchronous Receiver Transmitter (USART). All of these features make it ideal for more advanced level A/D application in automotive, industrial, appliances and consumer application.



B. Uart

The Universal Asynchronous Receiver Transmitter or simple UART is one of the common peripheral found on microcontroller (MCU) widely used for communication with the external devices and systems.

C. GSM

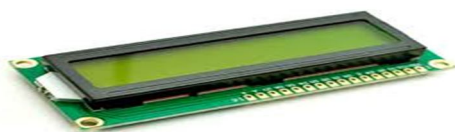
GSM is an open, digital cellular technology used for transmitting mobile data services. GSM differs from first generation wireless systems in that it uses digital technology and Time Division Multiple Access transmission method.

D. Relay Driver And Relay

Relay drivers are used to drive the electromagnetic relay and relays acts as a electromagnetic switch for the pump and motors. Relays are components which allow a low power circuit to switch a relatively high current on and off, or to control signal that must be electrically isolated from the controlling itself.

E. LCD Display

The liquid-crystal display has the distinct advantage of having low power consumption than the LED. It is typically of order of microwatts for the display. Its other advantages are its low cost and good contrast. Here it is used to display the balance amount available on the card.



F. Keypad

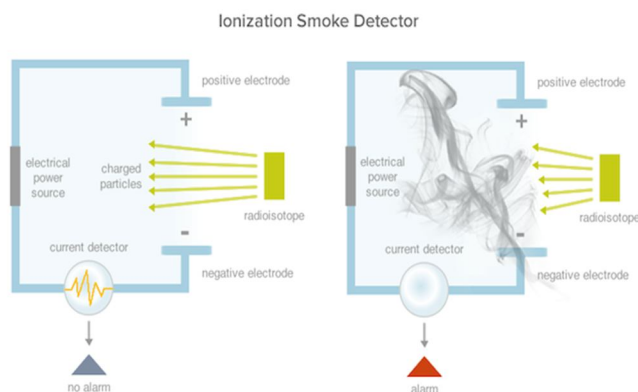
Keypad is widely used input device with lots of application in our everyday life. Keypad is used to take input from the user for further processing.

G. Alarm

An alarm system can detect an event such as fire, gas leak; determine if the event poses a threat; and then send a notification about the event. Here alarm is actuated when there is a wrong card or when no balance is available.

H. Smoke Sensor

A smoke detector also called smoke alarm is a device that detects smoke, typically as an indicator of fire. It works on the principle of Ionization smoke detection.



I. Infrared Level Sensor

Infrared level sensor is used to sense the fuel level available in the tank.

V. ADVANTAGES

- A. Avoids misconceptions and arguments
- B. Easy access and save time in the petrol bunk
- C. Ensures accuracy
- D. It reduces the time as well as man power
- E. GSM system used in our project provides quick data communication over long distance also.
- F. It requires very less power supply i.e., from 5Vs to 12V only which is easily available.

VI.CONCLUSION

The conclusion of this project is to provide easy access and save time in the petrol bunk. By installing this project is made the automated petrol bunk. This not only ensures accuracy, but also saves a lot of time for customers and avoids misconceptions and arguments. The customer need not wait in the petrol bunk. It reduces the time as well as man power.

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