DECLARATION

We declare that our project work titled **"RFID BASED AUTOMATED PETROL BUNK"** is the result of original work done by us and to the best our knowledge. This project report is submitted for the partial fulfillment of the requirement of the award of degree of Bachelor of Technology in Electronics and Communication Engineering of APJ Abdul Kalam Technological University.

Antony Jose

Place: Poonjar

Date:……

ACKNOWLEDGEMENT

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I am indebted to all teaching and non-teaching staffs of the Department of Electronics and Communication Engineering for their co-operation and support. Last but not the least I wish to express my sincere thanks to all my friends for their goodwill and constructive ideas.

ABSTRACT

The main aim of the project is to design a system which is capable of automatically deducting the amount of petrol dispensed from user card based on RFID technology. Petrol pumps are operated manually making fuel dispensing and filling, a time-consuming procedure. This we actualized automated petroleum pump by utilizing GSM and RFID. The principle aim of this proposed system is to give approval to the client and consequently control the start and stopping of the fuel valve as per the amount requested. This framework can enhance the filling procedure so as to keep it simpler, solid and secure. Here non permitted users and clients would not be provided with fuel. In this framework, all users have a specific card called RFID card which can be energized by a few focuses. The petrol station is outfitted with a smart card reader which detects the amount in the card along with all the security details and will show it on the LCD. The designated amount of fuel will be dispensed according to the amount entered.

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Chapter 1
INTRODUCTION

In the real world, replacing the human labor into automatic digitalized mechanism has become a huge increasing cause. Human race has transformed far more self-reliant than they have ever been. Every field has reached their purpose of user friendly interactions, in which the activites of a person are controlled by software. However, this is not applied in most of the fuel stations. Normally in petrol bunks there is a human to human interaction. Our project is to overcome this process by transferring the interaction between human and software. Also to avoid the cheating activities that a culprit laborer carry out in his work. The principle aim of this proposed system is to give approval to the client and consequently control the start and stopping of the fuel valve as per the amount requested. Providing fuel stations in distant areas is a herculean task due to lack of facilities. Mass travel organizations center to incorporate characteristics and most recent advancements in their framework expecting to diminish the administration labor. Presentation of innovation in conveying the administration has changed the conveyance benefit plan. [1]

When the RFID reader senses the RFID tag that contains the customer ID, it sends the ID to the main server using the GSM modem verifies the ID when the accurate password is entered. After the pin verification and confirmation of the user for the cost of the fuel, fuelling will be done. Finally, user will be notified about the ID details and total fuel amount dispensed from the filling station through SMS.

CHAPTER 2
RFID BASED PETROL PUMP

2.1 OVERVIEW

The overall process in automated fueling station consist of RFID reader placed at the filling station. The valve is opened only when the detected tag id by the RFID reader is valid. The complete filling station is made with the help of GSM which helps in accessing user environment and when the user enters into filling station, he enters necessary details and confirms for transaction of money using his pin number Once the valid pin is entered, transaction occurs., message is displayed on the lcd if user provides wrong pin for more than two times.In case of black listed card used once by any users or theft, message will be sent to card owner mobile phone number. A message of amount of fuel obtained by the user, amount deducted from the customer's account and fuel station location will be sent to user's registered mobile number using GSM technology for confirmation. All the user's id details and amount credited to filling station account and amount of fuel dispensed will be added to the filling station owner's database. Automated petroleum pump can be installed by GSM and RFID technology. This system filling procedure is to keep it simpler, solid and secure. Here non permitted users and clients with police black listed records would not be provided with fuel. Every user has a specific card called RFID card which has all the security details and will show it on the LCD. The Designated amount of fuel will be dispensed according to the amount entered. Cashless transaction made Man power is decreased in light of mechanized self-benefit. Accuracy in the measure of petroleum is also administered. [2]

All the drawbacks of the current system are overcome by the automation process used in the proposed project. Petro cards given to the customers, eliminate the use of labours and become secure and more digitalised.

2.2 BLOCK DIAGRAM

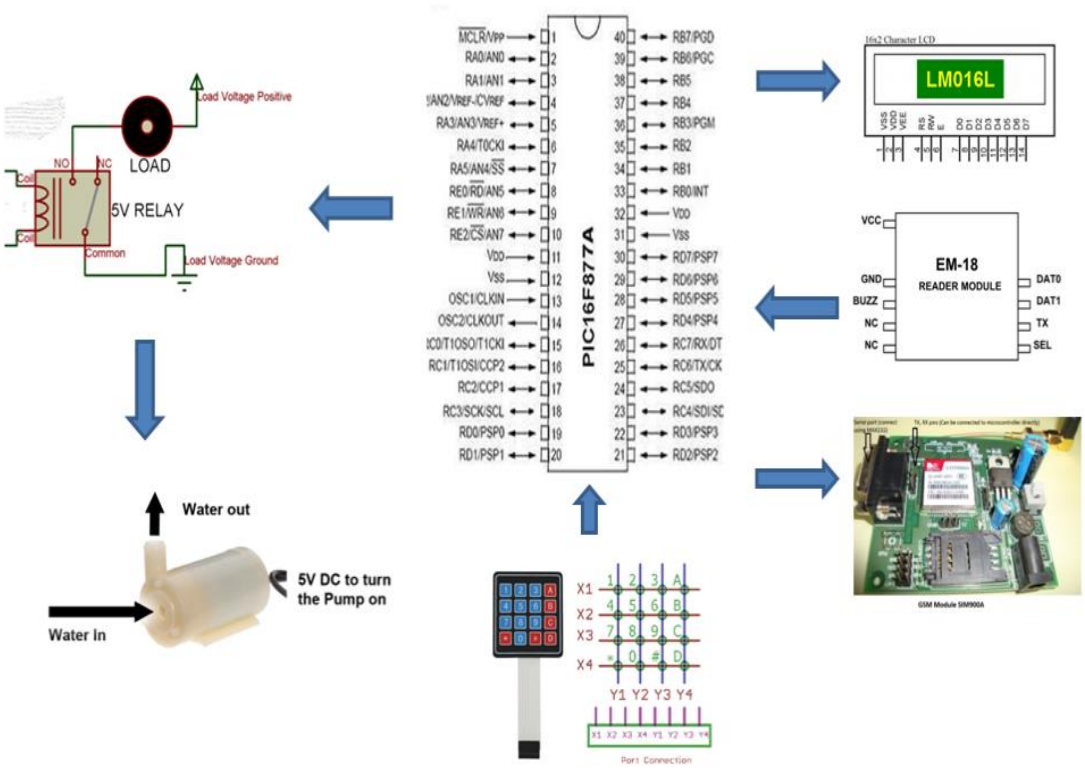


Fig 2.1 Block diagram of the system

RFID reader (EM18 MODULE) is placed at the filling station.Once the valid card is swiped lcd will be display the message(ENTER THE PIN) by using key pad, pin is entered if the pin is valid display the message (ENTER THE AMOUNT) after entering the amount the pump valve is automatically opened, Pump(12v dc). Message is produced if user provides wrong pin (INVALID PIN NUMBER).If user provides wrong pin for more than two times, the processing will be cancelled. In case of black listed card used once by any users or theft, message will be sent to police by using GSM technology. GSM technology (GSM 900A) gives message confirmation about-amount of fuel obtained by the user, amount deducted from the customer's account, etc. to user registered mobile number.

2.3 FLOW CHART

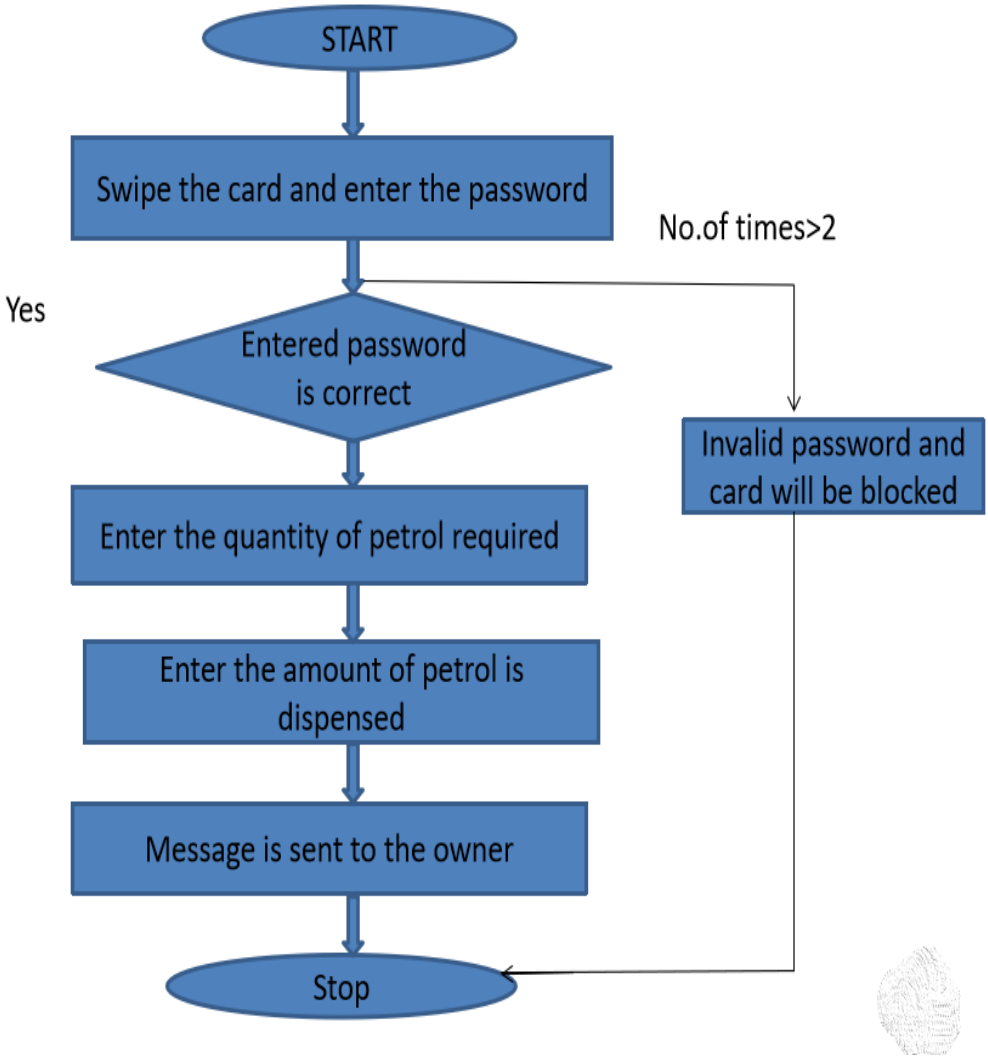


Fig 2.2 fuel transaction

CASE 1

1 START the process
2 Swipe the RFID card on the RFID reader and
3 Enter the pin number(password)
4 If entered password is correct, display message on LCD
5 Enter the quantity of petrol required.
6 Enter the amount of petrol to be dispensed by using key pad.
7 Pump will on automatically.
8 Message is sent to the owner's phone using GSM.
9 STOP the process

CASE 2

1 START the process
2 Swipe the RFID card on the RFID reader and
3 Enter the pin number(password)
4 If entered password is incorrect, display message on LCD
5 Password is in valid
6 STOP the process

2.4 CIRCUIT DIAGRAM

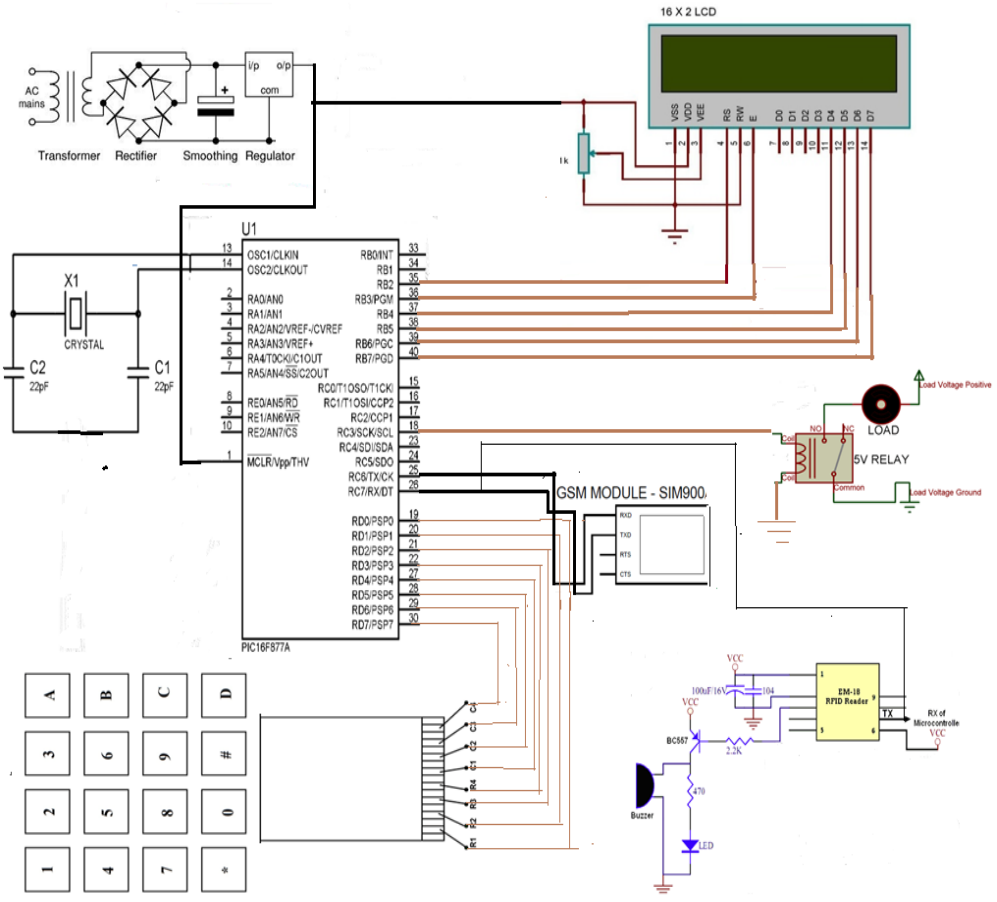


Fig 2.3 Circuit diagram

The circuit diagram consists of the PIC16F877A microcontroller, 4*4 keypad, LM016L lcd, sim900a gsm, em-18 rfid, crystal oscillator, pump and relay. These are the mail components. Keypad is connected to port D of the microcontroller. Lcd is connected to port B. Rfid is connected to the receiver in f the microcontroller and the gsm is connected to the transmitting pin of the microcontroller.

CHAPTER 3

MICROCONTROLLER

3.1 OVERVIEW

The microcontroller used in this project is PIC16F877A.

Fig 3.1 PIC16F877A microcontroller

PIC16F877a is a pic family Microcontroller and is used mostly in Embedded Projects and Applications.

Few of its features are as follows:

- PIC contain 40 pins in which 33 pins which are input and output pins.
- PIC contain an external oscillator of 20 MHz
- Operating voltage wee 2-5.5V
- Memory size were 14 k bytes
- RAM is 368 bytes
- It supports many communication protocols like:
    - Serial Protocol.
    - Parallel Protocol.
    - I2C Protocol ETC
- PIC contain SP interface
- PIC uses flash memory
- PIC uses UART

- Pin 11 is used as V_{dd} which is ground.
- Pin 25 is the transmitter pin which is tx pin which is connected to the receiver pin of the gsm
- Pin 26 is used as receiver pin which is connected to the transmitter of the gsm and rfid Pin 19-30 used to connect the keyboard pin
- Pins 31-40 used to connect the lcd display

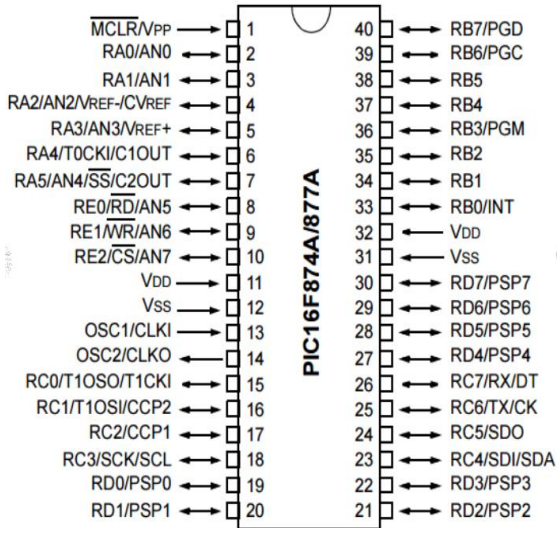
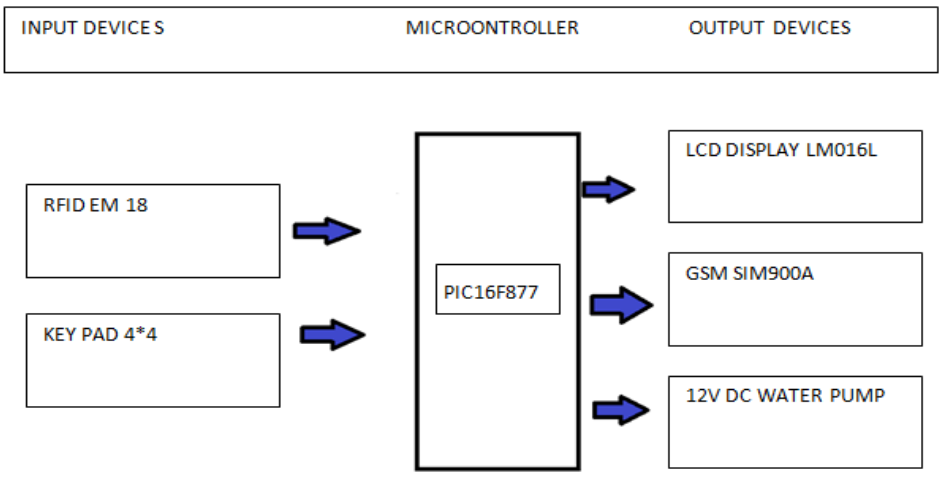


Fig 3.2 PIC16F877A pin configuration

3.2 I/O DEVICES CONNECTED TO MICROCONTROLLER



CHAPTER 4

INTERFACING KEYPAD WITH PIC16F877A

We are using a 4*4 matrix keypad for inputting the needed details from the customer.

*Fig 4.1 4*4 matrix keypad*

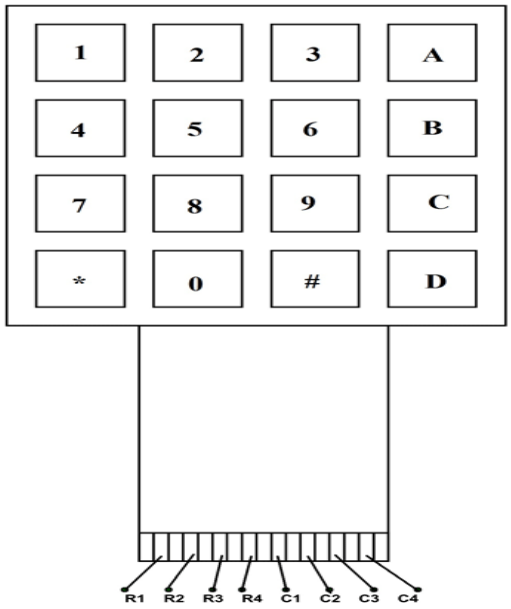


*Fig 4.2 4*4 matrix keypad pin out*

4x4 keypad modules are available in different sizes and shapes. But they all have same pin configuration. It is easy to make 4x4 keypad by arranging 16 buttons in matrix formation by ourselves. A 4*4 keypad will have eight terminals. In them four are rows of matrix and four are columns of matrix. These 8 pins are driven out from 16 buttons present in the module. Those 16 alphanumeric digits on the module surface are the 16 buttons arranged in matrix formation. Features of 4*4 keypad is given below:

- Maximum Voltage across each segment or button: 24v
- Maximum Current through each segment or button: 30ma
- Maximum operating temperature: 0°C to + 50°C
- Ultra-thin design
- Adhesive backing
- Easy interface
- Long life.

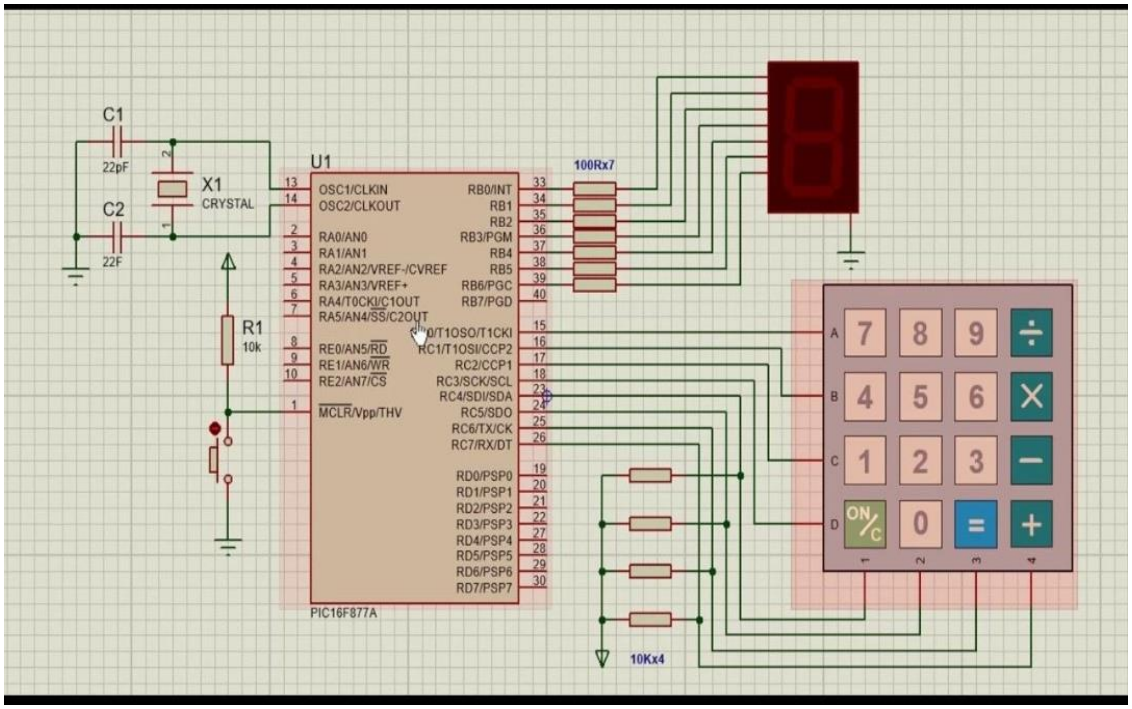


Fig 4.3 Interfacing keypad with PIC16F877A

We use single I/O pin of a microcontroller unit to read the digital signal, like a switch input. In few applications where 9, 12, 16 keys are needed for input purposes, if we add each key in a microcontroller port, we will end up using 16 I/O ports. This 16 I/O ports are not only for reading I/O signals, but they can be used as peripheral connections too, like ADC supports, I2C, SPI connections are also supported by those I/O pins. As those pins are connected with the switches/keys, we can't use them but only as I/O ports. This makes no sense at all. So, using a hex keypad or matrix keypad; we can reduce pin counts, which associate 4x4 matrix keys. It will use 8 pins out of which 4 connected in rows and 4 connected in columns, therefore saving 8 pins of the microcontroller's.1234 Pin no is used for the case one ,2345 pin no is used for the case two(wrong password),3456 pin no is used for the case three (black listed).

CHAPTER 5

INTERFACING LCD WITH PIC16F877A

We are using LM016L (16*2) LCD for displaying information.

Fig 5.1 lm016l lcd display

Features of lm016l is given below:

- Operating Voltage is 4.7V to 5.3V
- Current consumption is 1mA without backlight
- Alphanumeric LCD display module, meaning can display alphabets and numbers
- Consists of two rows and each row can print 16 characters.
- Each character is built by a 5×8 pixel box
- Can work on both 8-bit and 4-bit mode
- It can also display any custom generated characters
- Available in Green and Blue Backlight

16×2 LCD is named so because; it has 16 Columns and 2 Rows. There are a lot of combinations available like, 8×1, 8×2, 10×2, 16×1, etc. but the most used one is the 16×2 LCD. So, it will have (16×2=32) 32 characters in total and each character will be made of 5×8 Pixel Dots. [3]

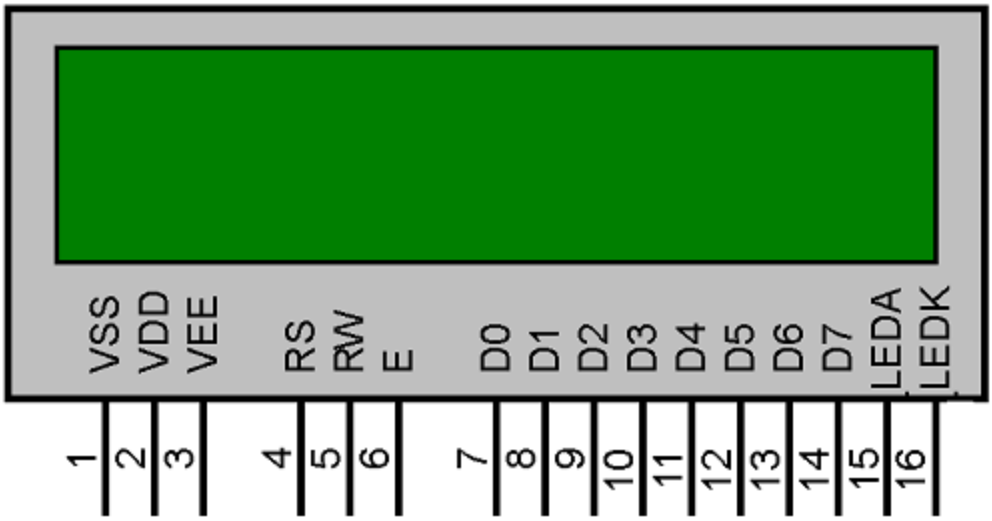


Fig 5.2 lcd module pin out

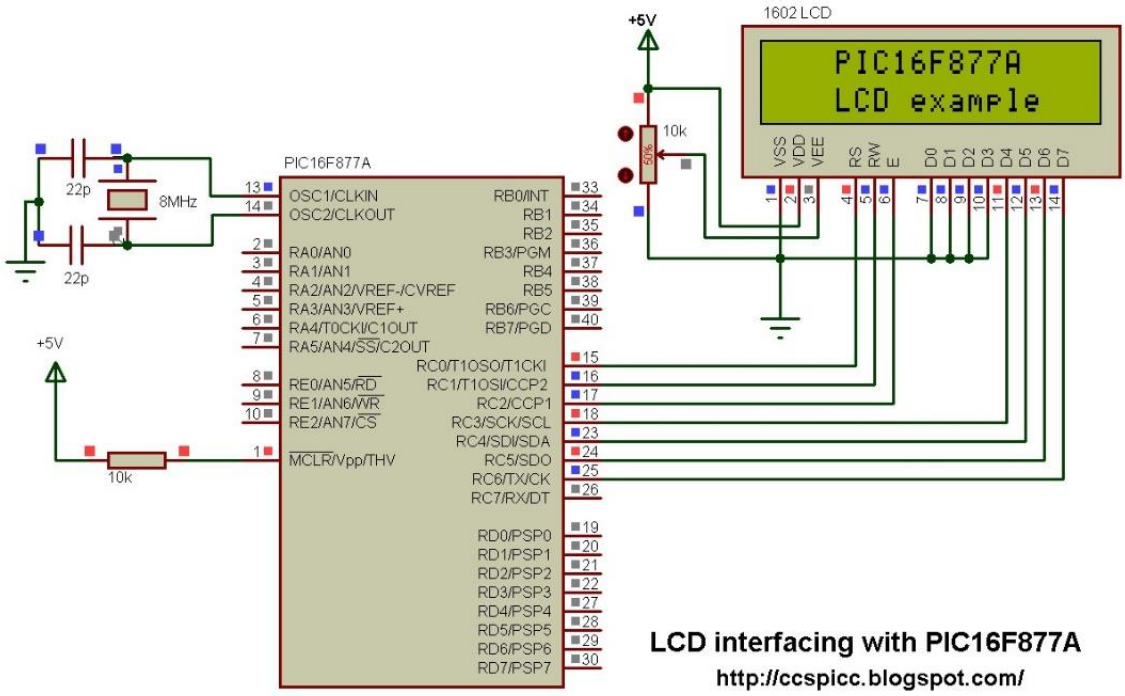


fig 5.3 interfacing lcd with PIC16F877A

Pin Number	Name	Use
1	Vss	Ground
2	Vdd	Power
3	Vee	To adjust the contrast
4	RS	1=Data input 0=Instruction input
5	R/W	1=Read from LCD 0=Write to LCD
6	Enable (EN)	From 1 to 0 = Data is written to the LCD
7	DB0	Data Bus Lines
8	DB1	
9	DB2	
10	DB3	
11	DB4	
12	DB5	
13	DB6	
14	DB7	
15	LED+	Backlight
16	LED-	

Table 5.1 lm016l pin out configuration

CHAPTER 6

RFID IDENTIFICATION

6.1 WORKING

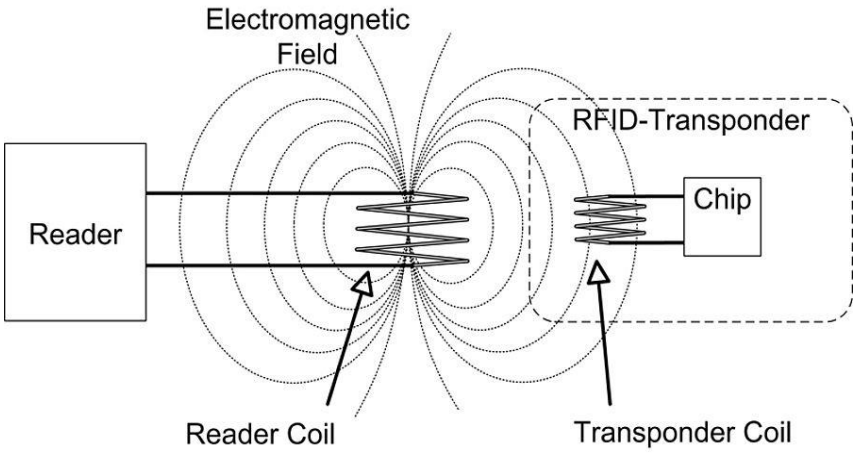


Fig 6.1 rfid working

RFID or Radio Frequency Identification System is a technology based identification system which helps identifying objects just through the tags attached to them, without requiring any light of sight between the tags and the tag reader. All that is needed is radio communication between the tag and the reader.Operate in low voltage It require minimum distance of 10 cm between RFID reader and tag RFID work in the operating frequency of 125 kHz RFID tag contain 12ASCII character out of which 10 character is tag ID and 2 character is XOR of previous of 10 character

RFID system contain three main parts:

RFID TAG: It consists of a silicon microchip attached to a small antenna and mounted on a substrate and encapsulated in different materials like plastic or glass veil and with an adhesive on the back side to be attached to objects.

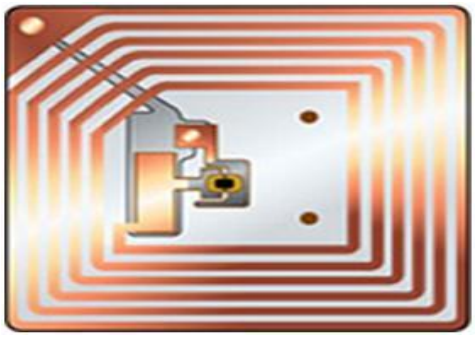
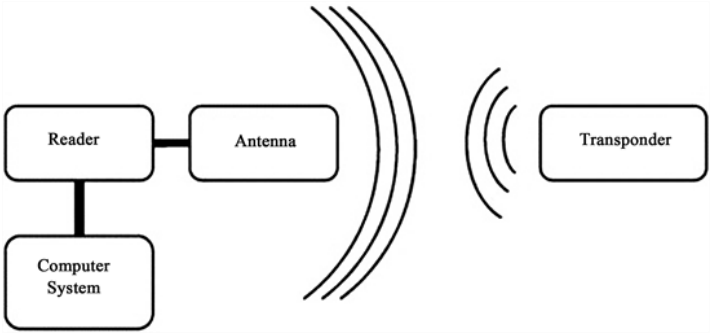


Fig 6.2 rfid tag

READER: It consists of a scanner with antennas to transmit and receive signals and is responsible for communication with the tag and receives the information from the tag.

Fig 6.3 rfid reader

MICROCONTROLLER: It can be a host computer with a Microprocessor or microcontroller which receives the reader input and process the data.



Reader transfer energy to the transponder by emitting electromagnetic waves through air transpondent uses RF energy to charge up, transpondent receive command

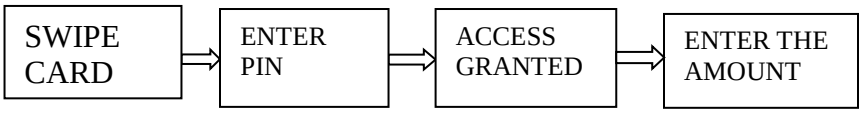
or data signal and respond accordingly reader receives transponder response and process accordingly such as sent to microcontroller.

6.2 AUTHENTIFICATION USING SECURITY PIN

In our working system each user or customer is provided with a RFID card. This RFID is secured with digital pin numbers. It may be numerical 4 digit. When a customer approaches a petrol pump, first he swipes the card. Then system ask him or her to enter the security pin number. We have two cases.

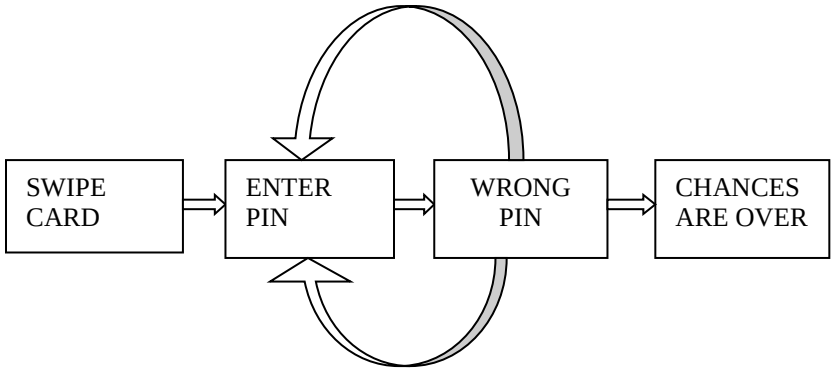
1) Entering the correct pin (normal working).

When the user enters the security pin number, the system checks whether the entered pin number is correct or not. If the entered pin number is correct the system acknowledges the user with a comment that 'access granted'. Then he or she can do further steps of fuelling.



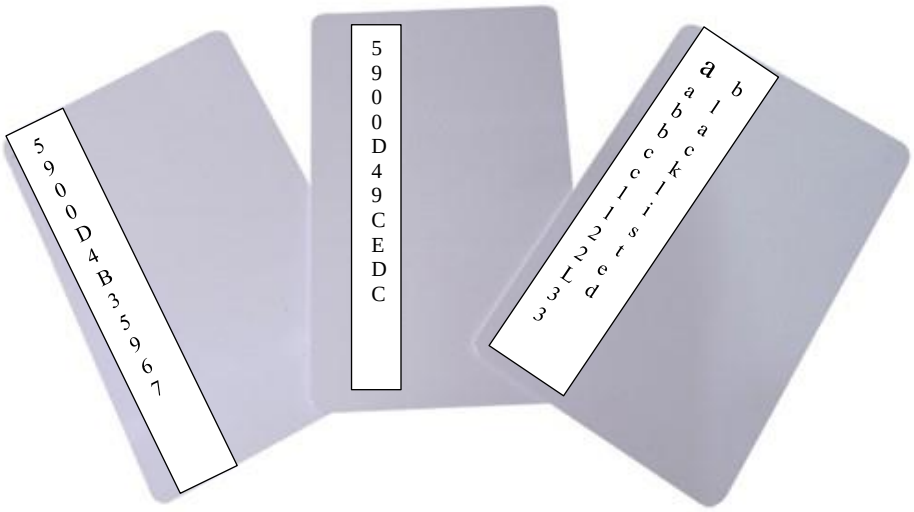
2) Entering incorrect pin

Totally a user will get three chances to enter the correct security pin number. If a user enters a wrong pin number, he will get two more chances to attempt with the correct pin number. When the three chances gets over, the system go backs to its initial state.



6.3 CRIMINAL DETECTION FROM BLACKLIST

In our proposed system, one of the major part is criminal detection from blacklisted user cards. Every customer have their own RFID cards which is linked with their licence number mobile number and bank account. If a person who is having this user card do any kind of series crime, and if he or she is wanted by police department, proposed method gives a partial solution. The petrol card of this user can be blacklisted by the police department. When this person approaches any petrol pump and while swiping this card automatically a message will be send to the police department server. From this message police can sketch the location of the criminal from the location petrol pump along with the information about the time he swiped his petrol card. Sometimes user access can also be denied if needed.



CHAPTER 7
FUELLING

The system is designed in such a way that the user can input either the amount or the required liter of the fuel needed. There will be option for selecting amount/liter by the user. We are utilizing a push button for this purpose.

7.1 WATER PUMP

The water pump used is 12 v dc centrifugal submersible pump ccentrifugal pumps are designed with a rotating impeller which can be used for supplying the water into the pump and force the discharge flow. These pumps come in several types which includes trash, submersible, and standard models. By using these pumps, all types of liquids can be pumped with low-viscosity. And also these pumps work fine with thin fluids & gives high flow rates. [4]

Fig 7.1 pump

CHAPTER 8

INTERFACING GSM WITH PIC16F877A

8.1 OVERVIEW

GSM is a mobile communication modem. It is stands for global system for mobile communication (GSM). GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. A GSM digitizes and reduces the data, then sends it down through a channel with two different streams of client data, each in its own particular time slot. The digital system has an ability to carry 64 kbps to 120 Mbps of data rates.

GSM Architecture

A GSM network consists of the following components

- **A Mobile Station:** It is the mobile phone which consists of the transceiver, the display and the processor and is controlled by a SIM card operating over the network.
- **Base Station Subsystem:** It acts as an interface between the mobile station and the network subsystem. It consists of the Base Transceiver Station which contains the radio transceivers and handles the protocols for communication with mobiles. It also consists of the Base Station Controller which controls the Base Transceiver station and acts as an interface between the mobile station and mobile switching center.
- **Network Subsystem:** It provides the basic network connection to the mobile stations. The basic part of the Network Subsystem is the Mobile Service Switching Centre which provides access to different networks like ISDN, PSTN etc. It also consists of the Home Location Register and the Visitor Location Register which provides the call routing and roaming capabilities of GSM. It also contains the Equipment Identity Register which maintains an account of all the mobile

equipment wherein each mobile is identified by its own IMEI number. IMEI stands for International Mobile Equipment Identity.

The gsm module used in this project is SIM900A

8.2 SIM900A GSM MODULE

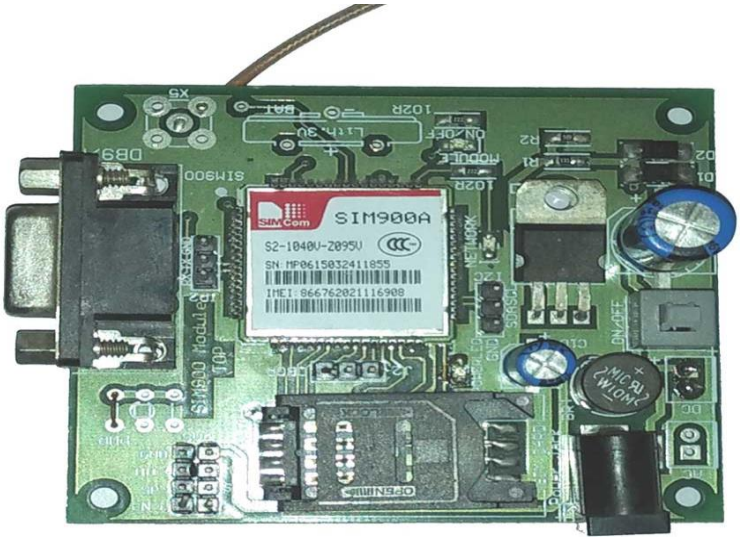


Fig 8.1 SIM900A GMS Module

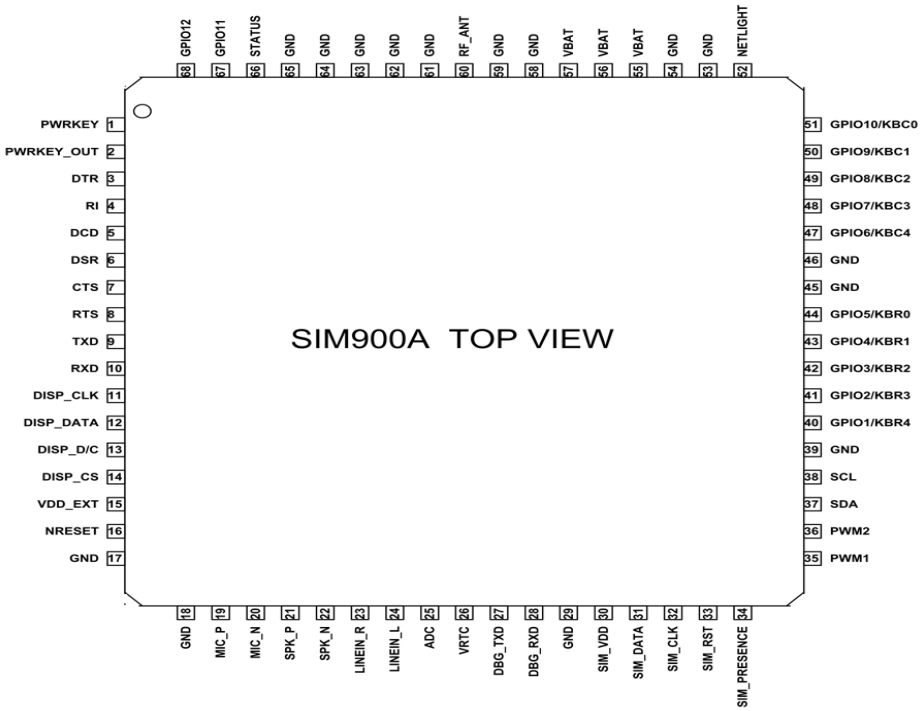


Fig 8.2 SIM900A GMS Module Pin out

8.3 SIM900A GSM MODULE FEATURES

- Single supply voltage: 3.4V – 4.5V
- Power saving mode: Typical power consumption in SLEEP mode is 1.5mA
- Frequency bands: SIM900A Dual-band: EGSM900, DCS1800. The SIM900A can search the two frequency bands automatically. The frequency bands also can be set by AT command.
- GSM class: Small MS
- GPRS connectivity: GPRS multi-slot class 10 (default) , GPRS multi-slot class 8 (option)
- Transmitting power: Class 4 (2W) at EGSM 900, Class 1 (1W) at DCS 1800
- Operating Temperature: -30ºC to +80ºC
- Storage Temperature: -5ºC to +90ºC
- DATA GPRS: download transfer max is 85.6KBps, Upload transfer max 42.8KBps
- Supports CSD, USSD, SMS, FAX
- Supports MIC and Audio Input
- Speaker Input
- Features keypad interface
- Features display interface
- Features Real Time Clock
- Supports UART interface
- Supports single SIM card
- Firmware upgrade by debug port
- Communication by using AT commands

Gsm is utilised in the project to send a message to the owner of the pump informing the details about the fuelling and also for sending a message to the police if a blacklisted card is fund trying to fuel, informing the details about the transaction. The details include the rfid identity number, the amount and the time of fuelling. The message to the owner will be in the form: <rfid card number> has paid <amount> at petrol pump. The message to the police will be in the form: Blacklisted card found Card Id: <rfid card id>.

Sending a message to the owner showing details of each fuelling helps the owner to be aware of the transactions happening in the pump simultaneously. Sending a message to the police if a blacklisted card is fund helps the police to track people with criminal background.

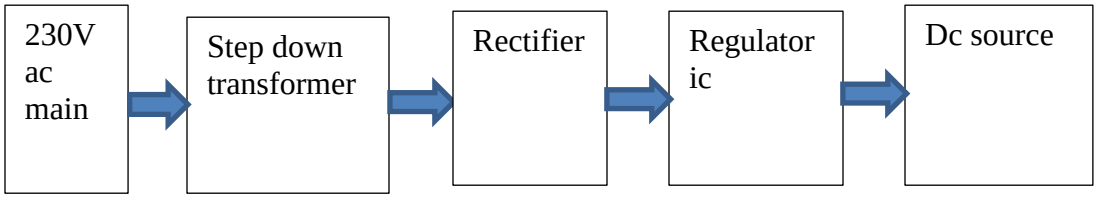
CHAPTER 9
POWER SUPPLY

Power supply we use 12V 2 amp adapter which convert the 230V ac in to 12V dc. We use a step down transformer 230 V ac in put to the primary side of the transformer and voltage step down to 12 V ac which is rectified using rectifier which convert in to 12 V dc and given to an regulator IC which give constant 5V dc .

COMPONENTS	POWER SUPPLY
MICROCONTROLLER (PIC16F877A)	+5V
RFID MODULE(EM-18)	+5V, 125kHz
4*4 KEY PAD	5V, 30mA(across each individual section)
GSM MODULE(SIM 900A)	3.4 - 4.5V, 1.5mA
LCD DISPLAY(16*2)LM016L	+5V
PUMP(12V DC)	+12
RELAY	5V
POWER SUPPLY	+4.3 - +5V

Table 9.1 power supply

The power conversion is shown below:



CHAPTER 10

RESULT

10.1 LCD STATUS

10.1.1 CASE 1: NORMAL WORKING

Step 1: Swipe Card

(a)

(b)

(c)

Fig 10.1 normal working

Step2: Authentication using security pin number.

(a)

(b)

Fig 10.2 Authentication using security pin number

Step 3: Enter the amount as per requirement.

Fig 10.3 Enter the amount as per requirement

10.1.2 CASE 2: INCORRECT SECURITY PIN

When entered security pin wrong

Fig 10.4 Password incorrect

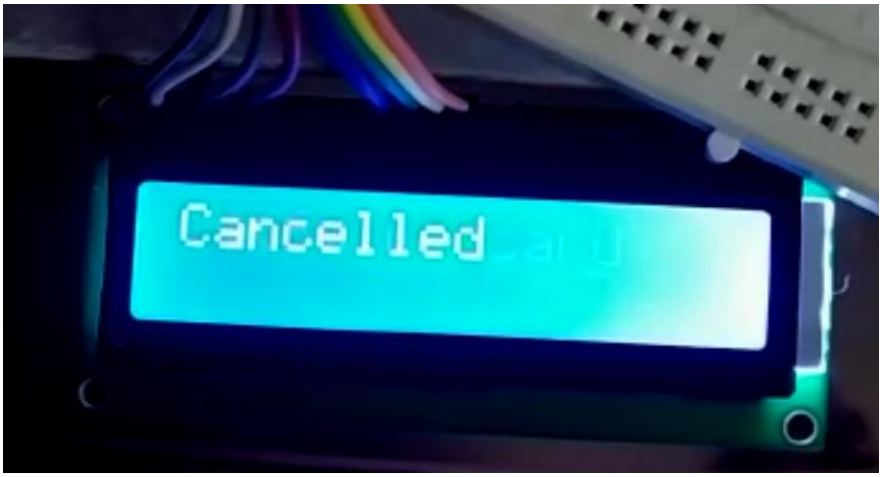


Fig 10.5 Cancelled

After three chances of entering wrong pin

Fig 10.6 No more chances

10.1.3 CASE 3: BLACKLISTED

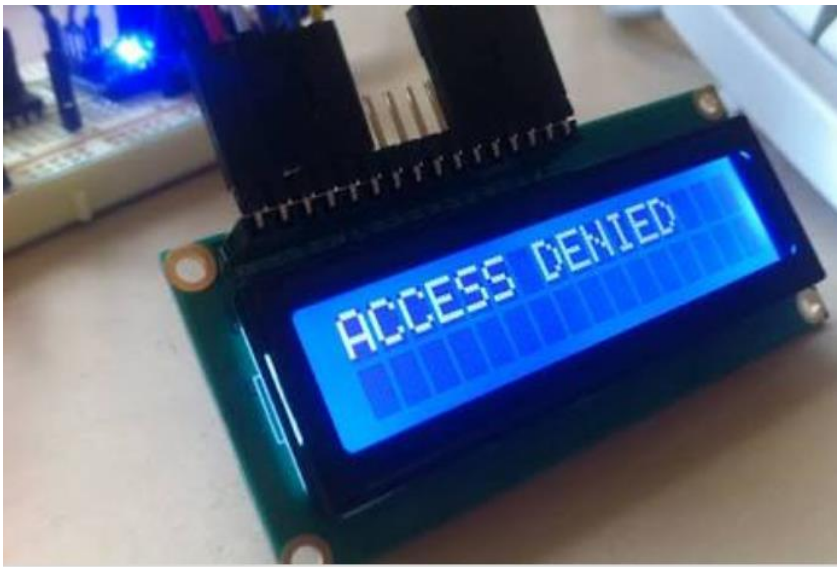


Fig 10.7 Access denied

10.2 GSM MESSAGE

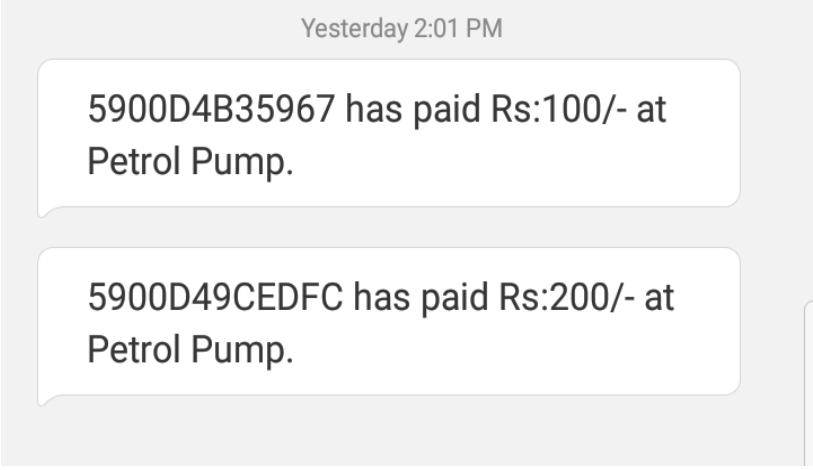


Fig 10.8 Sms to the pump owner

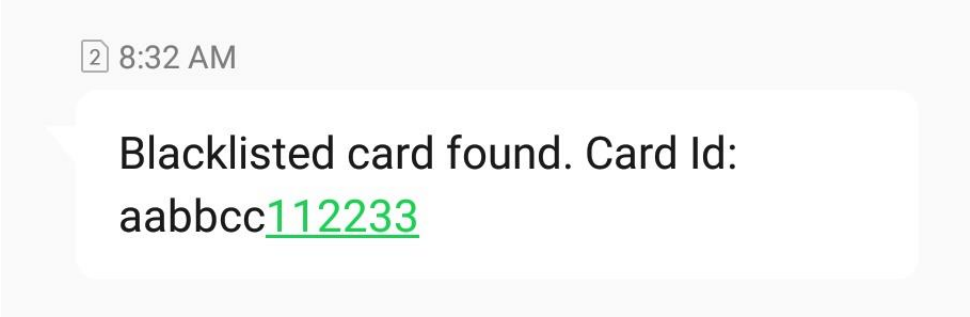


Fig 10.9 Sms to police

CHAPTER 11

COMPARISON WITH EXISTING METHODS

MANUAL CONTROL	ELECTRONICS CONTROL WITH LOGIC GATES	PROGRAMMABLE LOGIC CONTROL	RFID BASED AUTOMATED PETROL PUMP
Human Errors Hard Wired Logic Control Bulky and complex wiring Involves lot of rework implement changes in control logic.	Implementation of changes in the control logic is not possible Reducing project lead-time was not possible.	Expensive, Requires Third parties license, Bulky to carry, Expert person required.	Man power is decreased. Due to utilization of RFID framework theft of the fuel is minimized. The time is spared. Low power utilization. Fast response.

Table 11.1 Comparison with existing methods

CHAPTER 12
FUTURE SCOPE

Present days petroleum bunks include a considerable measure of manual process. So, it squanders of time, cash and parcel of weight to the clients. In future days all transactions are going to be totally digitalized. The work done is quick contrasting with the manual work. Its additionally advantageous to both sides, for example, client and proprietor. On the off chance that every one of the things are digitalized, there is no bamboozling procedure in a petroleum bunk, since all the data are refreshed to the server. Work done is so rapid that client is more fulfilled. [5]

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.

Future enhancements would also be automatic billing, enables swiping of credit/debit card on the fuel counter itself. It can be designed to give the information of the density of the fuel on real-time basis. Back office data received from the new machines can be used to generate bonus points to reward the customers on the loyalty front. Touch Screen technology may also be used instead of keypad. I-Button may be used instead of RFID card. [6]

CONCLUSION

RFID system is a versatile technology. This system is used in many application and real time application. In our application, RFID system dispenses the accurate amount of fuel which reduces the misuse of the fuel. And it also reduces the man power. And if the customer tries to swipe with the unauthorized card, the RFID system rejects the card. In this way the system is so secured. To obtain best performance the RFID readers and Tags must be in good quality. [7] All the drawbacks of the current system are overcome by the automation process used in the proposed project. Petro cards given to the customers, eliminate the need for station attendant, as the interaction is now between the customer and petro card reader giving instructions to the customer, to proceed at each step, which is displayed on the LCD unit. RFID framework is a flexible innovation. This framework is utilized as a part of numerous application and ongoing application. Providing fuel stations in distant areas is a herculean task due to lack of facilities. Mass travel organizations center to incorporate characteristics and most recent advancements in their framework expecting to diminish the administration labor. Presentation of innovation in conveying the administration has changed the conveyance benefit plan.

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APPENDIX

```
#define _XTAL_FREQ 20000000
// LCD Module Connections
#define RS RB2
#define EN RB3
#define D4 RB4
#define D5 RB5
#define D6 RB6
#define D7 RB7
// END LCD Module Connections
#define X_1    RD0
#define X_2    RD1
#define X_3    RD2
#define X_4    RD3
#define Y_1    RD4
#define Y_2    RD5
#define Y_3    RD6
#define Y_4    RD7
#define pump   RC3

#include <xc.h>
#include "lcd.h";
#include "uart.h";
#include <stdio.h>
#include <string.h>
#include <pic16f877a.h>
// BEGIN CONFIG
```

```
#pragma config FOSC = HS // Oscillator Selection bits (HS oscillator)
#pragma config WDTE = OFF // Watchdog Timer Enable bit (WDT enabled)
#pragma config PWRTE = OFF // Power-up Timer Enable bit (PWRT disabled)
#pragma config BOREN = ON // Brown-out Reset Enable bit (BOR enabled)
#pragma config LVP = OFF // Low-Voltage (Single-Supply) In-Circuit Serial Programming Enable bit (RB3 is digital I/O, HV on MCLR must be used for programming)
#pragma config CPD = OFF // Data EEPROM Memory Code Protection bit (Data EEPROM code protection off)
#pragma config WRT = OFF // Flash Program Memory Write Enable bits (Write protection off; all program memory may be written to by EECON control)
#pragma config CP = OFF // Flash Program Memory Code Protection bit (Code protection off)
//END CONFIG

void delay(int n) {
    for (int i = 0; i < 1000; i++)
        for (int j = 0; j < n; j++);
}

char keypad();
int get_num(char ch);
char keypad_read(void);
int status = 0;

void main() {
    char rfid[13], rfdata[][12] = {
        {"5900D49CEDFC"},
        {"5900D4B35967"},
        {"aabbcc112233"}
    },
```

```
    pindata[][6] = {
        {"1234\0"},
        {"2345\0"},
        {"3456\0"}
    },
    blacklist[][13] = {
        {"5900D4A7A08A"},
        {"abc123abc123"},
        {"abc123123abc"}
    };
    char pin[5], key_char,amount[4];
    int a, b, key_int, i, j, count, id = 0;
    pump = 0;
    TRISB = 0x00;
    TRISD = 0XF0;
    TRISC = 0XC0;

    Lcd_Init(); // Initialize LCD
    UART_Init(9600); // Initialize UART, 9600 baud rate
    rfid[12] = '\0';
success:
    status = 0;
    id = 0;
    key_int = 0;
    Lcd_Clear(); // Clear display
    Lcd_Set_Cursor(1, 1);
    Lcd_Write_String("<<<Swipe card>>>");
    while (1) {
```

```
if (UART_Data_Ready()) {
    for (i = 0; i < 12;) {
        if (UART_Data_Ready()) {
            rfid[i] = UART_Read();
            i++;
        }
    }
    Lcd_Set_Cursor(2, 1);
    Lcd_Write_String(rfid);
    delay(100);
    Lcd_Clear();
    Lcd_Set_Cursor(1, 1);
    Lcd_Write_String("Card Swiped");
    delay(100);
    Lcd_Clear();
    Lcd_Set_Cursor(1, 1);
    Lcd_Write_String("Checking");
    delay(100);
    for (i = 0; i < 3; i++) {
        count = 0;
        a = 0;
        for (j = 0; j < 4; j++) {
            if (memcmp(rfid, rfdata[j], 12) == 0) {
                count = 12;
                id = j;
            }
            if (count == 12) {
                a = 1;
```

```
count = 0;
Lcd_Clear();
Lcd_Set_Cursor(1, 1);
Lcd_Write_String("Match Found");
delay(100);

for (int k = 0; k < 3; k++) {
   Lcd_Clear();
   Lcd_Set_Cursor(1, 1);
   Lcd_Write_String("Enter Pin");
   status = 1; //Setting Password Mode
   Lcd_Set_Cursor(2, 1);
   pin[4] = "\0";
   for (j = 0; j < 4; j++) {
      pin[j] = 0;
      pin[j] = keypad_read();
      if (pin[j] == 'C') {
         Lcd_Clear();
         Lcd_Set_Cursor(1, 1);
         Lcd_Write_String("Cancelled");
         delay(100);
         goto success;
      }
   }
   count = 0;
   for (j = 0; j < 4; j++) {
      if (memcmp(pin, pindata[id], 4) == 0) {
         count = 4;
```

```
    id = 0;
  } else {
    Lcd_Clear();
    Lcd_Set_Cursor(1, 1);
    Lcd_Write_String("PASSWORD INCORRECT");
    delay(100);
    if (k == 2) {
      Lcd_Set_Cursor(2, 1);
      Lcd_Write_String("NO MORE CHANCES");
      delay(100);
      Lcd_Clear();
      Lcd_Set_Cursor(1, 1);
      Lcd_Write_String("Cancelled");
      delay(100);
      goto success;

    }
    break;
  }
  if (count == 4) {
    count = 0;
    Lcd_Clear();
    Lcd_Set_Cursor(1, 1);
    Lcd_Write_String("Enter Amount");
    status = 0;
    Lcd_Set_Cursor(2, 1);
    amount[4]='\0';
    for (j = 0; j < 4; j++) {
```

```
    key_char = keypad_read();
    if (key_char == 'A')
        break;
    if (key_char == 'C') {
        Lcd_Clear();
        Lcd_Set_Cursor(1, 1);
        Lcd_Write_String("Cancelled");
        delay(100);
        goto success;
    }
    amount[j] = key_char;
}
Lcd_Clear();
Lcd_Set_Cursor(1, 1);
Lcd_Write_String("Pumping started");
delay(100);
pump = 1;
delay(amount);
pump = 0;
Lcd_Clear();
Lcd_Set_Cursor(1, 1);
Lcd_Write_String("SUCCESS");
UART_Write_Text("ATE0\r\n");
delay(1000);
UART_Write_Text("AT\r\n");
delay(1000);
UART_Write_Text("AT+CMGF=1\r\n");
delay(1000);
```

```
                UART_Write_Text("AT+CNMI=1,2,0,0,0\r\n");
                delay(1000);
                UART_Write_Text("AT+CMGS=\"+918075506798\"\r\n");
                delay(1000);
                UART_Write_Text(rfid);
                UART_Write_Text(" as paid Rs:");
                UART_Write_Text(amount);
                UART_Write_Text("/- at Petrol Pump.");
                delay(500);
                UART_Write(26);
                delay(100);
                goto success;
            }

        }
    }
  }
}
for (j = 0; j < 12; j++) //checking blacklist
{
  if (memcmp(rfid, blacklist, 12) == 0) {
    id = j;
    count = 12;
  } else {
    break;
  }
  if (count == 12) {
    a = 1;
```

```
        Lcd_Clear();
        Lcd_Set_Cursor(1, 1);
        Lcd_Write_String("BLACKLISTED");
        delay(100);
        UART_Write_Text("ATE0\r\n");
        delay(1000);
        UART_Write_Text("AT\r\n");
        delay(1000);
        UART_Write_Text("AT+CMGF=1\r\n");
        delay(1000);
        UART_Write_Text("AT+CNMI=1,2,0,0,0\r\n");
        delay(1000);
        UART_Write_Text("AT+CMGS=\"+919400356078\"\r\n");
        delay(1000);
        UART_Write_Text("Blacklisted card found Card Id: ");
        UART_Write_Text(blacklist[id]);
        delay(500);
        UART_Write(26);
        delay(100);
        id = 0;
        goto success;
    }
}
if (a == 0 && i == 2) {
    Lcd_Clear();
    Lcd_Set_Cursor(1, 1);
    Lcd_Write_String("not in list");
    delay(100);
```

```
                goto success;
            }
        }

    }
  }
}

char keypad() {
  X_1 = 0;
  X_2 = 1;
  X_3 = 1;
  X_4 = 1;
  if (Y_1 == 0) {
    delay(100);
    while (Y_1 == 0);
    if (status == 0)
      Lcd_Write_String("7");
    else
      Lcd_Write_String("*");
    return '7';
  }
  if (Y_2 == 0) {
    delay(100);
    while (Y_2 == 0);
    if (status == 0)
      Lcd_Write_String("8");
    else
```

```
        Lcd_Write_String("*");
    return '8';
}
if (Y_3 == 0) {
    delay(100);
    while (Y_3 == 0);
    if (status == 0)
        Lcd_Write_String("9");
    else
        Lcd_Write_String("*");
    return '9';
}
if (Y_4 == 0) {
    delay(100);
    while (Y_4 == 0);
    if (status == 0)
        Lcd_Write_String("A");
    else
        Lcd_Write_String("*");
    return 'A';
}

X_1 = 1;
X_2 = 0;
X_3 = 1;
X_4 = 1;
if (Y_1 == 0) {
    delay(100);
```

```
    while (Y_1 == 0);
    if (status == 0)
        Lcd_Write_String("4");
    else
        Lcd_Write_String("*");
    return '4';
}
if (Y_2 == 0) {
    delay(100);
    while (Y_2 == 0);
    if (status == 0)
        Lcd_Write_String("5");
    else
        Lcd_Write_String("*");
    return '5';
}
if (Y_3 == 0) {
    delay(100);
    while (Y_3 == 0);
    if (status == 0)
        Lcd_Write_String("6");
    else
        Lcd_Write_String("*");
    return '6';
}
if (Y_4 == 0) {
    delay(100);
    while (Y_4 == 0);
```

```
    if (status == 0)
        Lcd_Write_String("B");
    else
        Lcd_Write_String("*");
    return 'B';
}

X_1 = 1;
X_2 = 1;
X_3 = 0;
X_4 = 1;
if (Y_1 == 0) {
    delay(100);
    while (Y_1 == 0);
    if (status == 0)
        Lcd_Write_String("1");
    else
        Lcd_Write_String("*");
    return '1';
}
if (Y_2 == 0) {
    delay(100);
    while (Y_2 == 0);
    if (status == 0)
        Lcd_Write_String("2");
    else
        Lcd_Write_String("*");
    return '2';
```

```
}
if (Y_3 == 0) {
   delay(100);
   while (Y_3 == 0);
   if (status == 0)
      Lcd_Write_String("3");
   else
      Lcd_Write_String("*");
   return '3';
}
if (Y_4 == 0) {
   delay(100);
   while (Y_4 == 0);
   if (status == 0)
      Lcd_Write_String("C");
   else
      Lcd_Write_String("*");
   return 'C';
}

X_1 = 1;
X_2 = 1;
X_3 = 1;
X_4 = 0;
if (Y_1 == 0) {
   delay(100);
   while (Y_1 == 0);
   if (status == 0)
```

```
        Lcd_Write_String("*");
    else
        Lcd_Write_String("*");
    return '*';
}
if (Y_2 == 0) {
    delay(100);
    while (Y_2 == 0);
    if (status == 0)
        Lcd_Write_String("0");
    else
        Lcd_Write_String("*");
    return '0';
}
if (Y_3 == 0) {
    delay(100);
    while (Y_3 == 0);
    if (status == 0)
        Lcd_Write_String("#");
    else
        Lcd_Write_String("*");
    return '#';
}
if (Y_4 == 0) {
    delay(100);
    while (Y_4 == 0);
    if (status == 0)
        Lcd_Write_String("D");
```

```
        else
            Lcd_Write_String("*");
        return 'D';
    }

    return 'n';
}

int get_num(char ch) //converting character into integer
{
    switch (ch) {
        case '0': return 0;
            break;
        case '1': return 1;
            break;
        case '2': return 2;
            break;
        case '3': return 3;
            break;
        case '4': return 4;
            break;
        case '5': return 5;
            break;
        case '6': return 6;
            break;
        case '7': return 7;
            break;
        case '8': return 8;
```

```
            break;
        case '9': return 9;
            break;
    }
}

char keypad_read(void) // Get key from user
{
    char key = 'n'; // Assume no key pressed
    while (key == 'n') // Wait untill a key is pressed
    key = keypad(); // Scan the keys again and again
    return key; //when key pressed then return its value
}
```