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MICRO CONTROLLER BASED BANK LOCKER SAFETY SYSTEM USING DIGITAL KEY PASSWORD WITH DOOR ACCESS FACILITY

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Abstract: The password-based door lock system is the device that has been developed to enhance the security of a place concerned where the entry of unauthorized individuals is restricted. The device works with the help of a microcontroller that has been set in such a way so as to respond to a certain binary code only. In this password-based door lock system when the authorized user types a certain password with the help of a keypad, the microcontroller checks it with the code it is supposed to compare with. If the entered code is correct it sends the signal to the gate to open, if the entered code is wrong then it would activate the theft alarm. Today's modern world, security plays an important role. Every person has precious accessories like gold, jewelry or cash. It is not enough to have these accessories, but security of this is very important, for this purpose we keep them in bank lockers. Still we often hear or read in newspaper that some fake person has access the locker of another person and have stolen money. In order to overcome this type of frauds, authentication of the person who wants to use the locker is very important

***Index Terms* – Micro controller AT89S8253, Voltage Regulator-LM7805, ULN 2803, Keypad, Solenoid, Rectifier**

I. Introduction

Most of us like to keep our valuables in bank lockers rather than at home. Bank lockers are considered to be the safest place to store valuable jewellery, important documents, certificates or the things precious to you. Both the public and private sector banks offer locker facility to individuals for annual charges of Rs1,000 to Rs10,000 depending upon the size you opt for safety has become an essential issue for most of the people especially in the urban areas. Some people will try to steal the property which may endanger the safety of money in the bank, house and office. To overcome the security threat, most people must install bunch of locks or alarm system. There are many types of alarm system available in the market which utilizes different types of sensors. The sensor system may not be good for all the time because it can detect different types of changes in the surrounding and the changes will be processed to be given out alert according to the pre-set value.

Today's modern world, security plays an important role.

- Every person has precious accessories like gold, jewellery or cash.
- It is not enough to have these accessories, but security of this is very important, for this purpose we keep them in bank lockers.
- Still, we often hear or read in newspaper that some fake person has access the locker of another person and have stolen money.
- In order to overcome this type of frauds, authentication of the person who wants to use the locker is very important. Introduction

Objectives Banks offer locker facilities to individuals as and when required Both public as well as private sector banks offer this facility to needy individuals for a small annual fee These lockers are maintained in a secure facility that is under constant surveillance and security There are several advantages of availing a bank locker, a few best ones are listed as follows:

- Softy.
- Easy access.
- Available in any bank branch.
- Anyone can avail.

II. AT89S8253 MICRO CONTROLLER

The AT89S8253 microcontroller is the most used microcontrollers in the industry and many other applications. This controller is very convenient to use, in terms of coding, debugging and programming of this controller. One of the main advantages is that it can be written-erased as many times as possible because it uses FLASH memory technology.

It has Following Features.

- 12Kb of Flash Memory for storing programs.
- Program is loaded via SPI System (Serial Peripheral Interface).
- Program may be loaded/erased up to 1000 times.
- 2Kb of EEPROM Memory.
- Power supply voltage: 4-6V.
- Operating clock frequency: 0-24MHz.
- 256 bytes of internal RAM for storing variables.
- 32 input/output pins.
- Three 16-bit timers/counters.
- 9 interrupt sources.
- 2 additional power

III. MAJOR COMPONENTS

1. Transformer

Transformer is a static electrical device that transfers energy by inductive coupling between its winding circuits. A varying current in the primary winding creates a varying magnetic flux in the transformer's core and thus a varying magnetic flux through the secondary winding. This varying magnetic flux induces a varying electromotive force (EMF), or "voltage", in the secondary winding.

In short transformer is electromagnetic device that transmit power from one active coil to another coil without changing the frequency.

Transformers range in size from a thumbnail-sized coupling transformer hidden inside a stage microphone to huge units weighing hundreds of tons used in power plant substations or to interconnect portions of the power grid. All operate on the same basic principles, although the range of designs is wide. While new technologies have eliminated the need for transformers in some electronic circuits, transformers are still found in many electronic devices. Transformers are essential for high-voltage electric power transmission, which makes long-distance transmission economically practical

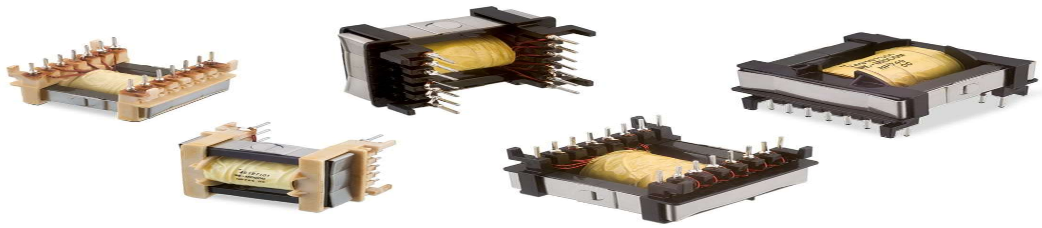

Fig 1 - Transformer

2. **Rectifier**

A rectifier is an electrical device that converts alternating current (AC), which periodically reverses direction, to direct current (DC), which flows in only one direction. The process is known as rectification.

The simple process of rectification produces a type of DC characterized by pulsating voltages and currents (although still unidirectional

2.1. Half wave Rectifier

In half wave rectification of a single-phase supply, either the positive or negative half of the AC wave is passed, while the other half is blocked. Because only one half of the input waveform reaches the output, mean voltage is lower. Half-wave rectification requires a single diode in a single-phase supply, or three in a three-phase supply. Rectifiers yield a unidirectional but pulsating direct current; half-wave rectifiers produce far more ripple than full-wave rectifiers, and much more filtering is needed to eliminate harmonics of the AC frequency from the output

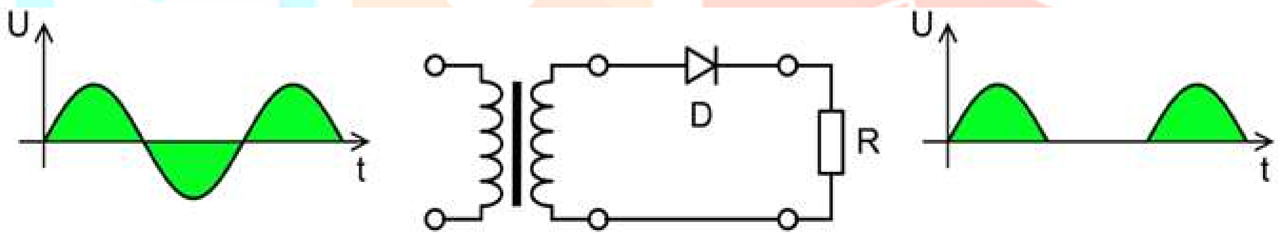

Fig 2 – Half wave rectifier

2.2. Full wave rectifier

A full-wave rectifier converts the whole of the input waveform to one of constant polarity (positive or negative) at its output. Full-wave rectification converts both polarities of the input waveform to DC (direct current), and yields a higher mean output voltage. Two diodes and a center tapped transformer, or four diodes in a bridge configuration and any AC source (including a transformer without center tap), are needed. Single semiconductor diodes, double diodes with common cathode or common anode, and four-diode bridges, are manufactured as single components.

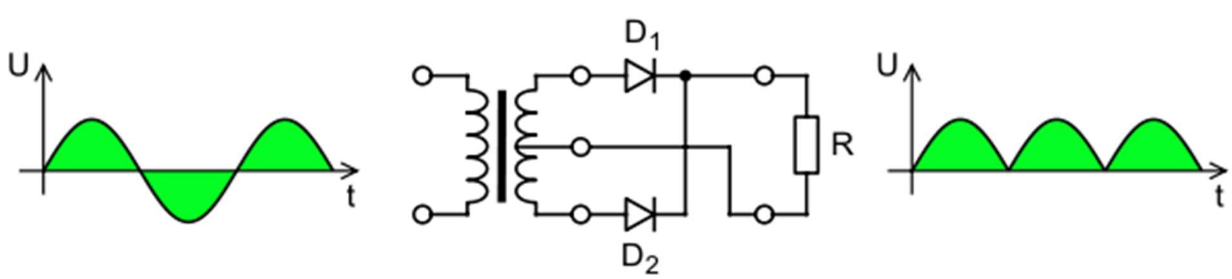

Fig 3 – Full wave rectifier

3. CAPACITOR

The function of capacitors is to store electricity, or electrical energy. The capacitor also functions as filter, passing AC, and blocking DC. The capacitor is constructed with two electrode plates separated by insulator. They are also used in timing circuits because it takes time for a capacitor to fill with charge. They can be used to smooth varying DC supplies by acting as reservoir of charge.

The capacitor's function is to store electricity, or electrical energy. The capacitor also functions as a filter, passing alternating current (AC), and blocking direct current (DC). This symbol (⊣⊢)is used to indicate a capacitor in a circuit diagram. The capacitor is constructed with two electrode plates facing each other but separated by an insulator.

When DC voltage is applied to the capacitor, an electric charge is stored on each electrode. While the capacitor is charging up, current flows. The current

will stop flowing when the capacitor has fully charged.

Fig 4 – Capacitor

4. LM7805

The LM7805 is a voltage regulator that outputs +5 volts.

Like most other regulators in the market, it is a three-pin IC; input pin for accepting incoming DC voltage, ground pin for establishing ground for the regulator, and output pin that supplies the positive 5 volts.

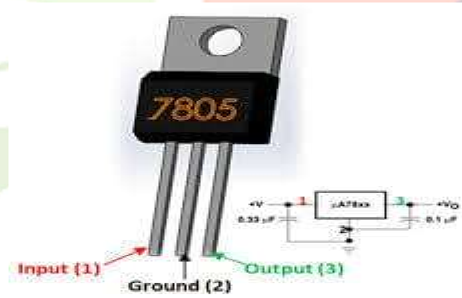

Fig 5 – LM7805

5. LCD - Liquid Crystal Display

LCD (Liquid Crystal Display) screen is an electronic display module and find a wide range of applications. A 16x2 LCD display is very basic module and is very commonly used in various devices and circuits. These modules are preferred over seven segments and other multi segment LEDs. The reasons being: LCDs are economical; easily programmable; have no limitation of displaying special & even custom characters (unlike in seven segments), animations and so on.

A 16x2 LCD means it can display 16 characters per line and there are 2 such lines. In this LCD each character is displayed in 5x7 pixel matrix. This LCD has two registers, namely, Command and Data. The command register stores the command instructions given to the LCD. A command is an instruction given to LCD to do a predefined task like initializing it, clearing its screen, setting the cursor position, controlling display etc. The data register stores the data to be displayed on the LCD. The data is the ASCII value of the character to be displayed on the LCD.

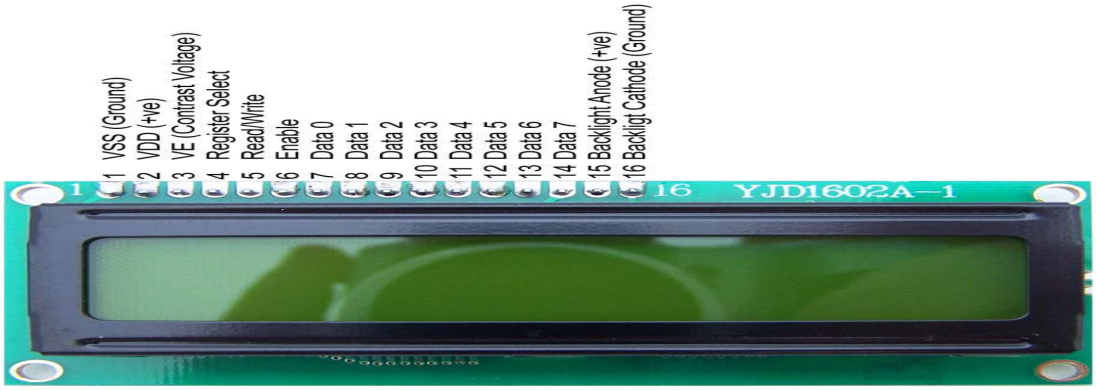

Fig 6 – LCD

6. **ULN2803**

This chip takes low level input signals (TTL) and use that to switch/turn off the higher voltage loads that is connected to the output side

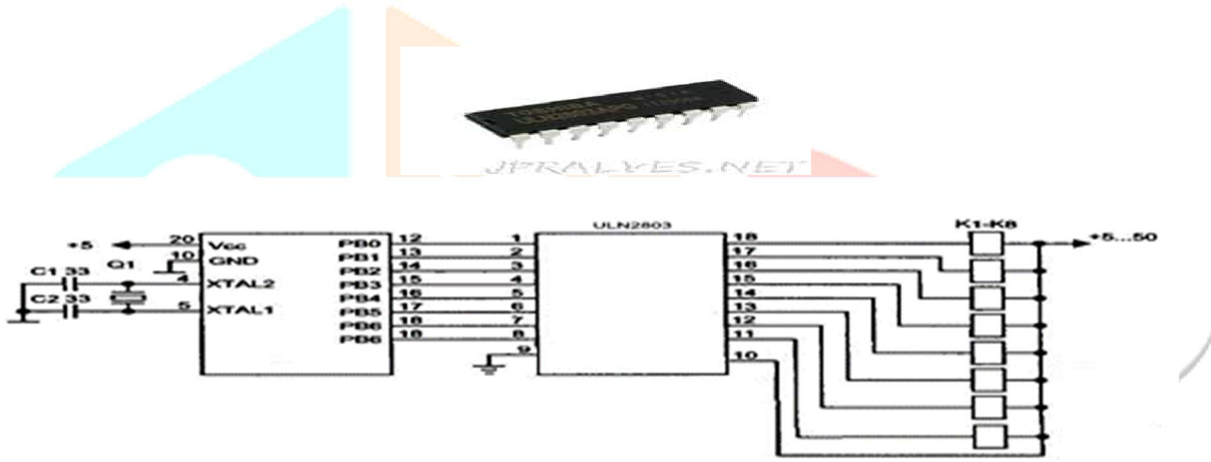

Fig 7- ULN2803

IV. BLOCK DIAGRAM

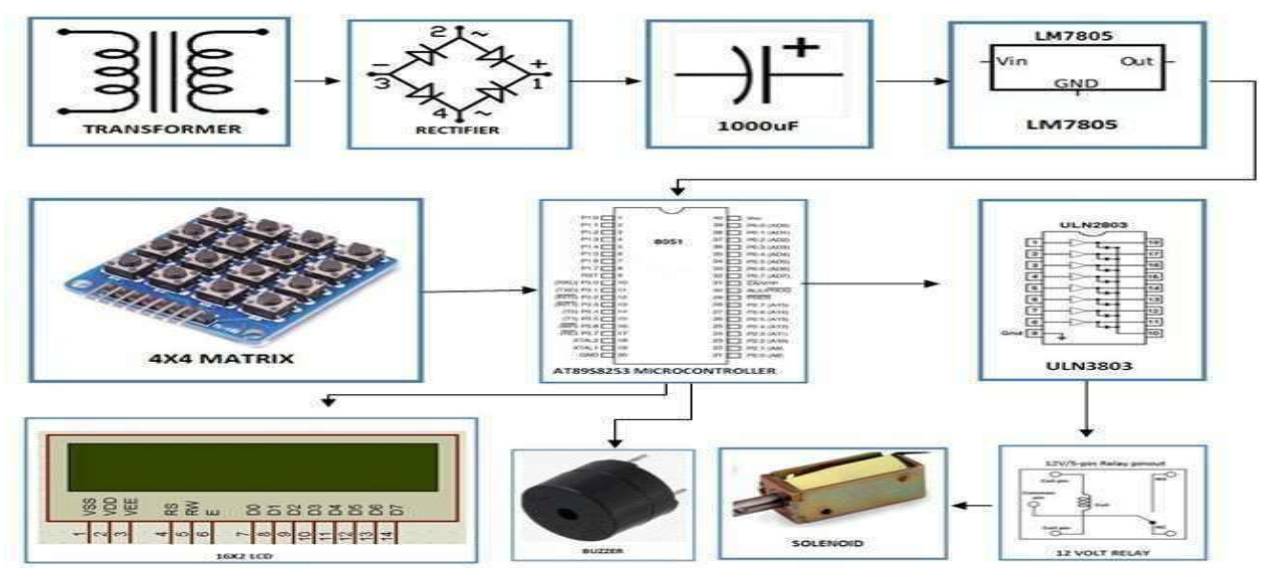

Fig 8- BLOCK DIAGRAM

V. CODE

```
sbit LCD_RS at P2.B0;
sbit LCD_EN at P2.B1;
sbit LCD_D7 at P2.B5;
sbit LCD_D6 at P2.B4;
sbit LCD_D5 at P2.B3;
sbit LCD_D4 at P2.B2;
// end lcd definitions

void keypad ()
     {

     {

      case  1: kp = 49; break; // 1        // Uncomment this block for keypad4x4
      case  2: kp = 50; break; // 2
      case  3: kp = 51; break; // 3
      case  4: kp = 65; break; // A
      case  5: kp = 52; break; // 4
      case  6: kp = 53; break; // 5
      case  7: kp = 54; break; // 6
      case  8: kp = 66; break; // B
      case  9: kp = 55; break; // 7
      case 10: kp = 56; break; // 8
      case 11: kp = 57; break; // 9
      case 12: kp = 67; break; // C
      case 13: kp = 42; break; // *
      case 14: kp = 48; break; // 0
      case 15: kp = 35; break; // #
      case 16: kp = 68; break; // D

     }
}

void change (int k)              // this function will change the password where
k stores the address of the first code of the password
     {
     int j;
     for (j=1;j<=3;j++)
              {
              keypad ();
              Eeprom_write (k+j,kp);
              Lcd_out (2,j,"*");
              }
     }

void read(int g) // will read the password stored where g stores the address of
the first code of the password
          {

         a=Eeprom_read (g);
         b=Eeprom_read (g+1);
         c=Eeprom_read (g+2);
         }

void main() {
     int i;
     int first,second, third;

     p1_1=1;
     start:
     first=20;
     second=20;
     third=20;

  Keypad_Init();                            // Initialize Keypad
  Lcd_Init();                               // Initialize LCD
  Lcd_Cmd(LCD_CLEAR);                       // Clear display
  Lcd_Cmd(LCD_CURSOR_OFF);                  // Cursor off
```

```
  do {
    i=2;

    if (third!=20) // when the third button is pressed
        {
        read (60); // read the master password
        if ((first ==a ) && (second == b) && (third ==c)) //match the password
with the master password
            {
            p1_1=0; // open the door
            Lcd_cmd (lcd_clear); // clear the lcd
            keypad ();
            if (kp==35) //if * is pressed for changing the master password
                    {

                    Lcd_Cmd (Lcd_clear);
                    Lcd_chr (1,1,'p');
                    change(59);
                    }
            if (kp==42) // if # is pressed for changing the password of any user
                {
                lcd_chr (1,1,'u');
                keypad();       //  enter  the  user  number
                 lcd_chr (1,5,kp); // print the user number
                 delay_ms (1000);
                 kp=kp-48;       // calculation of the address where the password is
saved
                 i=kp;
                 i=i-1;
                 i=i*3;
                 i++;
                 change (i); // change the password
                 }
            p1_1=1;
            i=11;
            }

        while (i<10)
          {

          read (i); // read the password of i the user
            if ((first==a) && (second == b) && (third == c)) // match password
                {
                p1_2=1; // switch off the buzzer
                p1_1=0; // open the gate
                Lcd_chr (2,1,'o');
                keypad();           // wait for any other button to be pressed
                if (kp==35) //if it is * then change the password of ith user
                    {
                    Lcd_Cmd (Lcd_clear);
                    Lcd_out (1,1,"p");
                    change(i-1);
                    }
                i=11;
                p1_1=1;// close the door
                }
             else
                 {
                 p1_2=0;// if wrong password is entered then switch on the buzzer
                 lcd_out (2,1,"l");



                 }
          i=i+3;
          }
                 delay_ms (2000);
```

```
                p1_2=1;
        goto start;
        }

        keypad();      // wait for any button to be pressed

    if ((second = 20) && (third =! 20)) // satisfies when the third button is
pressed
        {
        third=kp;
        Lcd_out (1,3,"*");
        delay_ms (1000);
        }

    if ((first = 20) && (second != 20))  // satisfies when the second button is
pressed
        {
        second=kp;
        Lcd_out (1,2,"*");
        }

    if (first = 20)  // satisfies when the first button is pressed
        {
        first=kp;
        Lcd_out (1,1,"*");
        }

  } while (1);
}
```

VI. TESTING

- Connect the black terminal of the Digital Multimeter to the ground of the supply source and turn the knob to 20V DC voltage.
- Make sure the knoch of all the IC's including microcontroller are same as given above.
- Check the continuity and short circuit of the PCB's.
- Check the voltages at pin o (output) of 7805 and it should be +5 volts.
- Check the voltage at pin 40 and 31 of the microcontroller it should be +5 volts.
- Check the voltage at pin 1 and 9 of L293D IC it should be +5 volts
- Check the voltage at pin 8 and 16 of L293D IC it should be +12 volts
- Check the voltage at pin 2 and pin 15 of the LCD, It should be +5V
- Now enter the password, and then check the door which is connected to the H-Bridge for opening and closing then the whole system is working properly
- Caution: make sure that the orientation of LCD is correct. The orientation of 7805 IC should be correct. If all the above parameters are met, then the testing part is complete and we can run our Project

VII. WORKING

POWER SUPPLY: The input is 230V AC which is step down using the transformer (12-0- 12) .The 12V ac input is fed to the bridge diode to gives 12V pulsating DC. This DC voltage is filtered through the capacitor to remove the ripples. The filtered DC is fed to 7805 regulator to fetch +5v regulated output.

This regulated voltage is given to all the components to function properly.

In this project we have used a 16 bit keypad to take the input from any user. The button pressed by any user is read by the micro controller through port 0.

The micro controller checks the password and displays the result of LCD. It controls the door locking or closing by a motor driver which uses a motor driver L2939D connected to the microcontroller pin

VIII. RESULT

The project "MICRO CONTOLLER BASED BANK LOCKER SAFETY SYSTEM USING DIGITAL KEY PASSWORD WITH DOOR ACCESS FACILITY" was designed such that it helps to enhance the security of a place concerned where the entry of unauthorized individuals is restricted.

1. **WHEN PASSWORD IS CORRECT**
   In this password-based door lock system when the authorized user types a certain password with the help of a keypad, the microcontroller checks it with the code it is supposed to compare with. If the entered code is correct it sends the signal to the gate to open then gate will open.

Fig 9- WHEN PASSWORD IS CORRECT

2. WHEN PASSWORD IS INCORRECT

In this password-based door lock system when the authorized user types a certain password with the help of a keypad, the microcontroller checks it with the code it is supposed to compare with, if the entered code is wrong then it would activate the theft alarm.

Fig 10- WHEN PASSWORD IS INCORRECT

IX. CONCLUSION

Integrating features of all the hardware components used have been developed in it. Presence of every module has been reasoned out and placed carefully, thus contributing to the best working of the unit. Thus the project has been successfully designed and tested

X. FUTURE SCOPE

This Password-Based Door Lock System Circuit is helpful in factories and laboratories where there are security concerns. It would help in protecting the stored material from unauthorized misuse or from being stolen. Our interface is an advanced design of the interface in which the user can open the gate by entering his assigned correct password. The user can change his password also. The system supports multiple users and each user has its unique password.

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