"ADVANCE ELECTROMAGNET SECURITY SYSTEM WITH GSM INTERFACE"

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ABSTRACT

The Electromagnet Door Lock is a lock that is simple to install and allows the user to easily lock and unlock doors. It will contain a Electromagnet driver and a magnetic door lock for simple use. All the user will need is an Electromagnet tag to be able to unlock and lock the door. A LCD will be used to let the user know when the door is in fact locked. The components included in the module are small and compact. Additionally, the door lock is simple and easy to install. It does not require the consumer to disassemble the door or door frame as the door lock are merely attachments. This is also leaves the consumer with the option of using their original lock and key if they so choose. All in all, this Electromagnet door lock should be a simple and cost effective upgrade to the average consumer's security and convenience.

CHAPTER 1

INTRODUCTION:

1.1 Problem Overview:

The increasing rate of crime, attacks by thieves, intruders and vandals,despite all forms of security gadgets and locks still need the attention of researchers to find a permanent solution to the well being of lives and properties of individuals. To this end, we design a cheap and effective security system for buildings, cars, safes, doors and gates, so as to prevent unauthorized person from having access to ones properties through the use of codes, we therefore experiment the application of electronic devices as locks. However, a modular approach was employed in the design in which the combination lock was divided into units and each unit designed separately before being coupled

1.2 Aim of Project:

Due to the advancement of science and technology throughout the world, there is a consequent increase in the rate and sophistication of crime As a result, it is necessary to ensure security of oneself and one's valuable belongings. Even with the use of mechanical locks, the crime rate still has increased due to the fact that these locks are easily broken. Consequently, there is a need for other types of locks especially electromagnet ones.

1.3Objective of Project:

Therefore, the main objectiveof the project design are:

- To design a economical and effective security system for buildings, offices, safes, doors and gates etc.,
- To experiment the application of electromagnetic devices as locks, and
- To prevent unauthorized person from having access to ones properties through the use of code
- Sophisticated to easy locking and unlocking

1.4 Sub Objectives of the Project:-

1. To Study Working of Electromagnetic Materials:

In this project we will study the actual working of electromagnetic materials. We will also study that how much holding force we have to apply on electromagnetic stamping to get required appropriate output.

2. Selection of Appropriate Components Required:

In this part of the system we will select the components required of specific and appropriate ratings such as rectifier, filter, regulator, inverter, etc.

3. Design of Block And Circuit Diagram:

The another objective of our project is to study and design block diagram and circuit for proposed system.

4. Overall Reduced Cost:

To reduce the cost for safety purpose besides increasing the efficiency of proposed the system.

1.5 Outlines of the Dissertation:

Chapter 2- Literature Review:

Chapter 3- Objective Completed: Out of the above mention objectives, till we are able to complete the some objectives only.

Chapter 4- Significance of Topic: Importance.

Chapter 5– Principle of Operation: The working principle of the Electromagnetic door lock system is mentioned.

Chapter 6- Project Development Stages: The information about how to develop the project.wise description of project development.

Chapter 7- Hardware Design: The information about the hardware completed by us.

Chapter 8- Controller Design: The controller used by us and its specifications.

Chapter 9- Block Diagram Description: This chapter gives description of block diagram for system.

Chapter 10- Hardware Design Circuitry:

Chapter 11-COMPERATIVE TESTING RESULTS: comparison of previous results and after hardware results obtained

Chapter 12- Advantages and Disadvantages: Advantages and disadvantages.

Chapter 13- Applications:

Chapter 14- Conclusion:

Chapter 15- Future scope:

Bibliography

CHAPTER 2

LITERATURE REVIEWS

1]Design, Development and Testing of an Electromagnet for magnetic levitation System ByDahiruSaniShu'aibu and SanusiSaniAdamu Department of Electrical Engineering Bayero University, Kano Nigeria.

This paper presents details of the design and development of an electromagnet for use in magnetic door lock control system experiment. The method is purely based on numerical approach. Cast steel was used as the material, because of its high permeability and fairly good coercivity. The genesis for the design is based on the phenomenon of holding

power of a magnet. The design was implemented using a local available component; the electromagnet was able to holds great amount of force by varying the current through the winding of the magnet. In the final analysis, the electromagnet was designed and built with a cost saving value. The electromagnet designed for different holding forces by taking a current. The force constant of the magnet was determined.

2]We used SECO-LARAM Electromagnet lock manual for design part of electromagnet from reference books.

The electromagnetic locks is the ideal way to secure a door against unauthorized entry. When power is applied to the electromagnetic lock, it creates an extremely strong magnetic field. The electromagnet is strongly attracted to the steel armature plate which is mounted on the secured door. Once the electromagnet is deactivated, the secured door will function normally without any residual magnetism.

3]International Journal of Embedded Systems and Applications (IJESA) Vol.2, No.2, June 2012 DOI : 10.5121/ijesa.2012.2201 1

Development of Low Cost Private Office Access Control System(OACS) Sadeque Reza Khan Prime University, Department of Electrical and Electronic Engineering, Dhaka-1216, Bangladesh .

Over the years, access control systems have become more and more sophisticated and several securitymeasures have been employed to combat the menace of insecurity of lives and property. This is done bypreventing unauthorized entrance into buildings through entrance doors using conventional and electroniclocks, discrete access code, and biometric methods such as the finger prints, thumb prints, the iris andfacial recognition. We have designed a flexible and low cost modular system based on integration of

keypad, magnetic lock and a controller. PIC 16F876A which is an 8-bit Microcontroller, is used here as amain controller. An advanced simulation based compiler Flowcode V4 is used to develop the software partin this project.

4]The block diagram, block diagramdescription, flowchart ,algorithm referred from paper reference journal .We referred the electromagnet pdf for advantages, disadvantages, and application. We use the A.K.SWANEY reference book for calculation and design part of electromagnet

CHAPTER 3

OBJECTIVES COMPLETED

1.To Design Electromagnet Stamping To Create Holding Force:

To create holding force by using electromagnetic material and systems can be install elsewhere specially in the dense populated areas easily.

2. To Study the working of Electromagnetic Materials:

In this type of material magnetic field is produced by flow of electric current. It is used electricity to produced magnet force. The main advantages of an electromagnet over a permanent magnet are that the magnetic field can be rapidly manipulated over wide range by controlling the amount of electric current.

3. Design of all Circuitry Required for Electromagnetic Lock System:

All the circuits required for electromagnetic lock system are design.

4. To Reduce overall cost of system:

The overall cost of system can be reduced as we are using less power input for the system and also the cost of the components required to make the electromagnetic lock is low and so of the system.

CHAPTER 4

SIGNIFICANCE OF TOPIC

4.1Significance of Topic:

1.The goal of the project is to develop a unique system through mobile technology,which can control various units of the houses, industries, and also provides a security system.

2. The various appliances can be utilized by managing them remotely by using GSM technology, which enables the user to remotely controlthe operations of the appliances.

3. Just by pressing keypad of remote telephonethe user can perform ON/OFF operations on the appliances.

4. Unlock the door by using pre-decided password.

5. Increase the security level to prevent an unauthorized unlockingof the door.

6. To prevent the opening of the door by unauthorized persons.

7. Flexibility to the user to change or reset the password

8. More secure yet cost-efficient way of door locking-unlocking system.

9. Contains a matrix key pad, door system and a GSM modem for the security dial up interfaced to the micro controller.

10.The keypad interfaced to the controller is used as the password entry.

11. As soon as the user enters the correct password, the door lock opens.

4.2Constraints or Difficulties Faced:

1.Design of electromagnet winding:

While Designing the Electromagnet of required high holding force, SWG of the conductor should be large. As SWG of conductor is greater thendiameter of conductor get reduced, so it will going difficult to making winding of electromagnet.

CHAPTER 5

PRINCIPLE OF OPERATION

Concept of Electromagnetism:

Electromagnetism is the production of a magnetic field by current in a conductor.

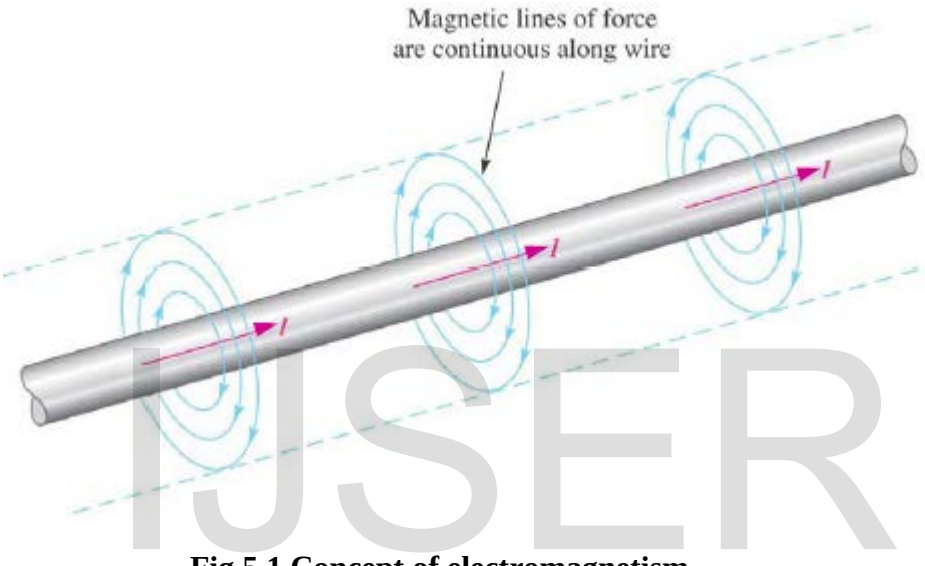


Fig 5.1 Concept of electromagnetism

The **right-hand rule** is used to determine the direction of the lines of force

Principle:

The principle behind an electromagnetic lock is the use of electromagnetism to lock a door when energized. The holding force should be collinear with the load and the lock and armature plate should be face-to-face to achieve optimal operation.

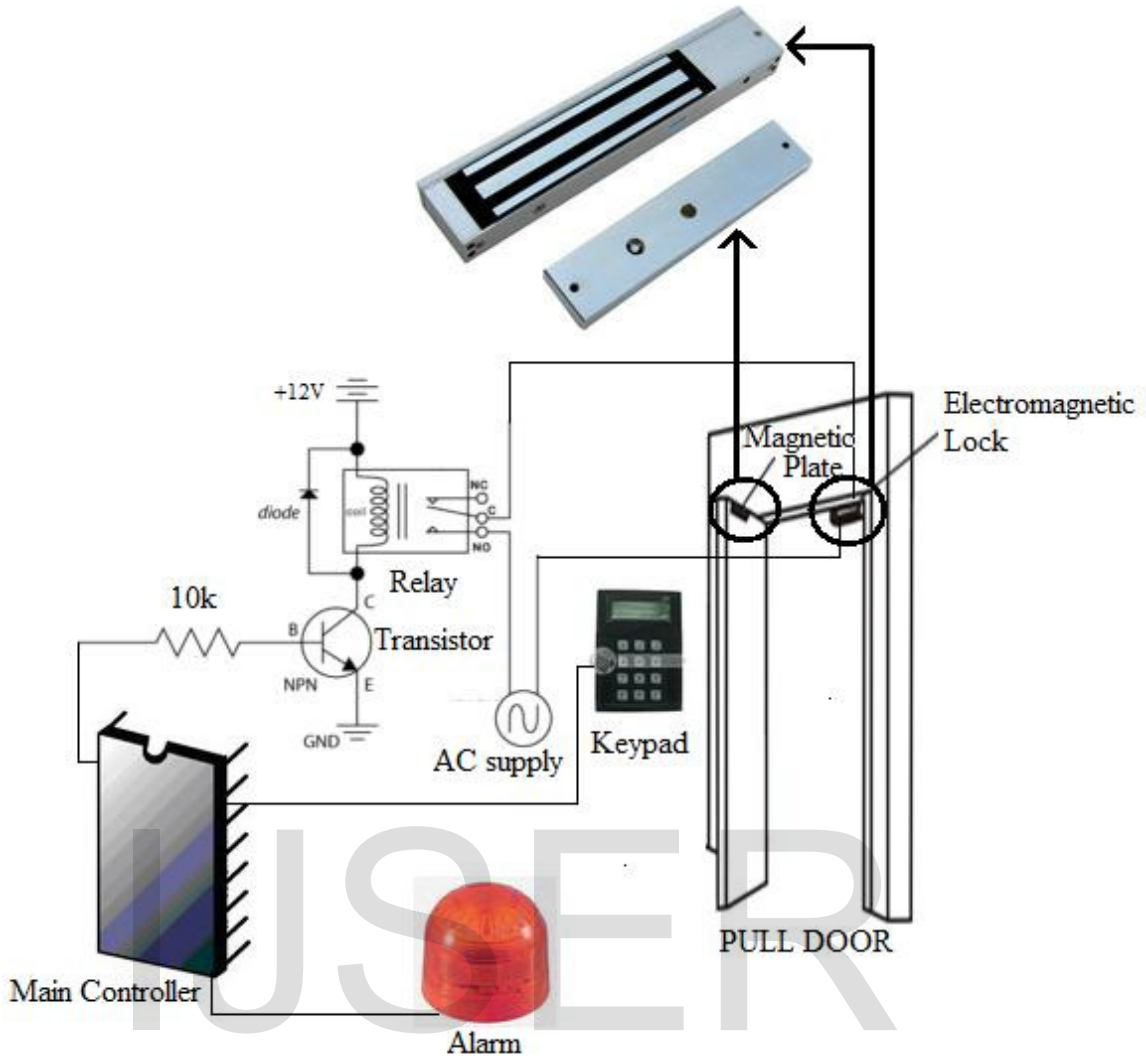


Fig 5.2 Working of electromagnetic door lock.

Operation:

An electromagnetic lock, magnetic lock, or maglock is a locking device that consists of an electromagnet and an armature plate. There are two main types of electric locking devices. Locking devices can be either "fail safe" or "fail secure". A fail-secure locking device remains locked when power is lost. Fail-safe locking devices are unlocked when de-energized. Direct pull electromagnetic locks are inherently fail-safe. Typically the electromagnet portion of the lock is attached to the door frame and a mating armature

plate is attached to the door. The two components are in contact when the door is closed. When the electromagnet is energized, a current passing through the

electromagnet creates a magnetic flux that causes the armature plate to attract to the electromagnet, creating a locking action. Because the mating area of the electromagnet and armature is relatively large, the force created by the magnetic flux is strong enough to keep the door locked even under stress.Typical single door electromagnetic locks are offered in 200kg. dynamic holding force capacities. A "fail safe" magnetic lock requires power to remain locked and typically is not suitable for high security applications because it is possible to disable the lock by disrupting the power supply. Despite this, by adding a magnetic bond sensor to the lock and by using a power supply that includes a battery backup capability, some specialized higher security applications can be implemented. Electromagnetic locks are well suited for use on emergency exit doors that have fire safety applications because they have no moving parts and are therefore less likely to fail than other types of electric locks, such as electric strikes.

The strength of today's magnetic locks compares well with that of conventional door locks and they cost less than conventional light bulbs to operate. There are additional pieces of release hardware installed in a typical electromagnetic locking system. Since electromagnetic locks do not interact with levers or door knobs on a door, typically a separate release button that cuts the lock power supply is mounted near the door. This button usually has a timer that, once the button is pressed, keeps the lock unlocked for either 15 or 30 seconds in accordance with NFPA fire codes. Additionally a second release is required by fire code. Either a motion sensor or crash bar with internal switch is used to unlock to door on the egress side of the door automatically.

CHAPTER 6

PROJECT DEVLOPMENT STAGES

1. Calculation for design of electromagnet:

- Calculate the pole area where the winding to be wounded.
- From the assumption of force we calculate the no. of turns, current and MMF

2. Developmentof Electromagnet:

- We are going to use E-shape CRNO magnetic material.
- Then make stamping of E-shape strips.
- After the making of stamping we wound the winding on middle part of stamping.

3. Development of Electromagnet Driver Circuit:

- By using circuit diagram driver circuit is designed.
- After receiving signal from controller Electromagnet driver circuitwork .
- And gives the 12v supply to the electromagnet

4. Development of Power Supply Circuit:

- By using circuit diagram power supply circuit is designed.
- It provides 5v dc to controller.

5. Connection of LCD, Keypad and Battery:

- Connect the keypad for enter the password.
- Connect LCD to show the door status.
- And battery act as bypass for power supply

6. Controller Design and Its Programming:

- ATMEGA 328 controller selected.
- Programming for door opening

7. Actual Implementation and testing of partial hardware

- Implementation of each circuit n testing of whole system ,work successfully.

CHAPTER 7

HARDWARE DESIGN

7.1 Component Selection:

1. **Power supply**
   - Transformer 230/15V AC.
   - Diode Bridge IN4007
   - Electrolyte Capacitor
   - Voltage Regulator
   - Resistor and LED
2. **Driver Circuit:**
   - Transistor BC547
   - Resistor and LED
3. **Arduino Microcontroller**
   - Advanced RISC Architecture
   - High Performance, Low Power Atmel®AVR® 8-Bit Microcontroller Family
   - 8 bit microcontroller.
   - 28 pin IC, 23 I/p pins.
   - 14 digital I/O pin
   - 8 analog I/P pin
   - Inbuilt PWM
   - Inbuilt ADC
4. **Keypad**
   - Ultra-thin design
   - Adhesive backing
   - Excellent price/performance ratio
   - Easy interface to any microcontroller
   - Example programs provided for the BASIC
5. **Electromagnet Material**

- Electromagnet stamping-E shape CRGO material
- Winding-insulated copper type A supper enamel
- Insulating material-Bobbin .

CHAPTER 8

OVERVIEW OF CONTROLLER

8. 1 OVERVIEW OF CONTROLLER

The Arduino Uno is a microcontroller board based on the ATmega328 (datasheet). It has 14 digital input/output pins (of which 6 can be used as PWM outputs), header, and a reset button. It contains everything needed to support the microcontroller; simply connect it to a computer with a USB cable or power it with a AC-to-DC adapter or battery to get started.

The Uno differs from all preceding boards in that it does not use the FTDI USB-to-serial driver chip. Instead, it features the Atmega16U2 (Atmega8U2 up to version R2) programmed as a USB-to-serial converter.

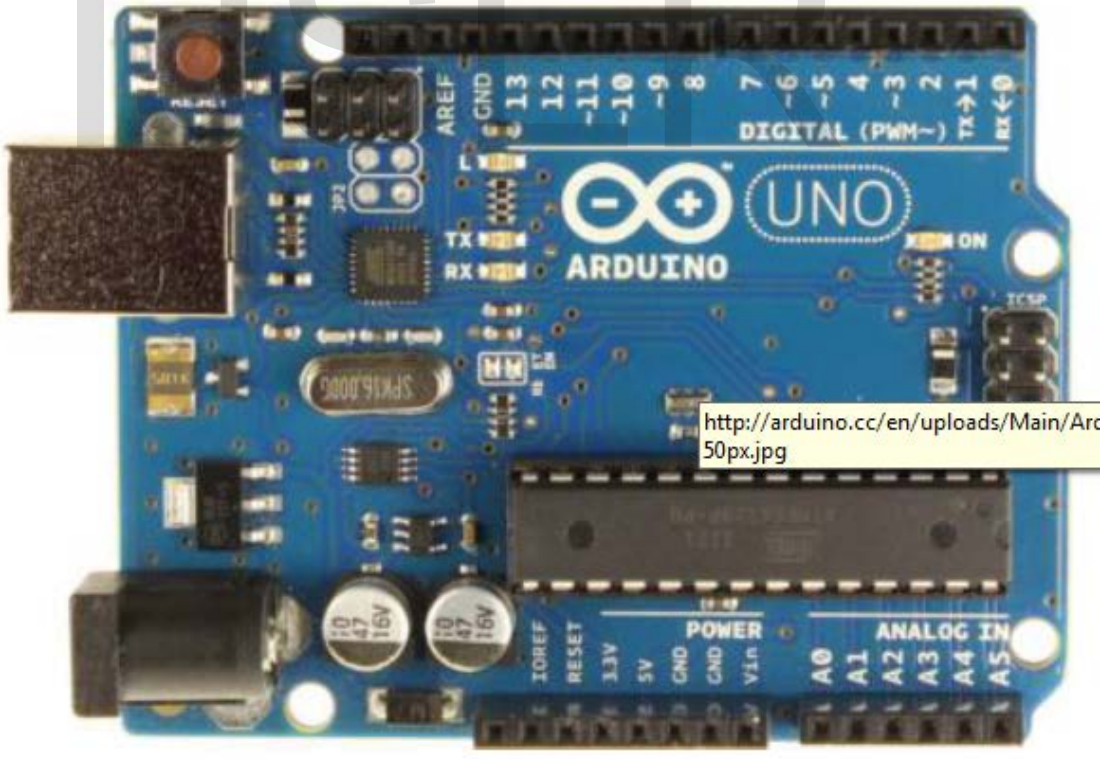


Fig 8.1Overview of Arduino

Board has the following new features:

- 1.0 pinout: added SDA and SCL pins that are near to the AREF pin and two other new pins placed near to the RESET pin, the IOREF that allow the shields to adapt to the voltage provided from the board. In future, shields will be compatible both with the board that use the AVR, which operate with 5V and with the Arduino Due that operate with 3.3V.
- The second one is a not connected pin, that is reserved for future purposes.
- Stronger RESET circuit.
- Atmega 16U2 replace the 8U2.
- "Uno" means one in Italian and is named to mark the upcoming release of Arduino 1.0. The Uno and version 1.0 will be the reference versions of Arduino, moving forward. The Uno is the latest in a series of USB Arduino boards

Summary

Microcontroller	ATmega328
Operating Voltage	5V
Input Voltage (recommended)	7-12V
Input Voltage (limits)	6-20V
Digital I/O Pins	14 (of which 6 provide PWM output)
Analog Input Pins	6
DC Current per I/O Pin	40 mA
DC Current for 3.3V Pin	50 mA
Flash Memory	32 KB (ATmega328) of which 0.5 KB used by bootloader
SRAM	2 KB (ATmega328)
EEPROM	1 KB (ATmega328)
Clock Speed	16 MHz

CHAPTER 9

CONTROLLER DESIGN

9.1 Pin Diagram of controller

Fig 9.1: Pin Diagram of ATMEGA328

9.2 PinDiscription

1. VCC

Digital supply voltage.

2. GND

Ground.

3. Port B (PB7:0) XTAL1/XTAL2/TOSC1/TOSC2

Port B is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port B output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port B pins that are externally pulled low will source current if the pull-up resistors are activated. The Port B pins are tristed.when a reset condition becomes active, even if the clock is not running.

Depending on the clock selection fuse settings, PB6 can be used as input to the inverting Oscillator amplifier and input to the internal clock operating circuit.

Depending on the clock selection fuse settings, PB7 can be used as output from the inverting Oscillator amplifier.

If the Internal Calibrated RC Oscillator is used as chip clock source, PB7...6 is used as TOSC2...1 input for the Asynchronous Timer/Counter2 if the AS2 bit in ASSR is set.

4. Port C (PC5:0)

Port C is a 7-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The PC5...0 outputbuffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port C pins that are externally pulled low will source current if the pull-up resistors are activated. The Port C pins are trites when a reset condition becomes active, even if the clock is not running.

5. PC6/RESET

If the RSTDISBL Fuse is programmed, PC6 is used as an I/O pin. Note that the electrical characteristics of PC6differ from those of the other pins of Port C.

If the RSTDISBL Fuse is programmed, PC6 is used as a Reset input. A low level on this pin for longer than the minimum pulse length will generate a Reset, even if the clock is not running.

6 Port D (PD7:0)

Port D is an 8-bit bi-directional I/O port with internal pull-up resistors (selected for each bit). The Port D output buffers have symmetrical drive characteristics with both high sink and source capability. As inputs, Port D pins that are externally pulled low will source current if the pull-up resistors are activated. The Port D pins are tractates when a reset condition becomes active, even if the clock is not running.

7. AVCC

AVCC is the supply voltage pin for the A/D Converter, PC3:0, and ADC7:6. It should be externally connected to VCC, even if the ADC is not used. If the ADC is used, it should be connected to VCC through a low-pass filter.

Note that PC6...4 use digital supply voltage, VC

8. AREF

AREF is the analog reference pin for the A/D Converter.

9. ADC7:6 (TQFP and QFN/MLF Package Only)

In the TQFP and QFN/MLF package, ADC7:6 serve as analog inputs to the A/D converter. These pins are Powered from the analog supply and serve as 10-bit ADC channels.

CHAPTER 10

BLOCK DIAGRAM DESCRIPTION

10.1 Design of Proposed System:

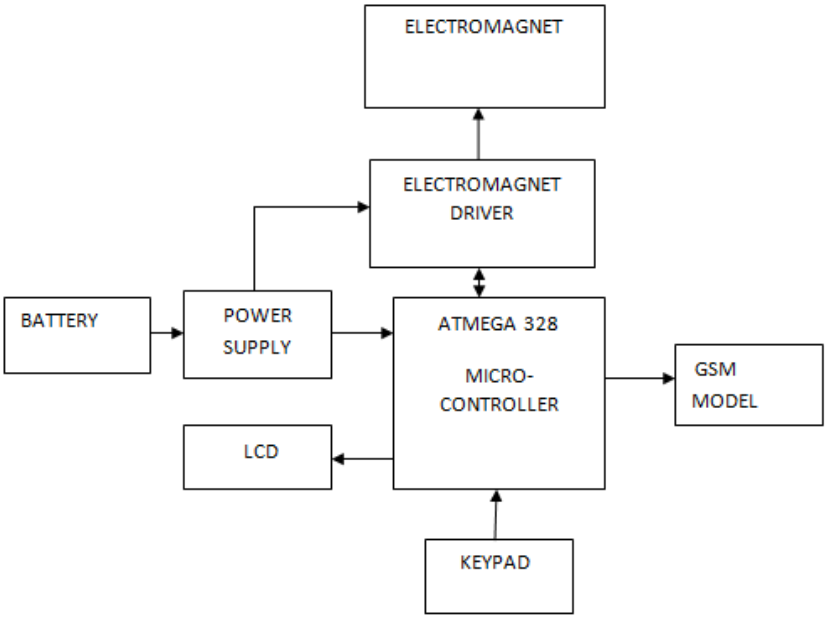


Fig10.1 Block Diagram of Electromagnetic lock system

1. Power Supply:

It consist of single phase 230 volt power supply .For operation of microcontroller and electromagnet we require 5Vand12V DC respectively.

2.Electromagnet driver:

Electromagnet driver block control the on-off operation of electromagnet.

3. Electromagnetic Lock:

The Magnetic lock uses an electrical current to produce aelectromagnetic force. When a current is passed through the coil, the magnet lock becomes magnetized. The door will be securely bonded when the electromagnet is energized holding against the armature plate. The magnetic lock is

Simple locking device that consists of a magnetic lock and armature plate with no moving parts and it purely works due to the magnetic field

5 .Microcontroller:

The control module is built with the microcontroller IC. The central controller is Microchip ATMEGA328 which is an 8-bit Microcontroller with up to eight channels built-in A/D converter and 23 I/O pins . This microcontroller IC manages overall DACS operations. It collects password from keypad, processes password and decides whether it is valid or not. One of the advantages of microcontrollers is low power consumption CMOS technology which makes them flexible for battery powered applications like this project and wide operating voltage range, for example ATMEGA328 operates in a voltage range of 2-5.5 volts. **6.LCD**:

are going to use 16x2 alphanumeric Liquid Crystal Display (LCD) which means it can displayalphabets along with numbers on 2 lines each containing 16 characters.

7. Keypad:

User will enter the password using the keypad

8 GSM:

The system is totally designed using GSM and Bluetooth Module. The Controlling unit has an application program to allow the microcontroller read the incoming data through the modem and control the electromagnet as per the requirement

CHAPTER 11

HARDWARE DESIGN CIRCUITARY

11.1 Power supply circuit:

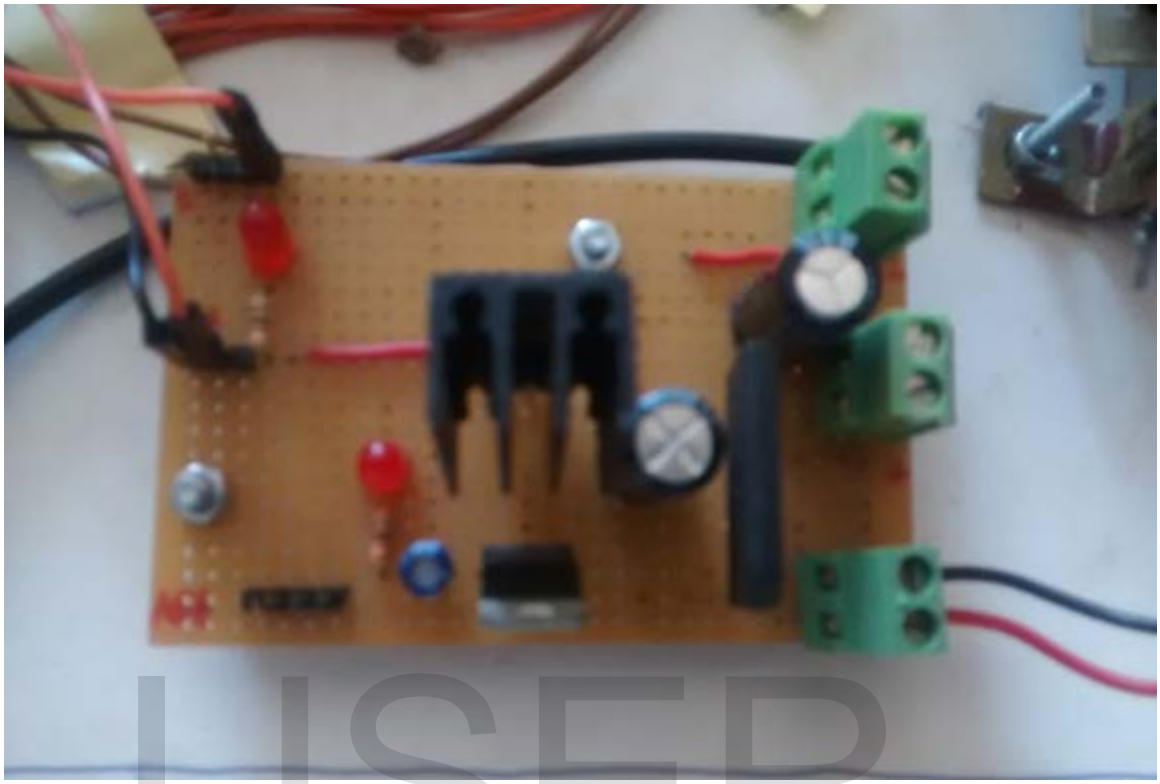


Fig 11.1 power supply circuit

7805&7812 is the 5v,12v respectively fixed two positive voltage regulator IC.The IC has features such as safe operating area protection ,thermal shut down, internal current limiting which makes the IC very rugged. Output currents upto 3Acan be drawn from the IC provided that there is proper heat sink A 15v transformer step down the main voltage,Bridge rectifier rectifies it &capacitor filters it.And 7805&7812 regulate it to produce steady 5v&12v DC.

11.2 Driver circuit:

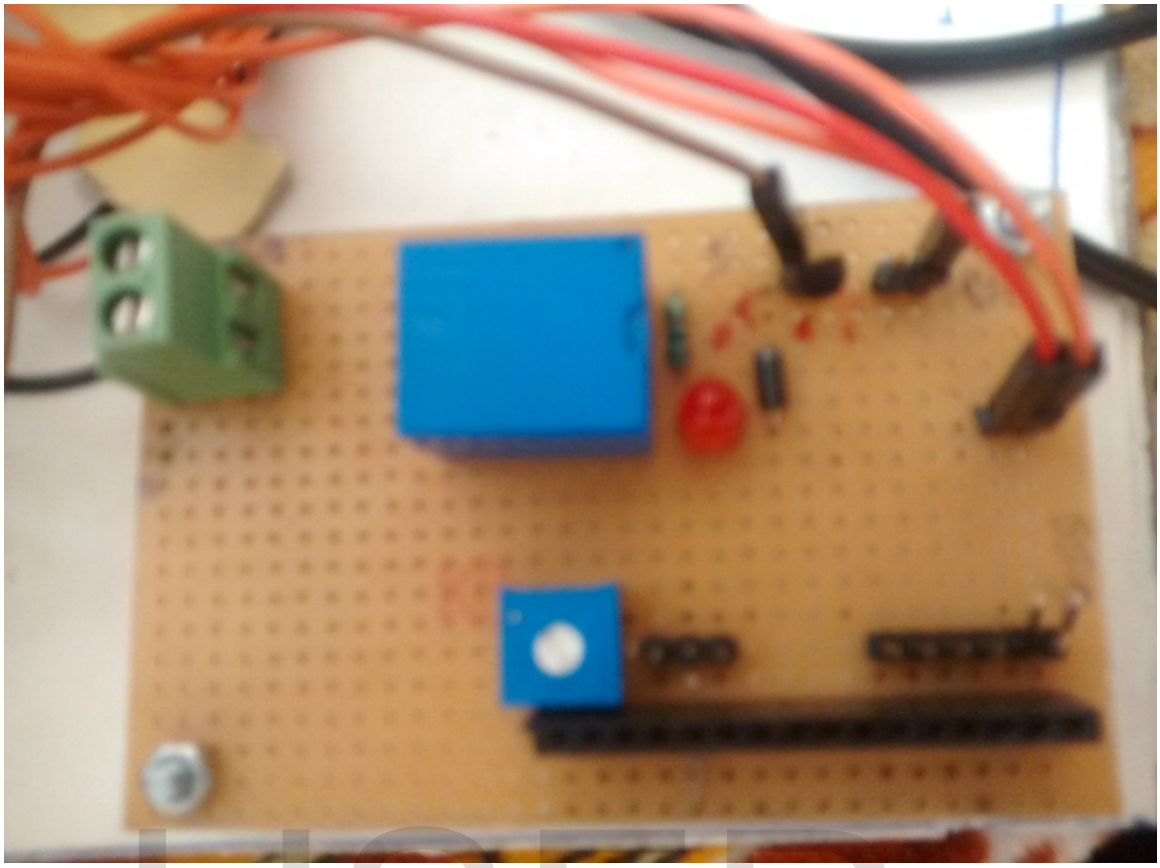


Fig 11.2 Relay driver circuit

In the driver circuit, we use relay,NPN transistor BC547,resistor and LED for the design purpose.Relay driver circuit is used to supply the power to the microcontroller and the electromagnet.

11.3 Electromagnetic Lock

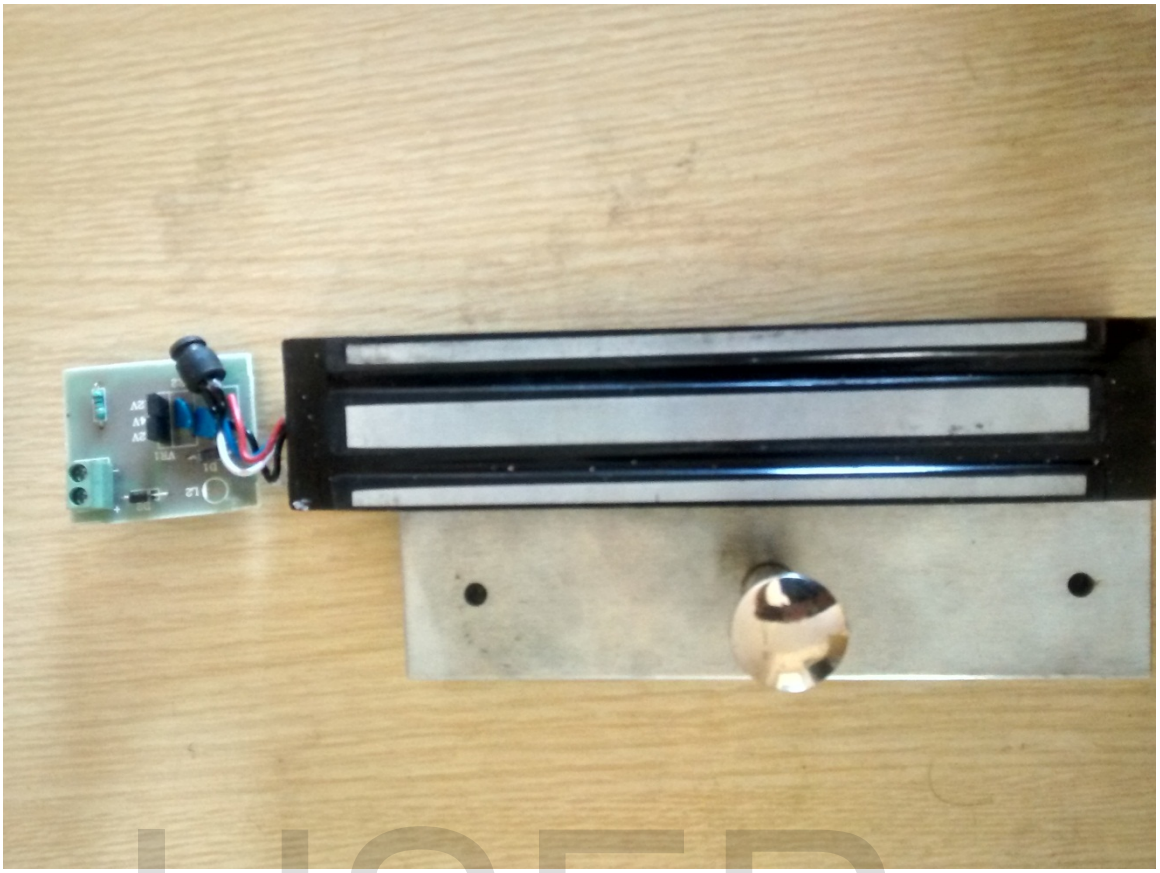


Fig 11.3 Electromagnetic lock

An electromagnetic lock consist of electromagnet and an armature plate.

CHAPTER 12

ADVANTAGES &DISADVANTAGE

❖ADVANTAGES:

- Easy to install: Electromagnetic locks are generally easier to install than other locks since there are no interconnecting parts
- Quick to operate: Electromagnetic locks unlock instantly when the power is cut, allowing for quick releasing in comparison to other locks
- sturdy: magnetic locks may also suffers less damage for multiple blows than do conventional locks if a magnetic lock is forced to open with a crowbar, it will often do little or no damage to the lock or door. There are no moving part in electromagnetic lock to break.
- Fit for wooden door, metal door, glass door, fire proof door etc
- Good quality and durable to use

❖DISADVANTAGES:

- Requires a constant power source in order to be secure.
- Can de-energize in the event of a power outage, disabling security.
- Expensive in comparison to mechanical locks.
- Requires additional hardware for safe operation.

CHAPTER 13

APPLICATION

❖APLLICATION:

- This simple circuit can be used at residential as well as official places to ensure better safety.
- It can be used at organizations to ensure authorized access to highly secured places.

CHAPTER 14

CONCLUSION&FUTURE SCOPE

14.1 CONCLUSION:

Security system nowadays has become an important aspect to human life. As the need was demanding nowadays, this system was built in order to meet the demand in the security system the automatic door lock system was built in order to have user in opening their door without using key.

We have implemented a Electromagnetic door lock security system using electromagnet and GSM. It is low cost, low in power conception, compact in size and standalone system. The microcontroller compares the passwords entered by keypad and received through mobile phone. If these passwords are correct the microcontroller provides necessary control single to open the door lock. The signal will be received.

This concept gives the additional features in security system as well as to help the consumer for more security of their life.

14.2FUTURE SCOPE:

- Future work of this project is planned to a develop security system based on 3Dcamera for visual identification of the person**.**
- Also we planned to develop Face Recognition Based on Auto-Switching magnetic door lock.

APPENDIX A

BRIEF DATA OF PROTOTYPE

A.1 Electromagnet Specifications:

- Dimensions:

  Length=60cm

  Width=2.5cm

  Height= 40cm
- Holding force= 98.1N

A.2Power supply Circuit Specifications:

- Transformer:230/15v,3A
- Diode:IN4007
- Capacitor:470µf,10µf
- Voltage regulator:7805,7812.
- Resistor:330ohm
- Red LED

A.3 Relay Circuit Specifications:

- Trasistor:BC547
- 12v relay
- Red LED

A.4: Calculation for electromagnet:

If the magnetic field is confined within a high permeability material, such as certain steel alloys, the maximum force is given by,

F=B^2A/2µ0 (1.0)

Where:

F is the force in N

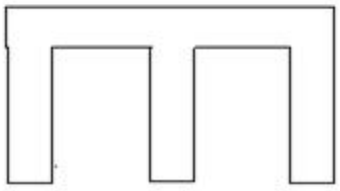
B is the magnetic field in tesla

A is the area of the pole faces in square meters

µo is the permeability of free space

In the case of free space (air), µo=$4\pi x10^{-7}$

When the pole area of the magnet to be used, in lifting an object is not one, then the total force is divided by the no of poles used. Some of the magnetic shapes with different number of poles are shown below E-shape has 3-poles.



E-Shape magnet

Shapes of used magnet

DESIGN FEATURES

The main consideration in the design of an electromagnet is its holding power of the magnet .silicon steel wasselected for this design because it has a narrow loop area which gives it a high permeability and fairly goodcoactivity, hence making it suitable for core of electromagnet. The core of the electromagnet is first specified, the core area (shape), diameter, and the required length of the winding are then selected by estimating or calculatingamount of current expected to pass through when lifting the required load.

A= axb

A=10x150

A=1500sq.mm

F=B^2A/2μ0

F=200kg=1962N

B^2=2x4πx10^{-7} x1962/1500

=3.28x10^{-6}

B=1.8131x 10^{-3}Tesla

Φ = BxA (2)

= 1.8131x 10^{-3}x1500

=2.71Wb

Where A is the core area

Hence the total flux from equation (2) is obtained to be Φ = 2.71Wb.

Totalflux in the core, is the same as the flux in the air-gap

The magnetizing strength (H) in the air-gap is given by

H = B/μo-(3)

Therefore

H=1.8131x $10^{-3}/4\pi$x10^{-7}

H=1442.81 AT/mm

For the air-gap of 25mm the magneto-motive force (mmf) is given by

AT = HxL = 1442.81x1mm =1442.81AT -(4)

L is the length of air-gap specified as 1mm

This magneto-motive force is the product of the current that will go round the magnet and the number of turns of thewire that make up the magnet. If one of the variable is chosen the other variable can be calculated, thus SWG of the conductor is choosen 28 then the current in the electromagnet is 0.35A therefore the no. of turn is given by;

I=MMF/N

N=1442.81/0.35

N=4122 turns-(5)

Finally,

The holding power or force of the magnet is computed using equation (1.0) as

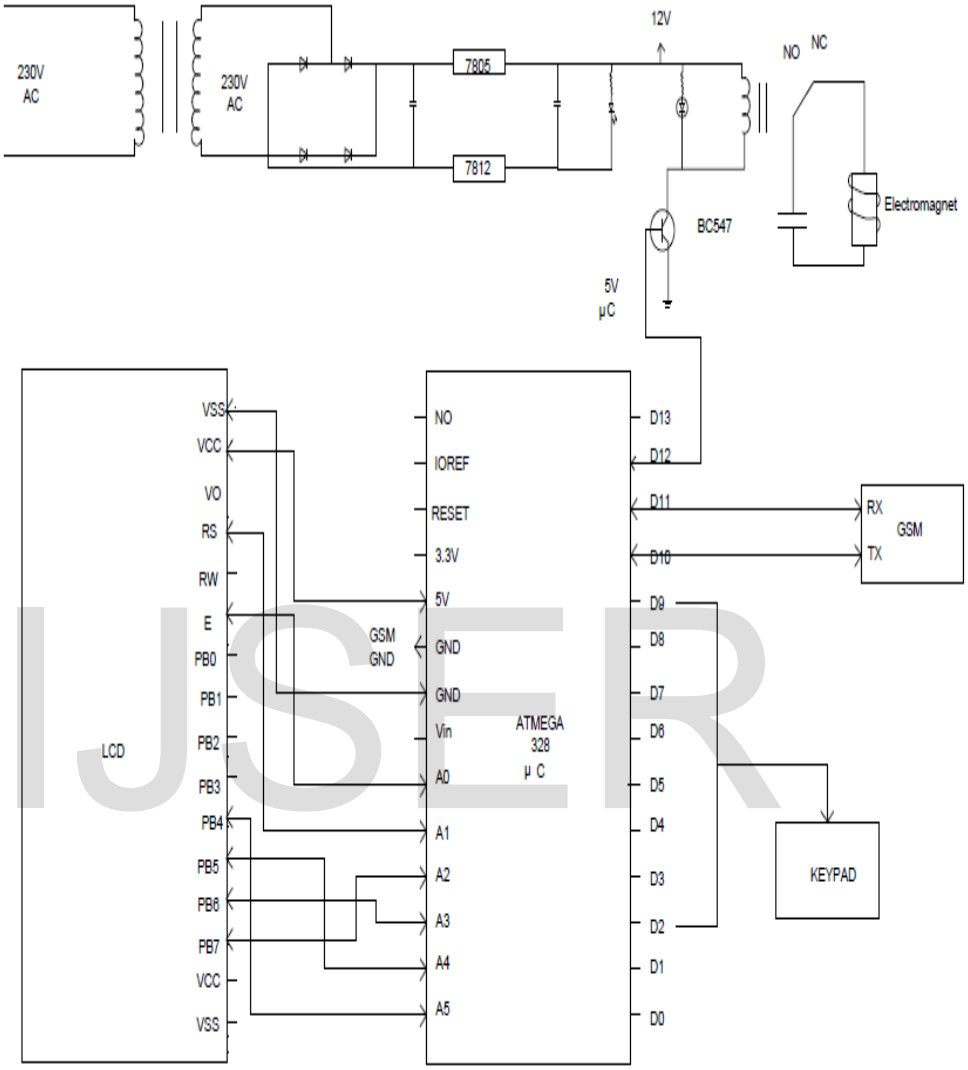
200Kg=1962N - (6)

The maximum operating voltage and the current are determined by the wire used to create the magnetic field.

APPENDIX B

DATA OF CIRCUITARY

B1:Circuit diagram



CIRCUIT DIAGRAM

Fig B1 circuit diagram

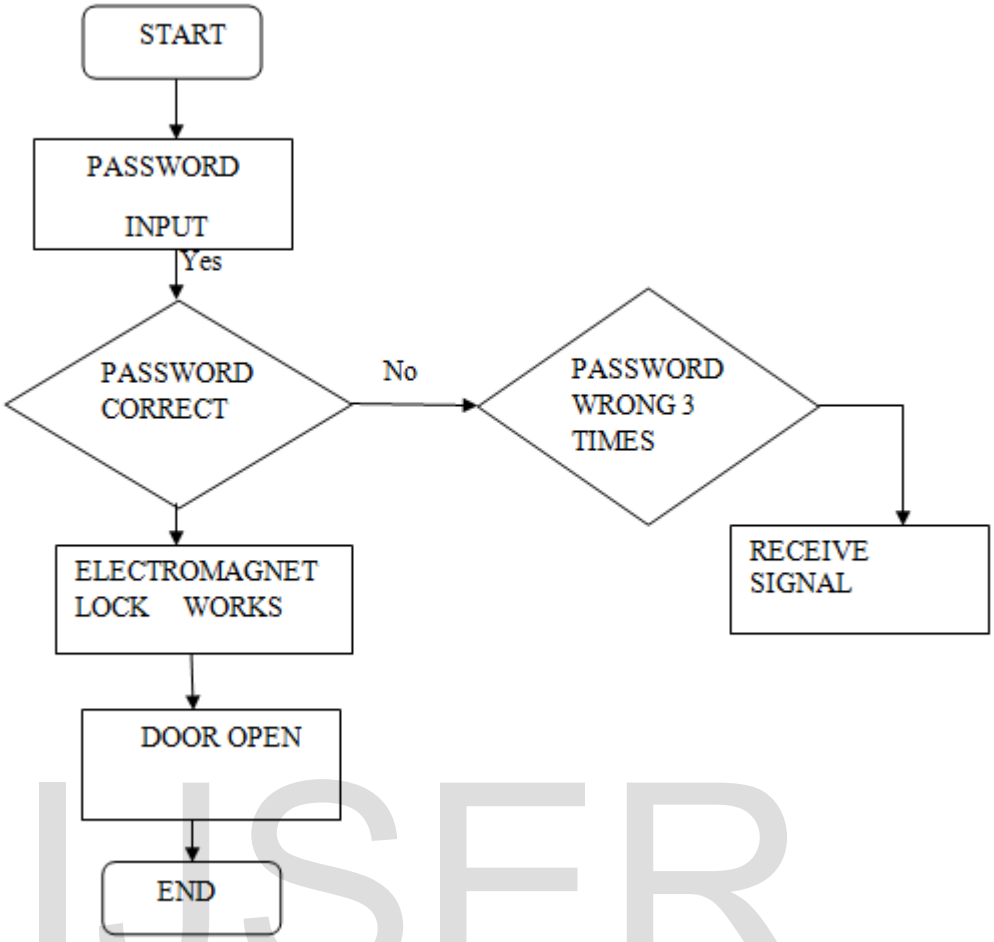
B2. Circuit diagram description

This is the circuit diagram. It consist of power supply ,relay driver circuit, microcontroller, GSM, LCD, keypad and electromagnetic lock. The Single phase 230

v AC supply is given to the step down transformer(230/15 v). The 15v ac is rectified by using bridge rectifier, we get 5v and 12v dc supply. This output 5v dc is given to microcontroller. Which further given to relay driver circuit. The 12v dc is given to electromagnetic lock through the relay driver circuit.
The 5v from relay driver circuit is given to microcontroller digital pin D12. The D10-D11 is connected to Tx and Rx pin of GSM resp. The digital pin D02-D09 connected to keypad.

The analog pin of microcontroller is connected to LCD. VCC of LCD is connected to 5v of microcontroller. Ground of each circuit is connected together.

FLOWCHART



PROGRAM

PROGRAM 1:

```
/*
  Blink
  Turns on an LED on for one second, then off for one second, repeatedly.

 */
// the setup function runs once when you press reset or power the board
void setup() {
  // initialize digital pin 13 as an output.
pinMode(13, OUTPUT);
}

// the loop function runs over and over again forever
void loop() {
digitalWrite(13, HIGH);   // turn the LED on (HIGH is the voltage level)
delay(1000);              // wait for a second
digitalWrite(13, LOW);    // turn the LED off by making the voltage LOW
delay(1000);              // wait for a second
}
```


Program 2

```
/*
 SMS receiver

 This sketch, for the Arduino GSM shield, waits for a SMS message
```

and displays it through the Serial port.

Circuit:

* GSM shield attached to and Arduino

* SIM card that can receive SMS messages

*/

```
// include the GSM library
#include <GSM.h>

// PIN Number for the SIM
#define PINNUMBER ""

// initialize the library instances
GSM gsmAccess;
GSM_SMS sms;

// Array to hold the number a SMS is retreived from
char senderNumber[20];

void setup()
{
  // initialize serial communications and wait for port to open:
Serial.begin(9600);
while (!Serial) {
    ; // wait for serial port to connect. Needed for Leonardo only
  }

Serial.println("SMS Messages Receiver");

  // connection state
booleannotConnected = true;

  // Start GSM connection
```

```
while (notConnected)
  {
if (gsmAccess.begin(PINNUMBER) == GSM_READY)
notConnected = false;
else
    {
Serial.println("Not connected");
delay(1000);
    }
  }

Serial.println("GSM initialized");
Serial.println("Waiting for messages");
}

void loop()
{
char c;

  // If there are any SMSs available()
  if (sms.available())
  {
    Serialprintln("Message received from:");

    // Get remote number
sms.remoteNumber(senderNumber, 20);
Serial.println(senderNumber);

    // An example of message disposal
    // Any messages starting with # should be discarded
if (sms.peek() == '#')
    {
Serial.println("Discarded SMS");
sms.flush();
```

```
    }

    // Read message bytes and print them
while (c = sms.read())
Serial.print(c);

Serial.println("\nEND OF MESSAGE");

    // Delete message from modem memory
sms.flush();
Serial.println("MESSAGE DELETED");
  }

delay(1000);

}
```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