

# **INTERNSHIP PROJECT REPORT ON:**

## **DOOR LOCK SECURITY SYSTEM**



**Submitted By**

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Submitted Date: 25/10/2021

## UNDERTAKING

I declare that the work presented in this project titled “**DOOR LOCK SECURITY SYSTEM**”, submitted to the All India council of robotics and Automation, for the award of the Internship in **INTERNET OF THINGS**, is my original work. I have not plagiarized or submitted the same work for the award of any other Internship. In case this undertaking is found incorrect, I accept that my Project may be unconditionally withdrawn.

October,2021

VAISHNAVI SINDOL

SABA YASMEEN

# **CERTIFICATE**

Certified that the work contained in the project titled “**DOOR LOCK SECURITY SYSTEM**”, by **VAISHNAVI SINDOL & SABA YASMEEN**, has been carried out under my supervision and that this work has not been submitted elsewhere for an internship.

All India Council of Robotics and Automation

Internet Of Things

Delhi-110020

## **Preface**

As thefts are increasing day by day security is becoming a major concern nowadays. So a digital code lock can secure your home or locker easily. It will open your door only when the right password is entered.

The need of safety can be achieved by making locks which can be electrical or mechanical with one or a few keys, but for locking a big area many locks are required. As everyone knows old fashioned locks are heavy weight and fragile also depending on the tools therefore electronic locks are given more value than those of mechanical locks. Nowadays every device's operation is based on digital technology. For example, technology-based identity devices are used for automatic door unlocking or locking. These locking systems are used to control the movement of door and are functional without requiring a key to lock or unlock the door. These locking systems are controlled by a keypad and are installed at the side hedge of the door. The main objective of this project is to give safety at every common place like home, public places. In this user would give a known password. The information will be stored in database. When the correct passcode will be entered, the microcontroller will give instruction to servo motor. Servo motor will perform the action on door unlocking. Thus, what we want is digital technology to construct an integrated and well customized safety system at a price which is reasonable.

The circuit of this project is very simple which contains Arduino uno, keypad module, Servo Motor, and LCD. Arduino controls the complete processes like taking a password from the keypad module, comparing passwords, rotating servo motor, and sending status to the LCD display. The keypad is used for taking the password. Servo motor is used for opening the gate while rotating and LCD is used for displaying status or messages on it.

## Acknowledgements

I take upon this opportunity to acknowledge the many people whose prayers and support meant a lot to me.

I am deeply indebted to **Sumit Chatterjee, Research Engineer** and **ALAAUDEEN K M, trainer** who motivated me along the way.

I would like to thank all my teachers who help me in this project.

I further thank my friends.

My heartfelt thanks to parents who supported me a lot.

I owe my sincere gratitude towards the God.

Finally, I would like to wind up by paying my heartfelt thanks to AICRA institute who provided me with this great opportunity.

VAISHNAVI SINDOL

SABA YASMEEN

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# INTRODUCTION

The **Internet of things (IoT)** describes physical objects (or groups of such objects) that are embedded with sensors, processing ability, software, and other technologies, and that connect and exchange data with other devices and systems over the Internet or other communications networks.

The field has evolved due to the convergence of multiple technologies, including ubiquitous computing, commodity sensors, increasingly powerful embedded systems, and machine learning. Traditional fields of embedded systems, wireless sensor networks, control systems, automation (including home and building automation), independently and collectively enable the Internet of things. In the consumer market, IoT technology is most synonymous with products pertaining to the concept of the "smart home", including devices and appliances (such as lighting fixtures, thermostats, home security systems and cameras, and other home appliances) that support one or more common ecosystems, and can be controlled via devices associated with that ecosystem, such as smartphones and smart speakers. The IoT can also be used in healthcare systems.

There are a number of concerns about the risks in the growth of IoT technologies and products, especially in the areas of privacy and security, and consequently, industry and governmental moves to address these concerns have begun, including the development of international and local standards, guidelines, and regulatory frameworks.

Anyone who says that the Internet has fundamentally changed society may be right, but at the same time, the greatest transformation actually still lies ahead of us. Several new technologies are now converging in a way that means the Internet is on the brink of a substantial expansion as objects large and small get connected and assume their own web identity. Following on from the Internet of computers, when our servers and personal computers were connected to a global network, and the Internet of mobile telephones, when it was the turn of telephones and other mobile

units, the next phase of development is the Internet of things, when anything will be connected and managed in the virtual world. This revolution will be the Net's largest enlargement ever and will have sweeping effects on every industry — and all our everyday lives. Smart connectivity with existing networks and context-aware computation using network resources is an indispensable part of IoT. With the growing presence of Wi-Fi and 4G-LTE wireless Internet access, the evolution towards ubiquitous information and communication networks is already evident. However, for the Internet of Things vision to successfully emerge, the computing paradigm will need to go beyond traditional mobile computing scenarios that use smart phones and portables and evolve into connecting everyday existing objects and embedding intelligence into our environment. For technology to disappear from the consciousness of the user, the Internet of Things demands: a shared understanding of the situation of its users and their appliances, software architectures and pervasive communication networks to process and convey the contextual information to where it is relevant, and the analytics tools in the Internet of Things that aim for autonomous and smart behaviour. With these three fundamental grounds in place, smart connectivity and context-aware computation can be accomplished. A radical evolution of the current Internet into a Network of interconnected objects that not only harvests information from the environment (sensing) and interacts with the physical world (actuation/ command/control), but also uses existing Internet standards to provide services for information transfer, analytics, applications, and communications. Fuelled by the prevalence of devices enabled by open wireless technology such as Bluetooth, radio frequency identification (RFID), Wi-Fi, and telephonic data services as well as embedded sensor and actuator nodes, IoT has stepped out of its infancy and is on the verge of transforming the current static Internet into a fully integrated Future Internet.

Password Based Door Lock Security System is designed using ARDUINO UNO where in once the correct code or password is entered, the door is opened, and the concerned person is allowed access to the secured area. Password Based Door Lock Security System using Arduino UNO is a simple project where a secure password



will act as a door unlocking system. Old fashioned lock systems use mechanical locking, and these can be replaced by new advanced techniques of locking systems. These methods are a combination of mechanical and electronic devices and are highly intelligent. One of the distinct features of these intelligent lock systems is their simplicity and high efficiency. Such an automated lock system consists of electronic control assembly, which controls the output load through a password. The example of this output load can be a motor or a lamp or any other mechanical/electrical load. Here, we made an electronic code lock system using Arduino UNO, which provides control to the actuating the load. It is a simple embedded system with takes input from the keyboard and the output being actuated accordingly. This system demonstrates a Password based Door Lock System using Arduino UNO, wherein once the correct code or password is entered, the door is opened, and the concerned person is allowed access to the secured area. If another person arrives, it will ask to enter the password again. If the password is wrong, then door would remain locked, denying access to the person.

Main idea behind this project is of a door-latch opening using a password entered through keypad. As well as the door will be remained close when password entered is wrong. User can modify this password anytime he/she wishes through modifying the code. The main component in the circuit is Arduino UNO which is basically used to send a text message to owner of the house about the breach of security. 4\*4 keypad is used to enter the password. The entered password is compared with the known password. If it is correct password, the system opens the door by servo motor. If the password is wrong then door remains closed and displays “WRONG PASSWORD” or “ACCESS DENIED” on LCD.

## **About Software**

### **Arduino Proteus Simulation Basics, Description:**

**Arduino Proteus– Proteus simulation software** is easy to use. When we have no access to maximum of the hardware components, and also low on budget and we can simulate our code on proteus software which gives virtual experience without using any hardware components. This was when it becomes easy to use **Proteus Simulation Software**. We can make intermediate and advanced level projects without even spending a single penny. **Proteus simulation software** really helped me a lot in learning the Electronics basics.

### **Arduino**

Arduino is an open-source electronics platform based on easy-to-use hardware and software. Arduino microcontroller is a microcontroller unit that can be used to make varieties of electronic projects, like robots, RC cars, 3D printers, embedded systems, displays, etc. The internet abounds with so many Arduino projects and designs. At the same time, Arduino has a large community of tech enthusiasts and hobbyists, who are building and making things every day. Most enthusiasts and hobbyists have access to Arduino parts to carry out their designs. For those that do not have Arduino parts, they resort to Electronic Circuit simulation. Sometimes, people resort to circuit simulation not because they do not have access to parts, but because they want to test the behavior of the Arduino circuit before they can eventually delve into the real design.

### **What is Proteus?**

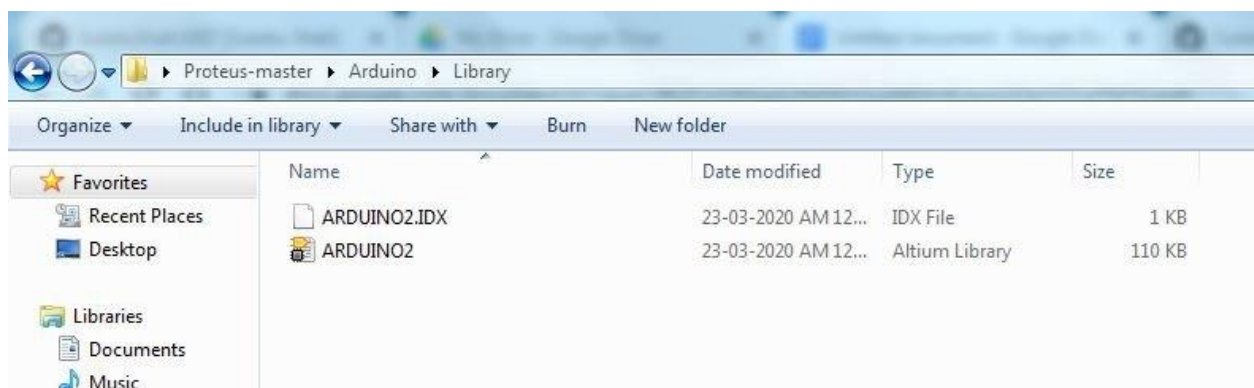
**Proteus Design Suite** is a proprietary software tool suite used primarily for electronic design automation. The software is used mainly by electronic design engineers and technicians to create schematics and electronic prints for manufacturing printed circuit boards.

Proteus circuit design and simulation software has been in use for years and has proven to be efficient in circuit design and simulation including printed circuit board design (PCB) design. The Arduino board is made with Atmel AVR controllers like the Atmega32 and host of others. the Proteus design suite comes with simulation libraries for these microcontrollers, however, some tech geeks in the Arduino community have done a great job in creating some Arduino board libraries for Proteus. they have also created a lot of Arduino compatible sensor libraries. The engineering Projects has done a tremendous work in creating such libraries.

## How to Install an Arduino Library in Proteus

Proteus doesn't come with an inbuilt Arduino library, so you have to install it externally. Follow the steps below to install it on your PC.

1. Extract the zip file and navigate to Proteus-master\Arduino\Library.

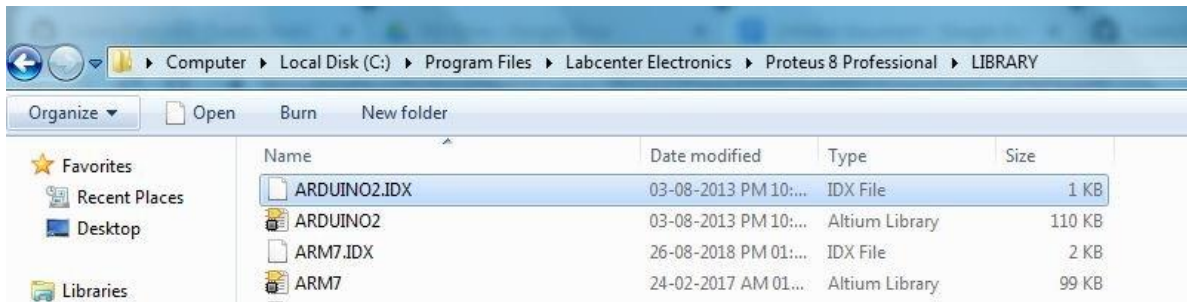


2. Copy both files and paste them in one of the following paths:

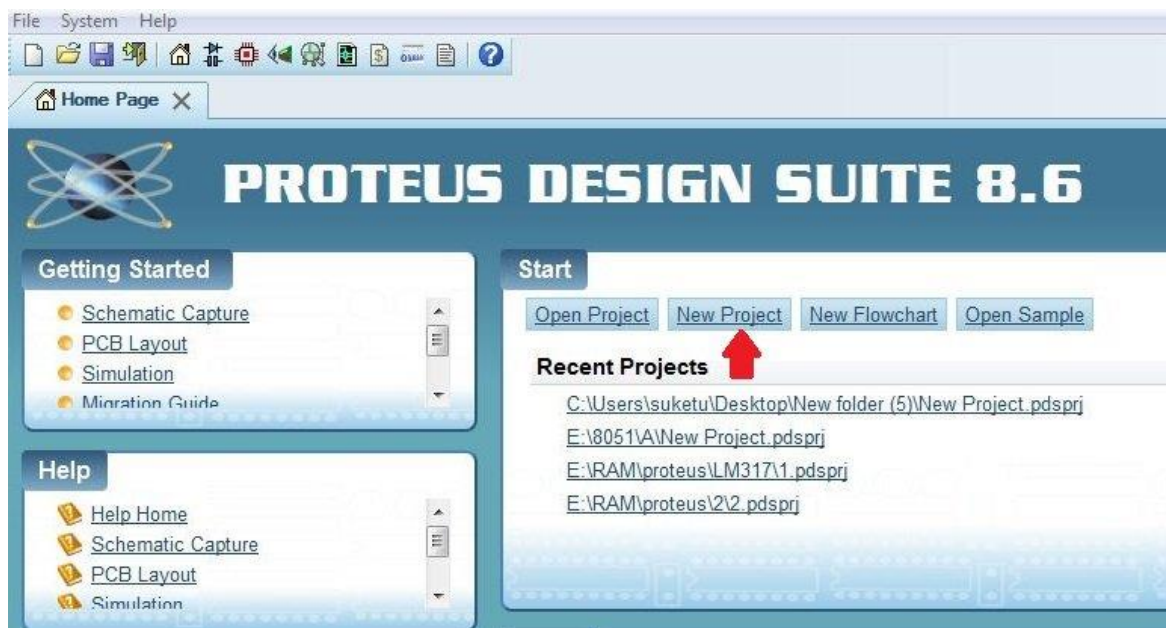
Or

*C:\Program Files\Labcentre Electronics\Proteus Professional\Data\LIBRARY*

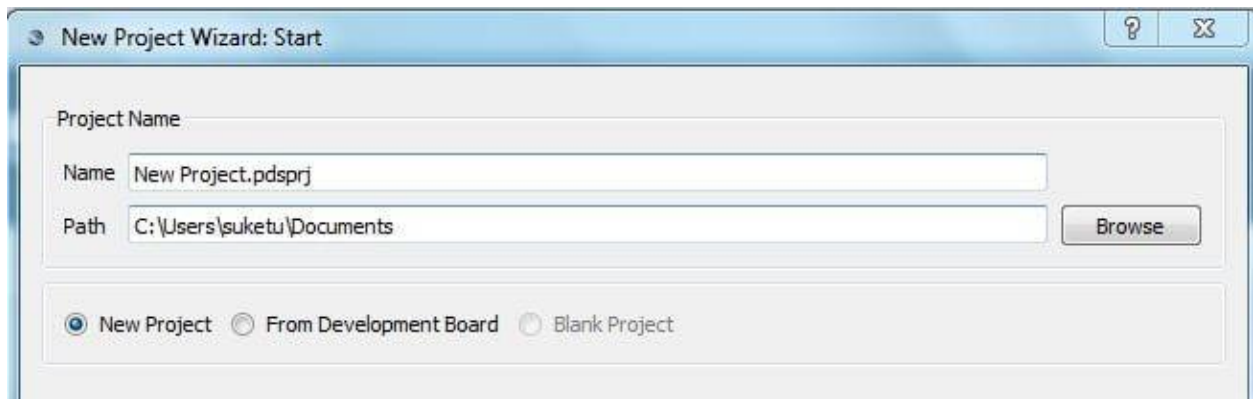
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3. In Proteus, create a new project.

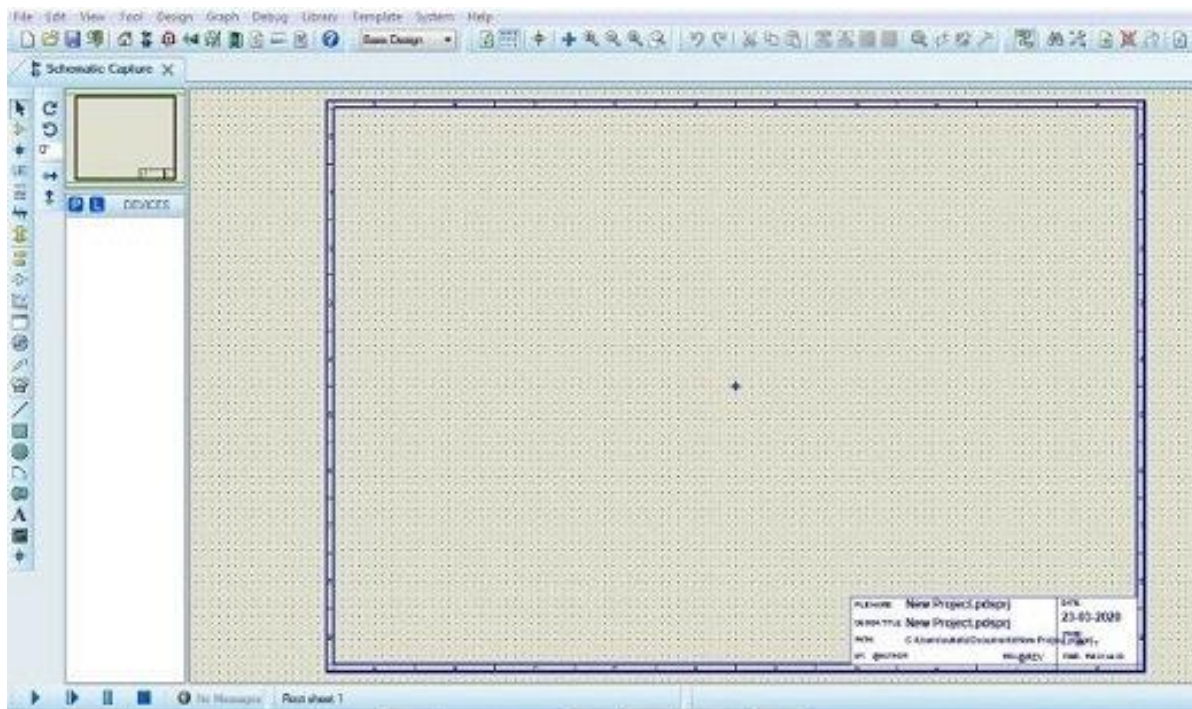


4. Decide where you would like to save your project.



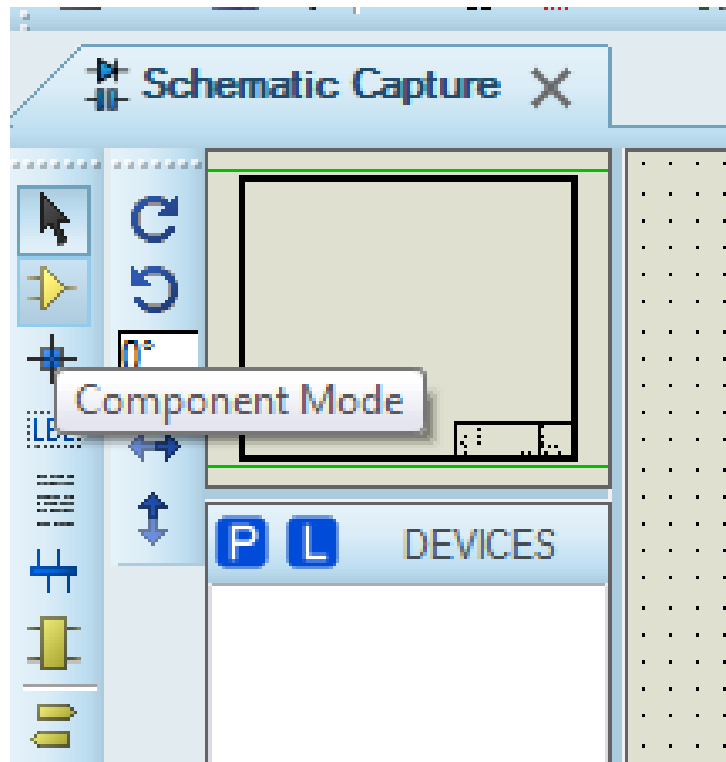
click Next once you are done and select the appropriate page layout according to your needs.

5. After finishing the settings, you will land on the empty workspace. Here, you can place components from the library.



## Getting Started in the Proteus Workspace

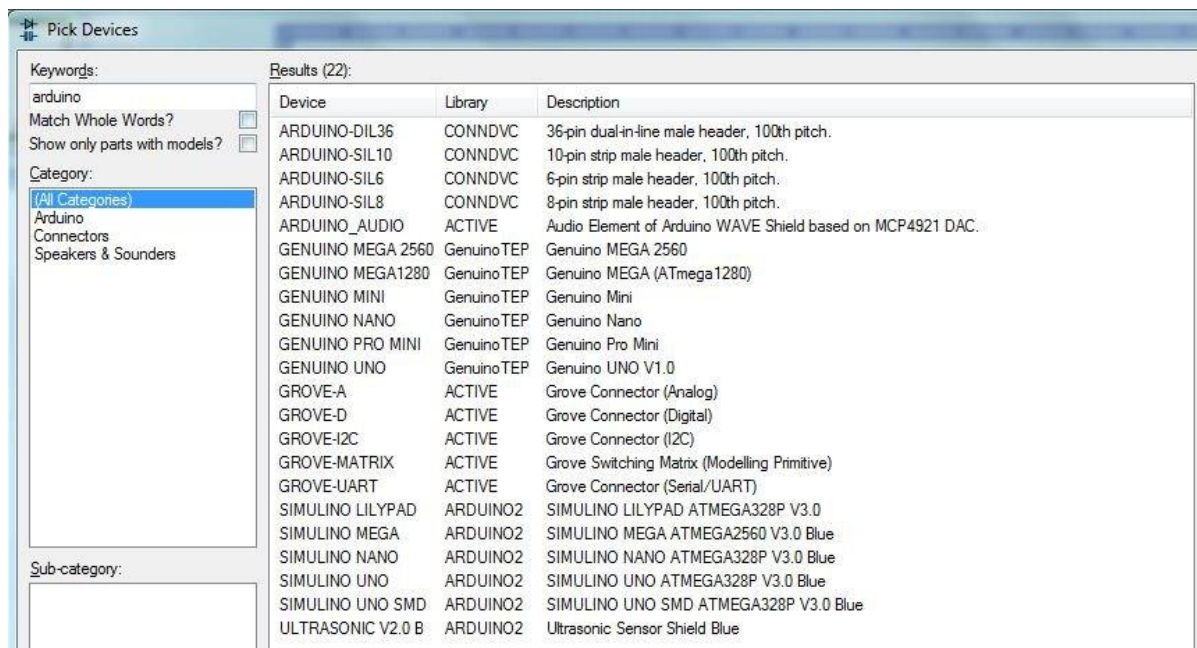
Select the op-amp symbol, which changes the mode to component mode. Then click P, which will cause a list of components to pop up. Here, you can find all types of components and footprints for simulation.



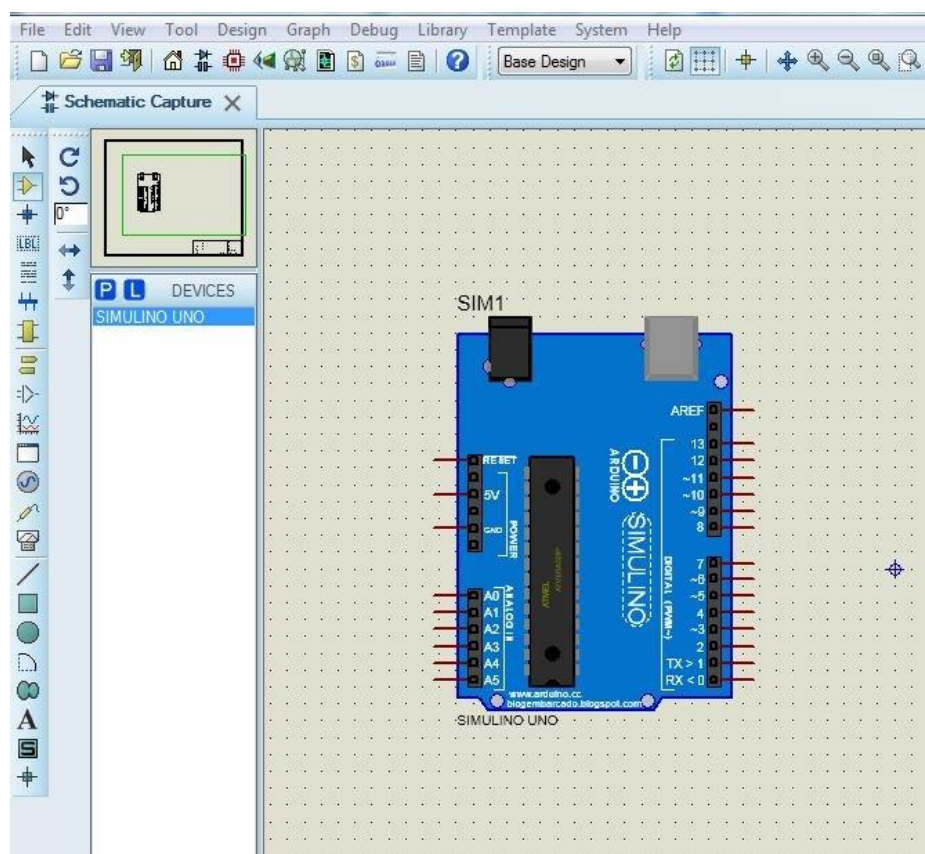
Search for Arduino in the component list. All Arduino related boards and connector libraries will display. If none of the files display on your machine, you can repeat re-installing the Arduino library.



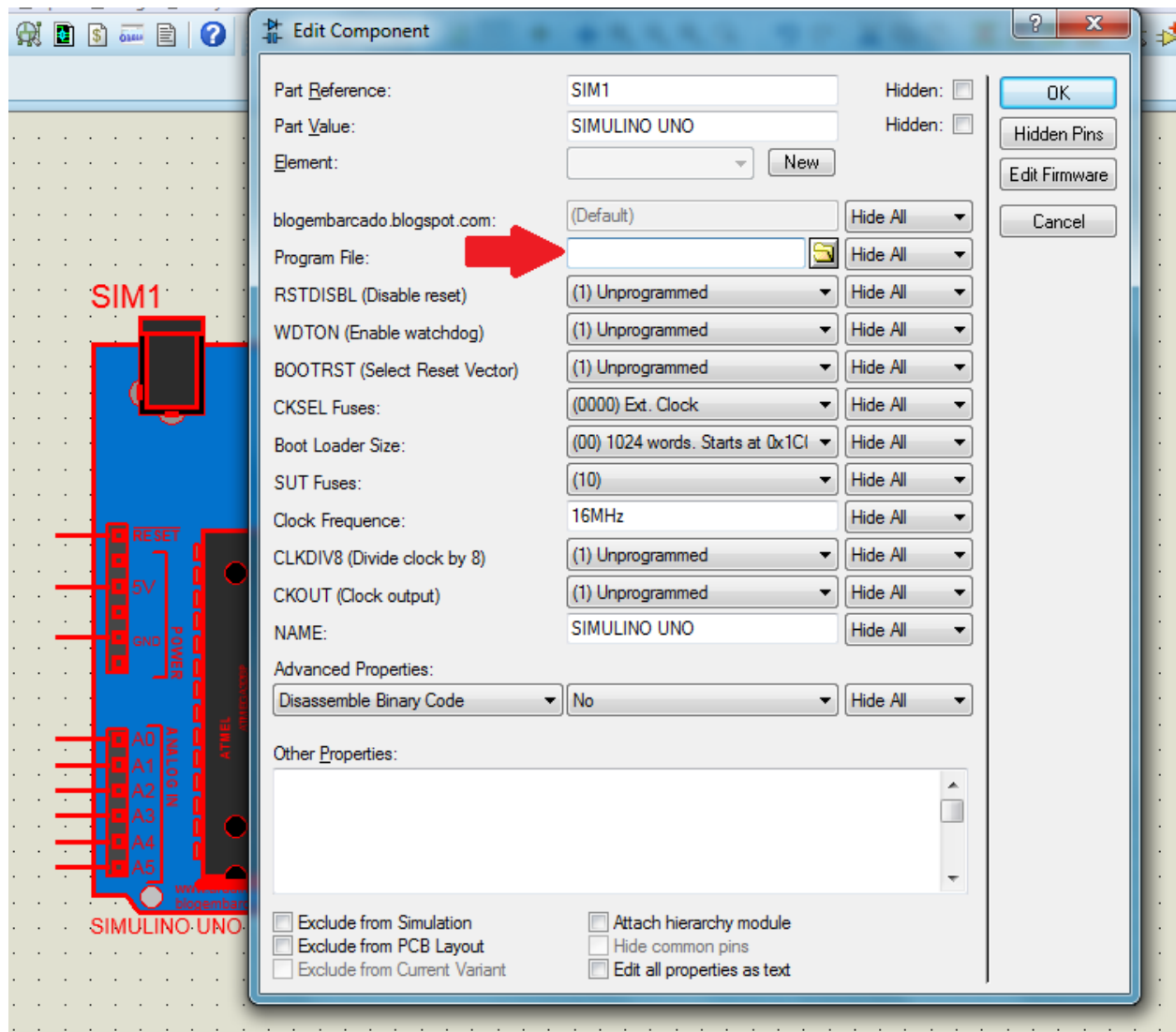
Select Arduino UNO, as you will be programming on this board in this example.



After selecting the library and clicking OK, click the spot on the workspace where you would like to drop the board.



Double click on the Arduino board to insert the hex file of code. After inserting the hex file, simulate it.





## **Existing System**

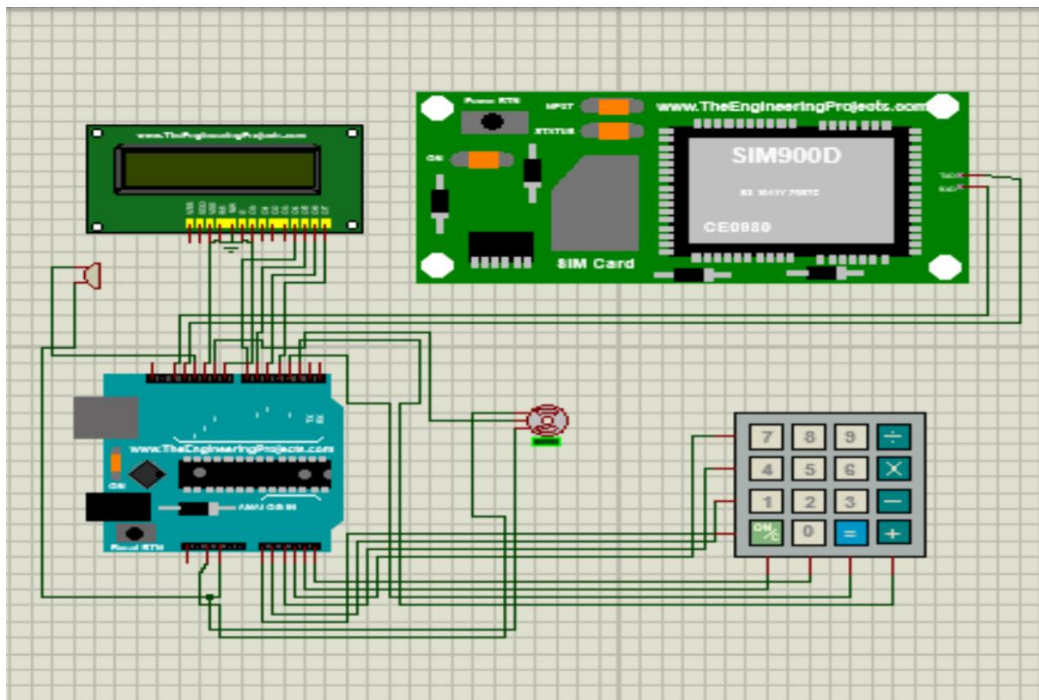
### **Abstract**

Main idea behind this project is of a door-latch opening using a password entered through keypad. As well as turning on the Buzzer when passcode is entered wrong for multiple times. User can modify this password anytime he/she wishes using a keypad. The main component in the circuit is Arduino UNO which is basically used to send a text message to owner of the house about the breach of security. 4\*4 keypad is used to enter the password. The entered password is compared with the known password. If it is correct password, the system opens the door by servo motor and displays the status of door on LCD. If the password is wrong, then door remains closed and displays "WRONG PASSWORD" on LCD.

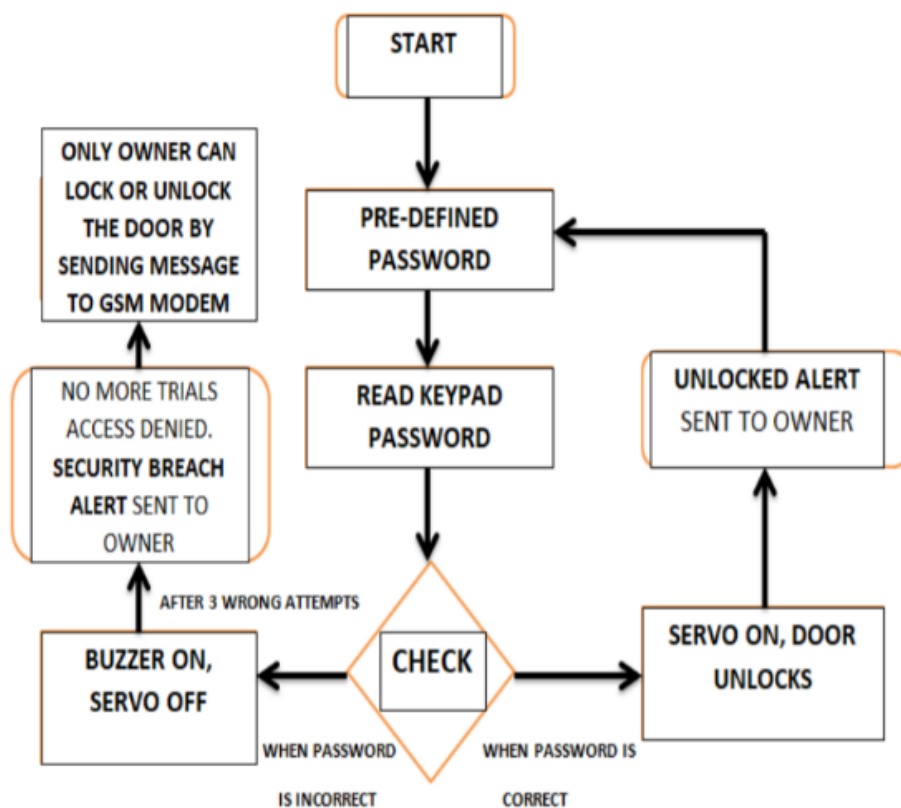
An electronic code lock system using Arduino UNO, which provides control to the actuating the load. It is a simple embedded system with takes input from the keyboard and the output being actuated accordingly. This system demonstrates a Password based Door Lock System using Arduino UNO, wherein once the correct code or password is entered, the door is opened, and the concerned person is allowed access to the secured area. If another person arrives, it will ask to enter the password again. If the password is wrong, then door would remain locked, denying access to the person.

Here we use a GSM module, which is a device which can be either a mobile phone or a modem device which can be used to create a computer or any other processor to communicate over a network. A GSM module needs a SIM card to be operated and operates over a network range subscribed by the network operator.

## Circuit Diagram:



## Flow Chart:



## Proposed System

Since we are going to simulate our code through Proteus software, we used only the main components required for simulation.

## Components Required

Arduino UNO

LCD display

Servo Motor

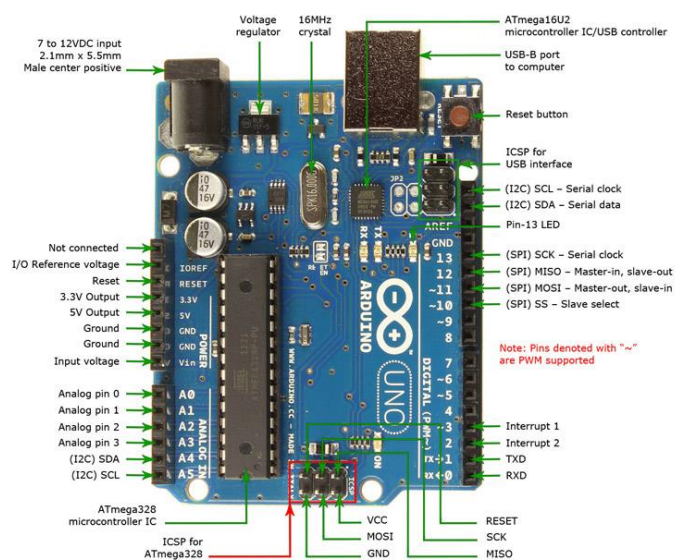
Keypad

Jumper wires

## COMPONENTS DESCRIPTION

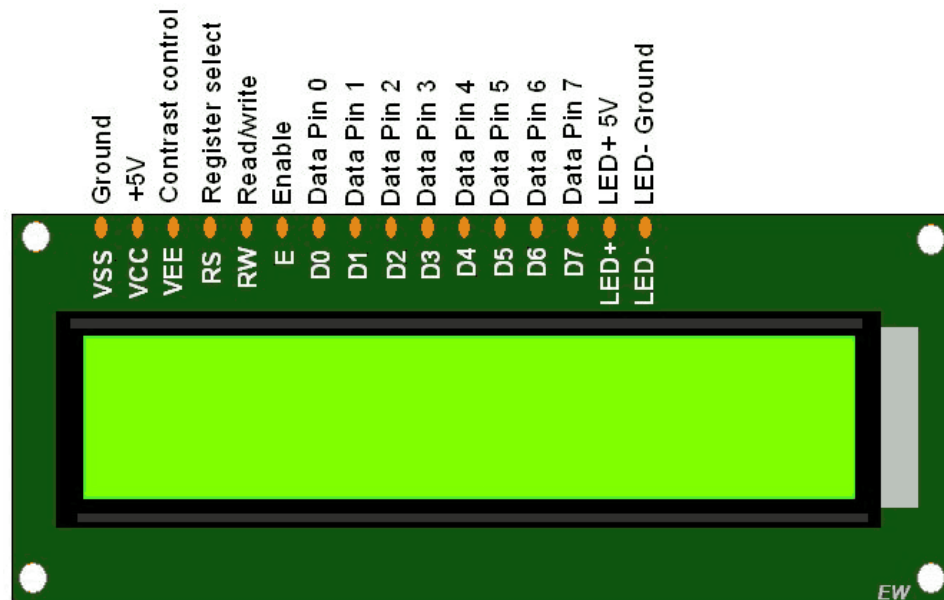
### ARDUINO UNO

Arduino UNO This microcontroller is based on the ATmega328P. There are total of 20 pins (0-19) out of which 6 are analog inputs, 14 are digital input output pins(6 pins provide PWM voltage) which can also be used as general purpose pins, a ceramic resonator of frequency 16 MHz, an USB connection, a power jack and a reset button. It has an operating voltage of 5V. It contains everything needed to support a microcontroller.



## LCD Display

Liquid Crystal Display, which we are using in our project is 16\*2 LCD. This display consists of 16 columns and 2 rows. This is programmed using the library <LiquidCrystal.h>



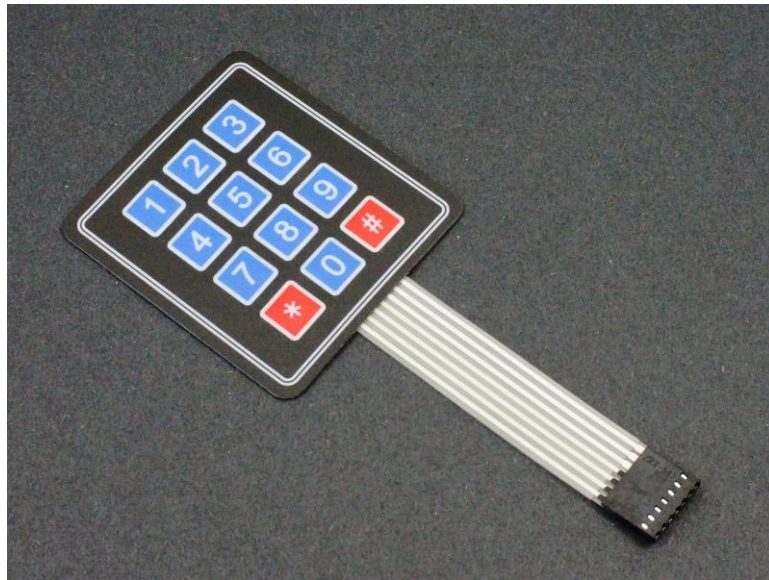
## Servo Motor

The servo motor used in the project is SG90 Micro Servo weighing about 9g. This is programmed using the library <Servo.h>



## Keypad

In our project we will be using 4X3 matrix membrane keypad. This 16-button keypad will provide user interface component for Arduino project. This is programmed using the library <Keypad.h>

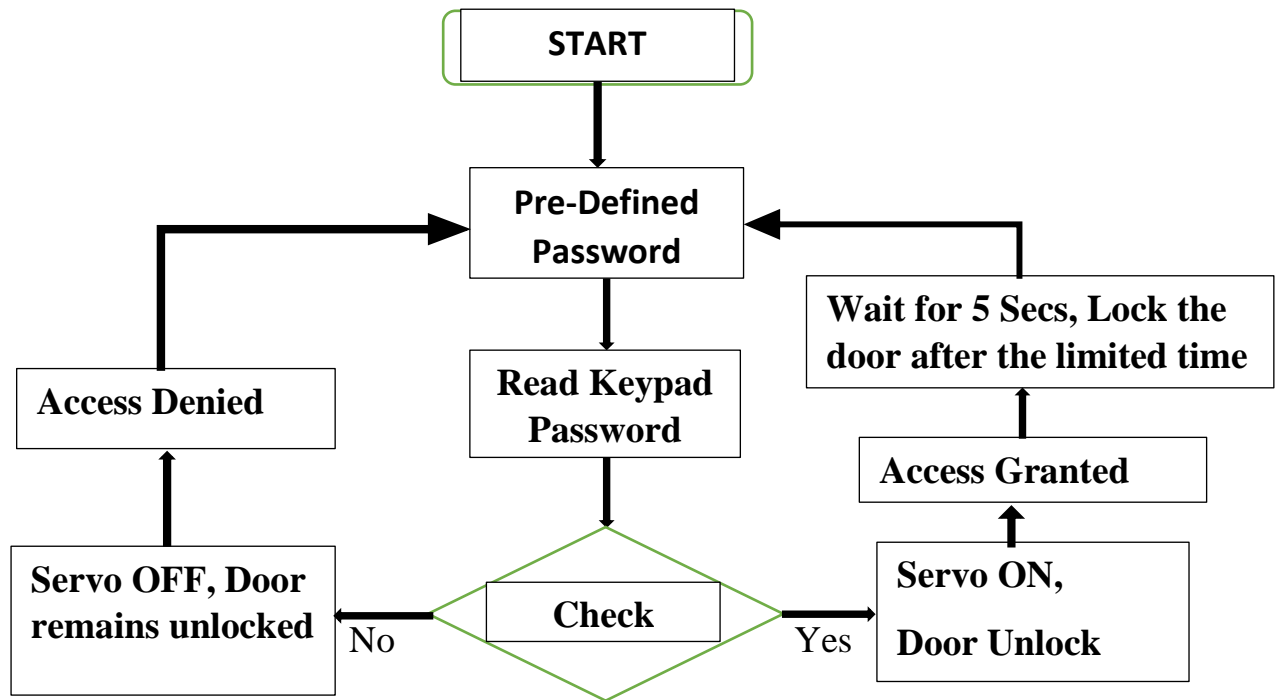


## Jumper Wires

A jump wire is an [electrical wire](#), or group of them in a cable, with a connector or pin at each end (or sometimes without them – simply "tinned"), which is normally used to interconnect the components of a [breadboard](#) or other prototype or test circuit, internally or with other equipment or components, without soldering.

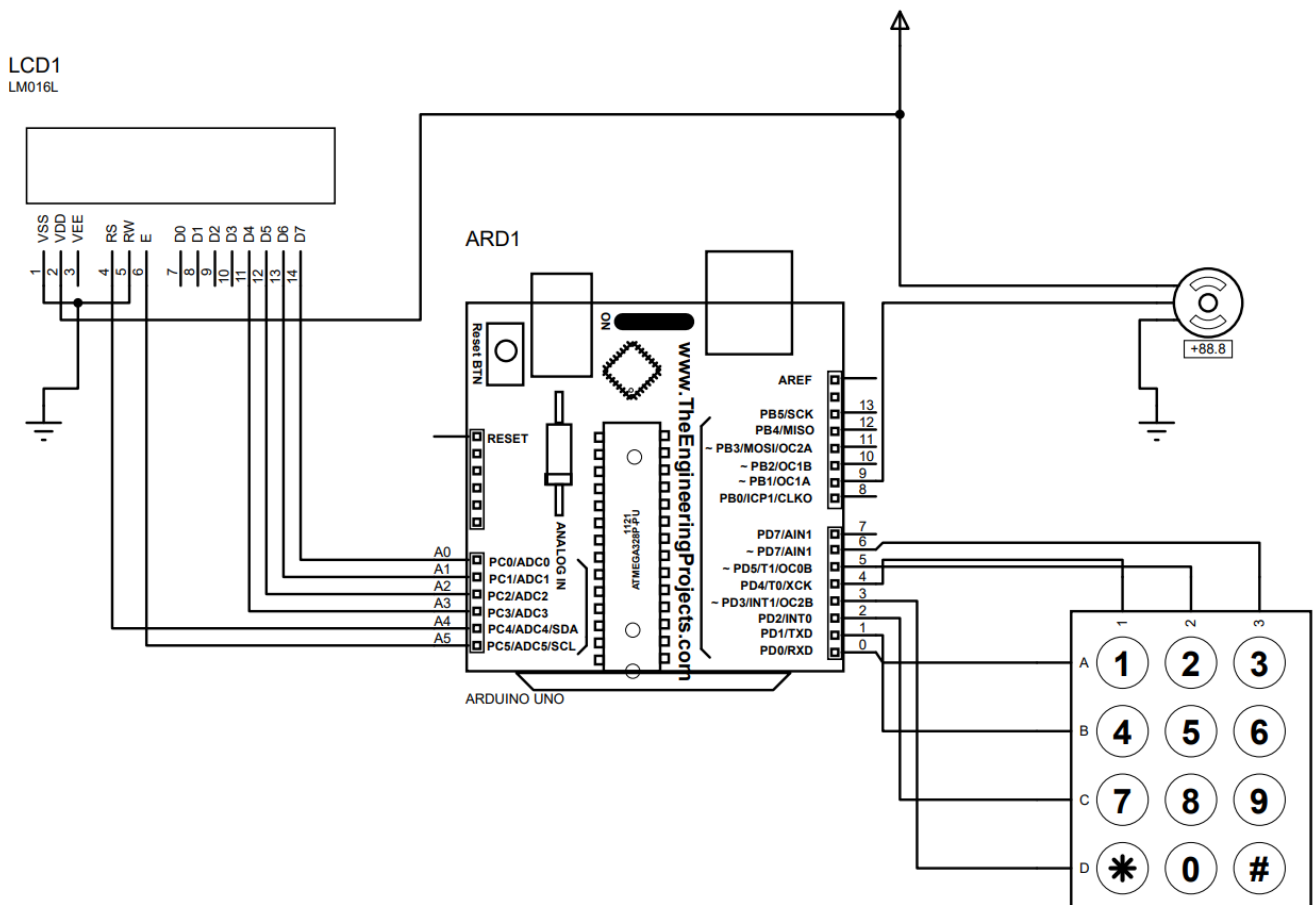


## Flow Chart



The above flowchart gives a brief idea as to how the project works. Initially the password is known. When the device is turned on, it resets the servo angle to lock the door. Now the user is prompted to enter the password. The user enters the passcode through a keypad which is read by the Arduino. Now the entered password is checked with the known password. If the password matches, then the servo motor rotates, and the door unlocks for 5 seconds else access is denied and door remains locked.

## Circuit Diagram



The circuit or the schematic of Password Based Door Lock Security System is simple.

First, we will make a connection to the 4×3 Keypad. For connecting the keypad with the Arduino, we are using digital pins D1 to D7. Connect all seven pins of the keypad to analog pins D1 ~ D7 of Arduino.

To connect the servo motor with the Arduino, use digital pin D9 of Arduino to output the PWM pin of the servo motor.

Now we will connect the 16×2 LCD to the Arduino.

1. Connect pin 1,5 of LCD to the GND.
2. Connect pin 2 of LCD to the VCC (5V).
3. Connect pin 4 of LCD to pin A4 of Arduino.
4. Connect pin 6 of LCD to pin A5 of Arduino.



5. Connect pin 11 of LCD to pin A3 of Arduino.
6. Connect pin 12 of LCD to pin A2 of Arduino.
7. Connect pin 13 of LCD to pin A1 of Arduino.
8. Connect pin 14 of LCD to pin A0 of Arduino.

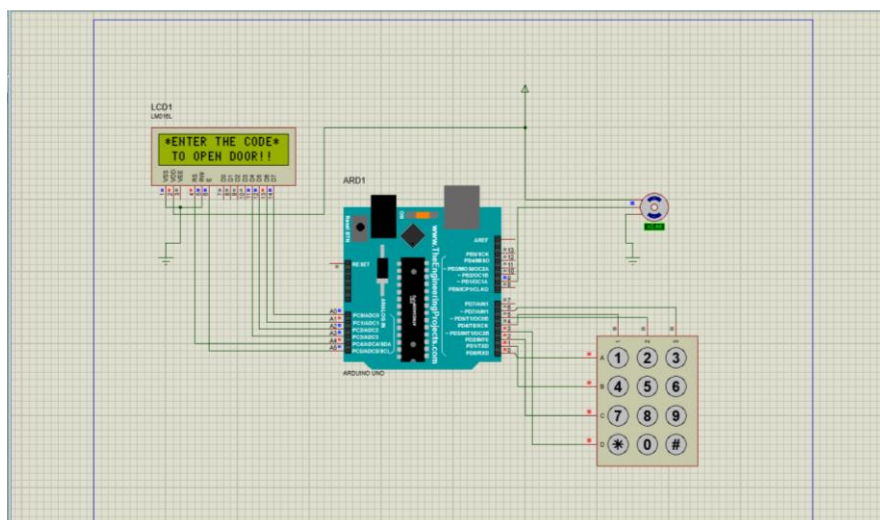
## Working of Password Based Door Lock Security System

In this project, we have defined the default password “0123” in the Arduino. You can change it via coding. When we enter a password, it will match it with the password stored in the Arduino. If it is correct, then it will show ‘Access Granted’, ‘Welcome’ and then rotate the servo motor to 180 degrees as the door is opened. It will then give 5 seconds time for entering via the door. Once 5 seconds is completed, the door will get locked automatically.

If the password is wrong, then it will show ‘Code Incorrect’, ‘Access Denied’ and the door will remain locked.

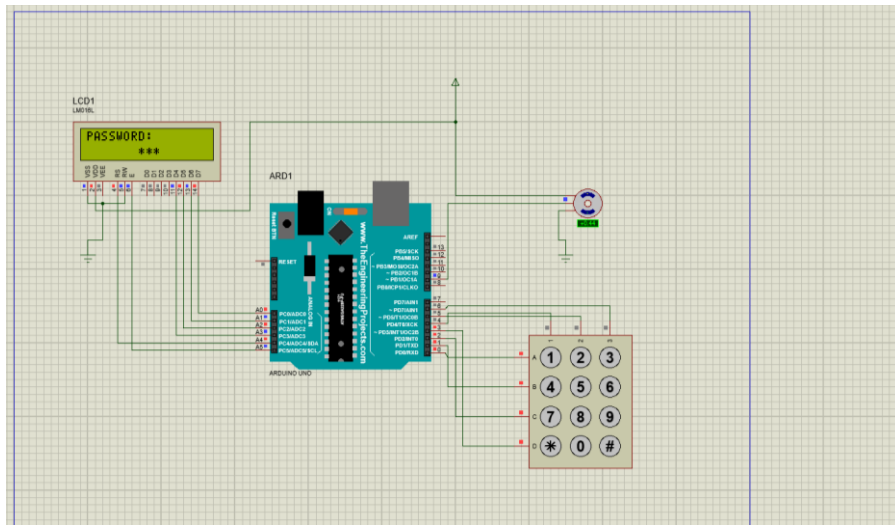
### STEPS INVOLVED ARE:

- I. When we simulate in the software then LCD display shows “Enter the Code”, “To OPEN THE DOOR”

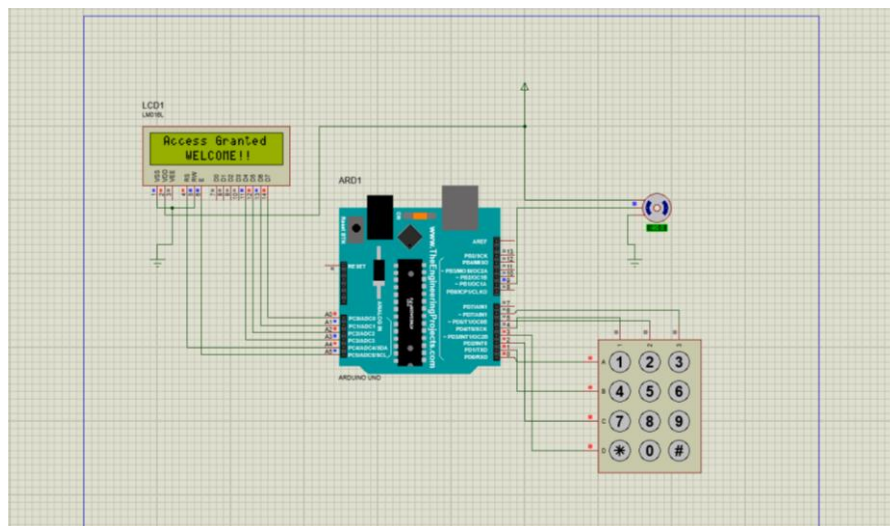




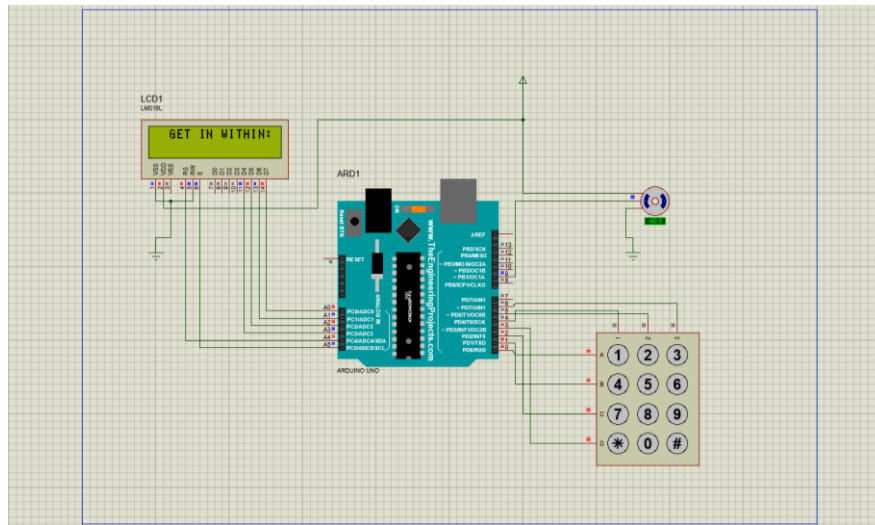
- II. The it displays “PASSWORD”, we have to enter the password through the keypad.



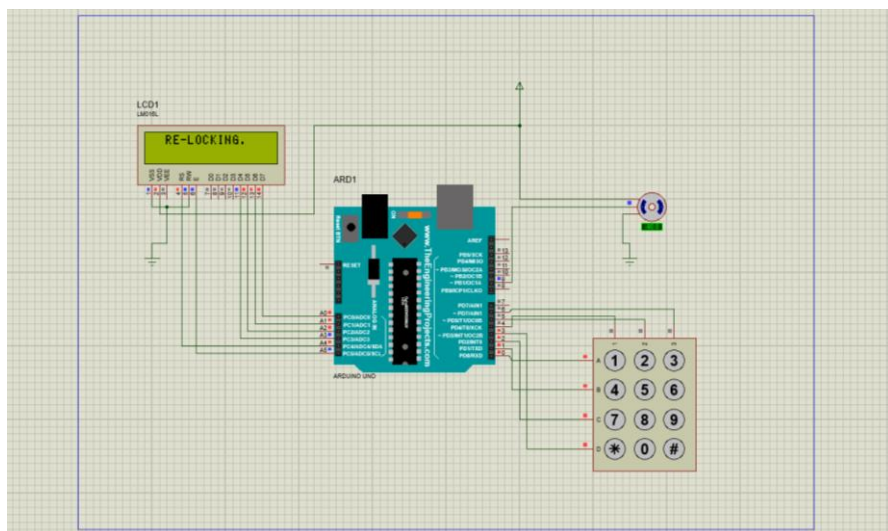
- III. If the password entered is correct, then it displays “Access Granted”, “WELCOME!!”.

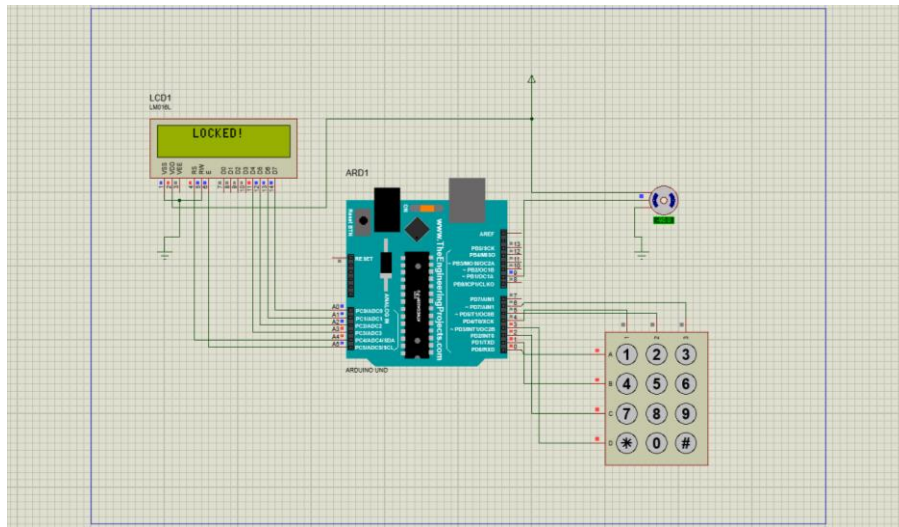


- IV. Later the timer starts and displays “GET IN WITHIN” and we must get in within limited time

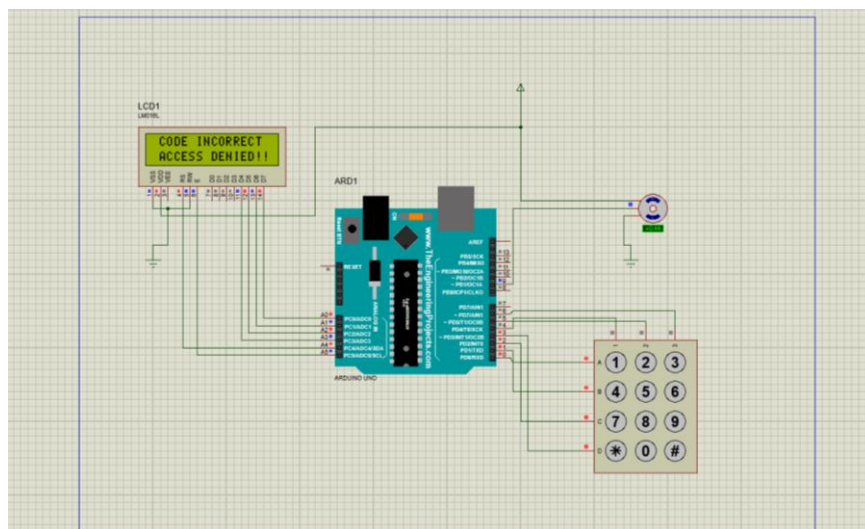


- V. After the Limited time, the door gets locked automatically and displays “RE-LOCKING” and the finally displays “LOCKED”





VI. If the password entered is incorrect, it displays “CODE INCORRECT”,  
“ACCESS DENIED!!”.



## Source Code/Program

The code for Password Based Door Lock Security System Using Arduino & Keypad is given in the below link. We can simply copy & paste the code using Arduino IDE and further simulate it in proteus software.

<https://drive.google.com/file/d/1MizedUVVvhbOtXLmdPOp0oSOuuYiJYJU/view?usp=drivesdk>

## Applications

1. This project can be used in offices, companies also at home. It will provide keyless entry.
2. This can be used in Banks for safety lock.
3. User don't have to carry keys along with him.

## Advantages

- **Convenience**

When using smart door lock you do not need to carry a key. You do need to be not afraid of losing or forgetting somewhere. You will not have to sit outside the door to wait for the mechanic to break the door lock. Smart door lock opens / closes automatically, can be activated via smartphone or biometric reader.

- **Fast opening / closing times**

With normal mechanical locks you will have to take a few minutes to open the door. You also take that much time to close the door. But the smart lock will save you a lot of time. This type of lock only takes about 3- 5s to unlock and you just need to close the door, the latch will close itself.

- **High safety and security**

Door lock using fingerprint or password to open so it is difficult to fake. Smart lock is very structured consisting of 5 latches instead of 2 latches like normal faculties. Keyhole is replaced by biometric reader, or a smartphone detection unit so there will be no phenomenon break. Moreover, when there is a strong action or a raid

phenomenon, the door lock will emit an alarm sound, so the safety is greatly enhanced.

- **Strict control of in / out**

With the smart *door lock* installation, you will have full access control. In fact, smart lock is an electronic device, allowing you to record dates, times, people entering and leaving at any time. Smart *door lock* memory is an ideal tool especially for the working environment. It allows full access control to a specific area; it is especially useful for when you want to control your child and follow monitor their activities.

By installing smart locks, you can easily monitor your entry and exit at home. In addition to being able to control who comes in and out, you can decide who will be able to open the door for a certain period. This can simply be done by setting up the application, avoiding all problems related to changing locks to prevent key granting such as in mechanical locks.

- **Utility**

Smart door locks can almost be installed on any type of door. The lock type is almost the same as traditional locks. It's just different from using electronic devices rather than mechanical systems.

- **Easy to use**

Many people still think that technology-related items are often complicated and difficult to use. But with smart *door lock*, the operation is very simple. In a short time you can understand how to install and use the *door lock* through manuals or instructions directly from the installation staff.

- **High aesthetic**

Smart locks have a variety of designs, designs, colors, so you can easily choose a *door lock* that fits your preferences and interior.

- **Safe and modern opening technology with smart ways of accessibility**

Different from conventional locks, digital *door lock* has many ways of accessibility such as:

password, magnetic card, via applications, voice, ...This makes unlocking flexible for people

when choosing a room lock for house or office.

- **Give the alarm when battery is low or digital lock has errors**

This feature will warn the house owner about the level of battery avoiding the battery goes

low and the lock cannot operate efficiently.

## **Disadvantages**

Besides many advantages, smart *door lock* also has some disadvantages to overcome:

- Installation of doors is very successful, requiring specialized installation personnel.
- If we forget the password, it will be more difficult to unlock the door until the person who knows the password arrives.
- If tried to enter the wrong password many times the door gets locked permanently until the owner gives the access.
- The controller has a sudden power outage, or the device recognizes an error, the system cannot be verified.
- There are many fake brands which products have unclear origin. They are a lot cheaper than the genuine one. Feature and style are nearly similar. This leads to misunderstanding of products of customers. Customers should carefully research about the product which you want to buy to avoid buying the low-quality goods.

## **FUTURE SCOPE**

The security level can be increased by adding a biometric fingerprint scanner or by adding password. We can interface sensors like Fire, LPG, PIR motion detector to microcontroller in case of any accident so that door will open automatically. We can interface camera to the micro controller so that it could capture the picture of the thief who is trying to breach the security. This simple circuit can be used at places like home to ensure better safety. With a slight modification, this project can also be used to control the switching of loads through password. It can also be used at organizations to ensure authorized access to highly secured places.

## **Conclusion:**

This project is productive in providing enough security if the password is not shared. In future this “Password based Door Lock System” can be provided maximum security by the above enhancements to completely satisfy user’s needs. Hence, a common man can afford to buy such locking system in minimal cost to keep his valuables safely without any worries.

## **References:**

<https://how2electronics.com/>

<https://www.irjet.net/>

<https://en.wikipedia.org/>

<http://heleh.it/news-events/advantages-and-disadvantages-that-smart-door-lock-benefits-users.html>

<https://www.youtube.com/watch?v=HpBvUFPhB-I>

<https://www.projectsof8051.com/>