Smart Door Lock System

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Abstract—**The Smart door lock system has been previously implemented using several techniques. However, the purpose of this project is to introduce yet another, but simpler technique to achieve the same result. This technique focuses majorly on the use of the Arduino Uno, Servo motor, Blynk app and the Keypad as the focal points for this project.**

I.   INTRODUCTION

The idea was to build a smart lock which works intelligently without having too many components. We intend it to have a Keypad and Blynk app which would work simultaneously in case one doesn't work, upon conformation the Arduino runs the Servo motor which would then lift the hinge attached to the door. After a delay of few seconds it locks again. If wrong password is entered more than twice it would sound the buzzer. The use Blynk app will help us in controlling the Arduino wirelessly from anywhere.

The motivation behind this arises from the fact that we currently don't have many options for smart locks which allows easy access to both users and guests. Our unique selling point is the affordability, easy to use and secure. The smart lock is designed mostly for residential housing and offices.

II.   RELATED STUDY

Aman Gupta in the Digital Door Lock project using Arduino stated that the major drivers are the Arduino uno, Liquid Crystal Display, push pull solenoid representing the door. Again, Aman Gupta, in a project, Arduino Keyless Door Lock System with Keypad and LCD says that the major components include the Arduino Uno, a DC Lock, Relay and Liquid Crystal Display [1].
Hence, from previous works, there has been no attempt to employ the use of servomotor driver and a DC motor in conjunction with a 4x4 matrix keypad and the Arduino Uno. This is a fresh concept, hence, making the setup unique.

Chinmai Naregal discussed that the major drivers of the Arduino door lock with password are the Arduino Uno microcontroller and a servo motor to represent the opening and closing of door [2].

Anushka D, in a project stated that the major drivers of Arduino door lock using 4x4 Keypad and Servo Motor are the Arduino Uno and a servo motor representing the opening and closing of the door [3].

III.   PROPOSED SYSTEM

The system is composed of 5 major parts. The microcontroller module consists basically of the Arduino Uno. The keypad module serves as the input to the microcontroller, as the password required to open the door must be entered into the system via the module. The servo motor module controls the mechanical action of the hinge (opening and closing).

The entered password appears on the interface of the Blynk app. If correct password has been entered the app interface shows "The Door is Opening". If incorrect password is entered it shows "Incorrect Password".

If the Arduino Uno gets disconnected from internet then in the Blynk app we will get a notification showing "Smart door Disconnected".
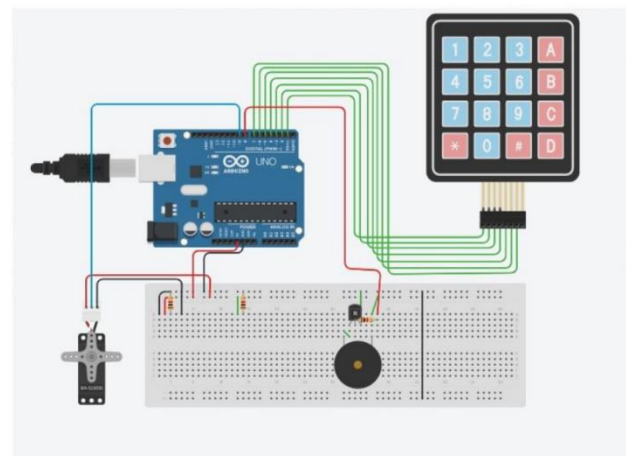

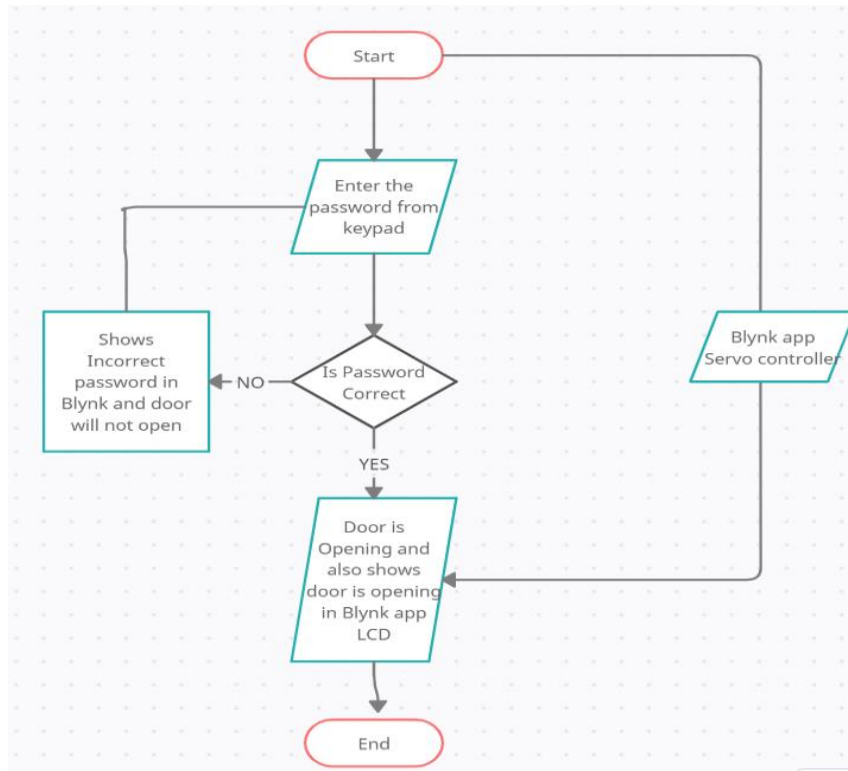Figure 1: Circuit diagram for the automated door lock system

Figure 2: Flow Chart

IV. IMPLEMENTATION

Table 1: Specifications.

NAME	QUANTITY
Arduino Uno	1
Key Pad	1
Servo Motor	1
Jump Cables	12
Buzzer	1
Blynk App (Smart Phone)	1
9v Battery	1


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#include <SoftwareSerial.h>
#include <Keypad.h>
#include <Servo.h>

#include <BlynkSimpleStream.h>


SoftwareSerial SwSerial(10, 11); // RX,
char auth[] = "Enter the Code";// mine:

const int ROW_NUM = 4; //four rows
const int COLUMN_NUM = 4; //three column


char keys[ROW_NUM][COLUMN_NUM] = {
  {'1','2','3','A'},
  {'4','5','6','B'},
  {'7','8','9','C'},
  {'*','0','#','D'}
};

byte pin_rows[ROW_NUM] = {11,10,9,8}; //
byte pin_column[COLUMN_NUM] = {7,6,5,4};
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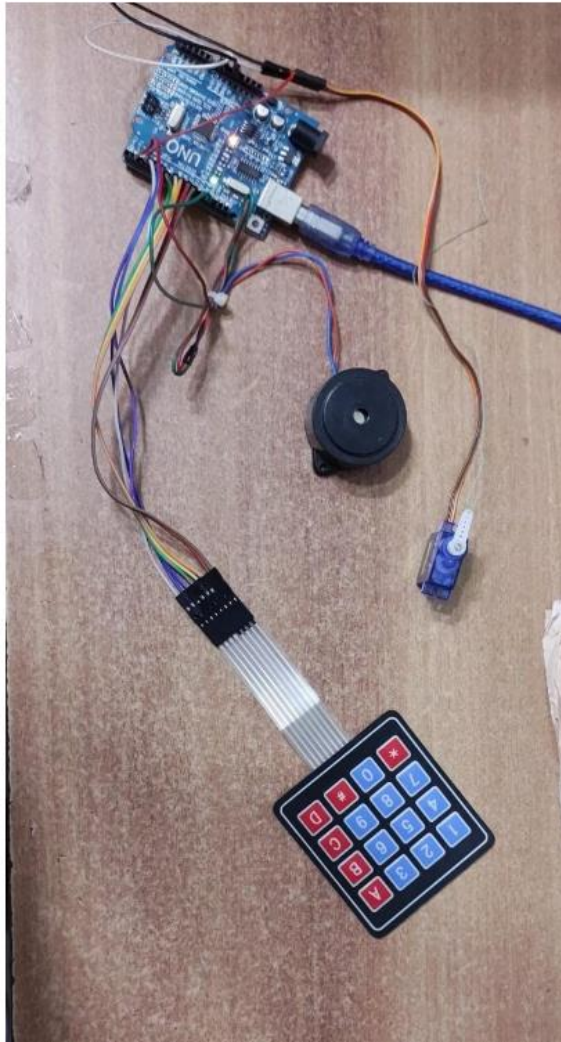Figure 3: Software tool used for implementation

Figure 4: Hard Ware Implementation

V. RESULT

The entered password appears on the interface of the Blynk app. If correct password has been entered the app interface shows "The Door is Opening" and Servo motor turns by 180 degree and the Buzzer gives us a soft sound.
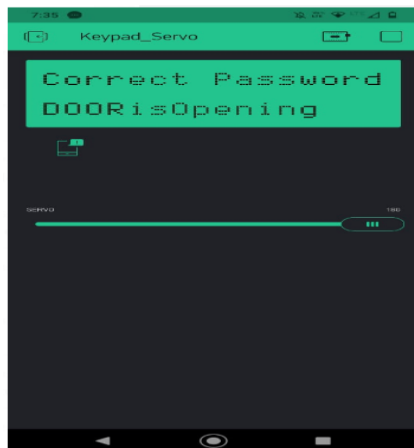

Figure 5: Message displayed in Blynk app LCD

If incorrect password is entered it shows "Incorrect Password" in the Blynk app, the Servo motor remains at 0 degree and the Buzzer gives a loud noice.
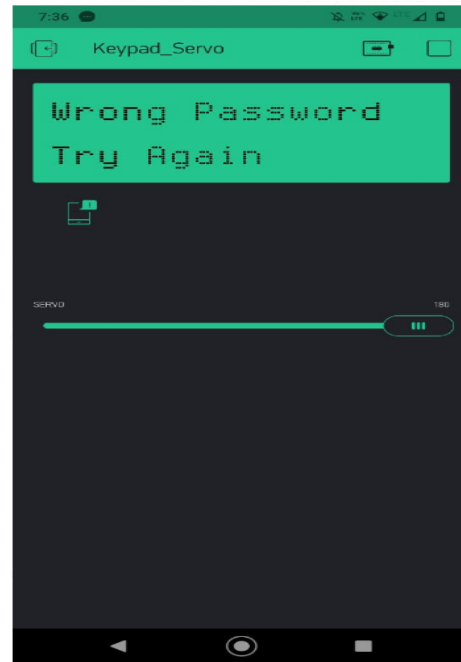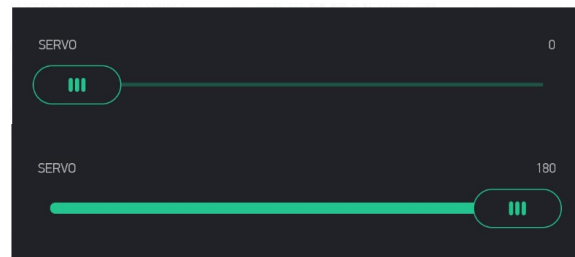

Figure 6: Message displayed in Blynk app LCD

Figure 7: Servo Slider

You can open the door from anywhere using the servo slider.

If the Arduino Uno gets disconnected from internet then in the Blynk app we will get a notification showing "Smart door Disconnected".
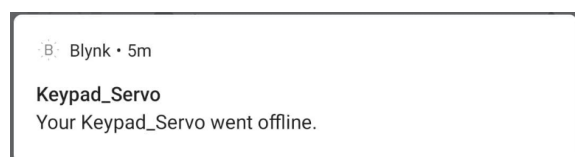

Figure 8: Notification from Blynk

VI.   ANALYSIS

From the analysis of the various products found on the market we have observed that majority of devices are hard to implement, costly and not trust worthy.

Our product tries to solve all these problems that the different products fail to offer these services. The idea was to build a smart lock which works intelligently without having too many components. As our system is made of simple things there are certain limitations to it. The major limitation of this system is its inability to automatically detect the presence of people outside when the door is closed.
As an improvement, motion sensors could be employed to implement this functionality.
Based on the motivation behind this project, this system could be applied as an access control mechanism in tertiary institutions like universities, polytechnics and the likes.

VII.   CONCLUSION

We can conclude that as we use the Arduino UNO microcontroller in this project allows for design simplicity, hence, the project can be achieved in lesser time compared to other techniques previously employed. This technique focuses majorly on the use of the Arduino Uno, Servo motor, Blynk app and the keypad as the focal points for this project.

We have a Keypad and Blynk app which would work simultaneously in case one doesn't work, upon conformation the Arduino runs the Servo motor which would then lift the hinge attached to the door.

Finally we have successfully implemented and completed the project.

References

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https://create.arduino.cc/projecthub/SurtrTech/keypad-door-lock-with-changeable-code-468b15

https://community.blynk.cc/t/how-to-display-keypad-on-blynk-lcd/36476/3

https://examples.blynk.cc/?board=Arduino%20Uno&shield=Serial%20or%20USB&example=Widgets%2FLCD%2FLCD_SimpleModePushing

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