Door lock password using Arduino

ASSIGNMENT REPORT

Submitted by

ASHOK G	**(6176AC22UEE005)**
KALAITHARAN C	**(6176AC22UEE015)**
RAJESH M	**(6176AC22UEE027)**
SUDALAIMUTHU M	**(6176AC22UEE035)**
VIJAYAN S	**(6176AC22UEE044)**

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BONAFIDE CERTIFICATE

Certified that this assignment report "Door lock password using Arduino" is the Bonafide work of "**ASHOK G (6176AC22UEE005), KALAITHARAN C (6176AC22UEE015), RAJESH M (6176AC22UEE027), SUDALAIMUTHU M (6176AC22UEE035), VIJAYAN S (6176AC22UEE044)**" who carried out the project work under my supervision.

SIGNATURE

Dr.K.SANTHI

HEAD OF THE DEPARTMENT

Department of Electrical and Electronics Engineering

Adhiyamaan College of Engineering, Hosur

SIGNATURE

Dr.BHARATHIDASAN MOHAN

SUPERVISOR

Professor of Practice

Department of Electrical and Electronics Engineering

Adhiyamaan College of Engineering, Hosur

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CHAPTER 1

PROBLEM IDENTIFICATION

1.1 Problem Identification

- Traditional mechanical locks are vulnerable to picking, duplication of keys, and unauthorized access. There's a growing need for more secure and customizable access control solutions.
- Regular door locks do not authenticate the person accessing the premises. Anyone with a key can gain access, which poses a risk in shared or sensitive environments.
- Physical keys can be lost, stolen, or shared without permission. Managing multiple keys for different users is inefficient and insecure in the long run.
- Most conventional locking systems do not provide logs, access control, or the ability to change the password easily. There's a demand for smart locks that can be easily updated and customized.

1.2 Objective

To design and implement a password-protected door lock system using Arduino for enhanced security and controlled access.

1.3 Block diagram

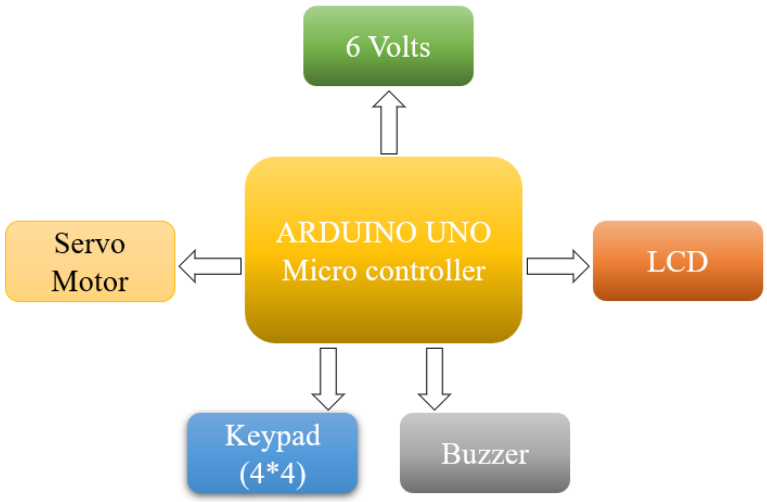

Figure 1.3.1 Block Diagram of Door lock password using Arduino

CHAPTER 2

DISCRIMINATION OF EACH ELEMENTS

2.1 Arduino Uno

- The Arduino Uno is a versatile microcontroller board used for building electronic projects.
- At its core is the ATmega328P microcontroller which executes programmed instructions to interact with various components.
- The board provides digital and analog input/output pins for connecting sensors actuators and other peripherals.
- It also features an onboard USB interface for programming and communication with a computer.
- With its simplicity and compatibility with a vast library of open-source code the Arduino Uno is ideal for prototyping and learning electronics.
- Its functionality makes it suitable for tasks ranging from controlling LEDs to managing complex systems like robots and IoT devices.

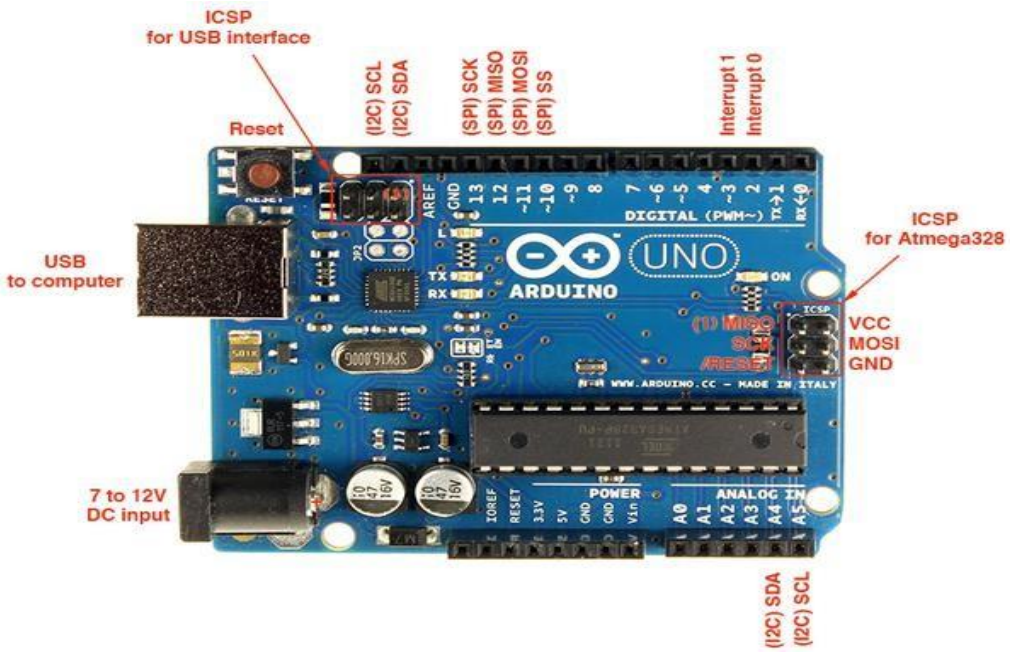

Figure 2.1.1 Arduino Uno

2.2. LCD Display with Module

- LCD (Liquid Crystal Display) shows text or numbers; common types are 16x2 (2 lines, 16 characters each) or 20x4.
- It often comes with an I2C module that reduces the number of wires needed from 6+ to just 2 (SDA, SCL).
- The module allows easy communication with microcontrollers like Arduino or Raspberry Pi.
- Power supply is usually 5V, and a potentiometer on the module adjusts the screen contrast.
- Widely used in DIY projects to display sensor data, menus, clocks, or system status.

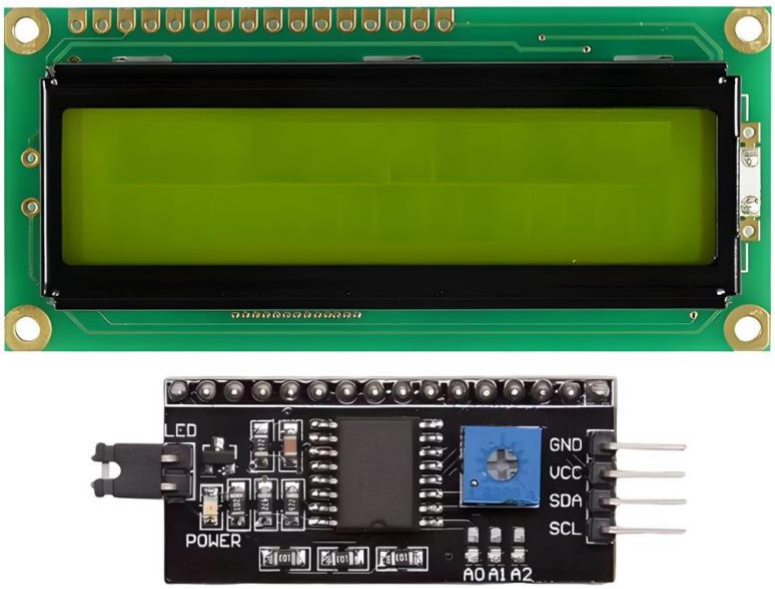

Figure 2.2.1 LCD Display with Module

2.3. Buzzer

- Buzzer is an audio signaling device that produces a beep or tone when powered.
- There are two main types:
  - **Active buzzer**: has a built-in oscillator just connect power to make sound.
  - **Passive buzzer**: needs a signal (like from PWM) to create sound.
- It usually operates on 5V and is commonly used with Arduino, Raspberry Pi, etc.
- Used in alarms, notifications, timers, or feedback systems in electronics.
- Controlled through a digital pin on microcontrollers easy to turn on/off or chang tone.

Figure 2.3.1 Buzzer

2.4. Sevro Motor

- Servo motor is a type of motor that allows precise control of angular position, usually from 0° to 180° (sometimes 360° or more for continuous rotation).
  - It has three wires:
  - Power (VCC, usually 5V)
  - Ground (GND)
- Control signal (PWM input)
- Controlled using PWM (Pulse Width Modulation) from a microcontroller like Arduino to set its angle.
- Internally, it includes a DC motor, gearbox, and feedback circuit for position control.
- Commonly used in robotics, RC vehicles, arms, pan-tilt systems, and other applications needing controlled movement.

Figure 2.4.1 Sevro Motor

2.5 Printed Circuit Board

- A Printed Circuit Board (PCB) serves as the foundation for electronic devices by mechanically supporting and electrically connecting electronic components.
- It consists of a flat insulated substrate with conductive pathways etched into its surface enabling efficient signal transmission between components.
- Components like resistors capacitors and microcontrollers are soldered onto the PCB forming a complete circuit.
- PCBs are widely used due to their ability to compactly and reliably organize circuits ensuring stable operation of devices like computers smartphones and appliances.

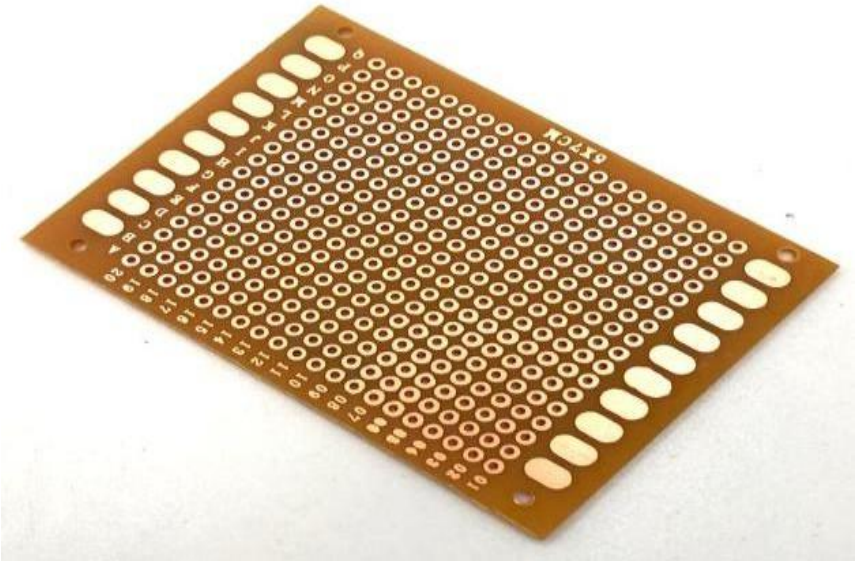

Figure 2.5.1 Printed Circuit Board

2.6 Jumper Wire

- Jumper wires are essential tools in electronics for creating temporary or flexible connections between components or devices on a breadboard PCB or other prototyping setups.
- These wires are insulated with connectors or bare ends allowing for easy insertion and removal without soldering.
- They enable quick circuit assembly testing and troubleshooting making them ideal for experiments and prototypes.
- Jumper wires come in various types—male-to-male male-to-female and female-to-female—offering versatility in connecting different components.
- Their simplicity and reusability make them indispensable in learning and developing electronics.

Figure 2.6.1 Rainbow wire

2.7 Power Supply

- A power supply is a crucial component that provides electrical energy to power electronic devices and circuits.
- Its primary function is to convert electrical energy from a source (such as mains AC or batteries) into a suitable form and voltage level required by the connected devices.
- Power supplies often regulate the output voltage to ensure a stable and consistent supply protecting sensitive components from fluctuations.
- They can be categorized into linear power supplies which are simple and reliable and switching power supplies which are more efficient.
- Widely used in chargers computers and industrial equipment power supplies are indispensable for ensuring the smooth operation of modern electronic systems.

Figure 2.7.1 Charger

CHAPTER 3
COST ESTIMATION

3.1 COST ESTIMATION

Table 3.1.1 Cost Estimation

S. No	Components	Quantity	Approximate Cost (INR)
1	Arduino Uno	1	500
2	LCD display with module	1	300
3	Buzzer	1	50
4	Sevro Motor	1	100
5	PCB Board	1	65
6	Rainbow wire	few	50
7	12V Charger	1	100
		Total:	1,165

CHAPTER 4

EXPLANATION

4.1. A digital security system that unlocks a door only when the correct password is entered using a keypad.

4.2. Definition:

Processing refers to how the microcontroller (e.g., Arduino) handles and interprets input signals (from sensors, keypads, etc.) to make decisions and perform actions.

4.3. Input Handling:

The system receives data from input devices (like a keypad, motion sensor, or fingerprint scanner), which is read and interpreted by the Arduino.

4.4. Decision Making:

Based on programmed logic (e.g., "If password = correct"), the microcontroller processes the input to determine the correct action (e.g., unlock door, sound buzzer).

4.5. Control Signals:

After processing, Arduino sends output signals to actuators such as servo motors, buzzers, or displays, depending on the decision.

4.6. Example in Password Door Lock:

User enters a code → Arduino processes the code → compares with stored password → sends command to servo to unlock if matched → else shows error or triggers buzzer.

CHAPTER 5

RESULT

5.1 Door lock password using Arduino Output

- When the correct password is entered, Arduino sends a signal to the servo to rotate and unlock the door.
- After a short delay, it returns to the locked position.

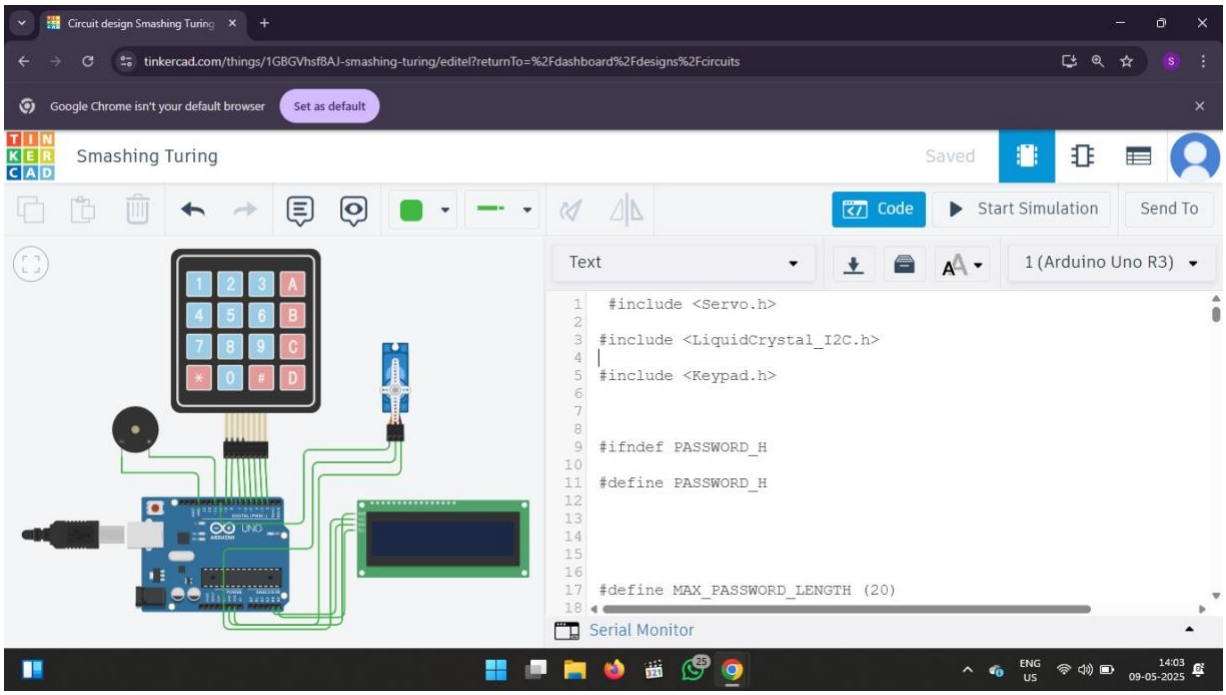

Figure 5.1.1 Software Output (Tinker cad) Door lock password using Arduino

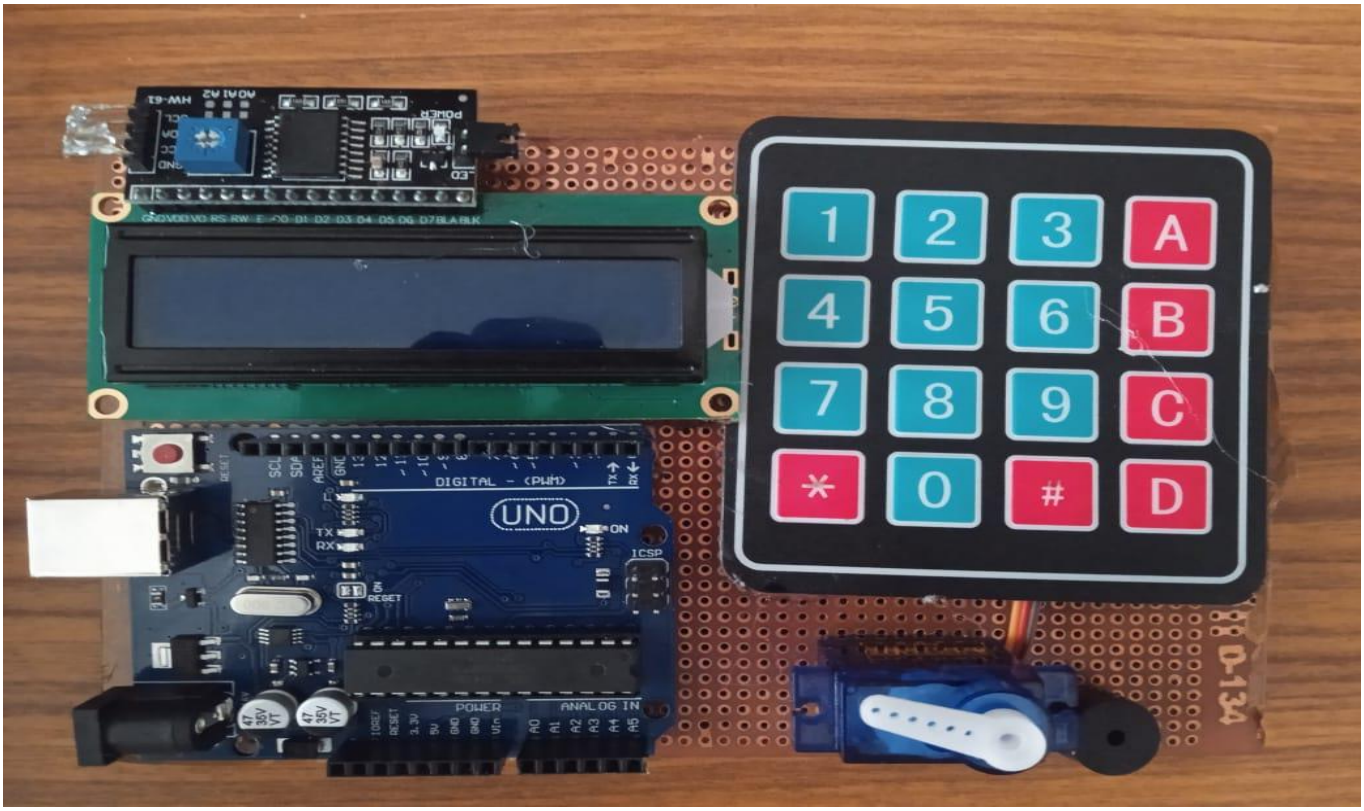

Figure 5.1.2 Hardware Output Door lock password using Arduino output

CHAPTER 6

ADVANTAGES AND APPLICATIONS

6.1 ADVANTAGES

1. Improved Security
2. Real-Time Updates
3. No Physical Key Needed
4. Ease of Use
5. Customizable
6. Cost-Effective
7. Educational Value

6.2 APPLICATIONS

1. Home security, office access, locker protection, educational projects.
2. Smart home systems, restricted area entry, portable security solutions, DIY projects.
3. Personal storage, toolbox security, exhibition booths, temporary installations.
4. Access control for small businesses, shared spaces, campus security, learning prototypes.