4-Digit Password Lock Using Keypad & Servo Motor with Arduino

(Full Tutorial with Library Installation Instructions)

🔧 Components Required

1. **Arduino Uno** (or any compatible board)
2. **4x4 Matrix Keypad**
3. **SG90 Servo Motor**
4. **Jumper Wires**
5. **External Power Supply** (if needed)

📥 Library Installation in Arduino IDE

Before uploading the code, you need to install the required libraries:

1️⃣ Install Keypad Library

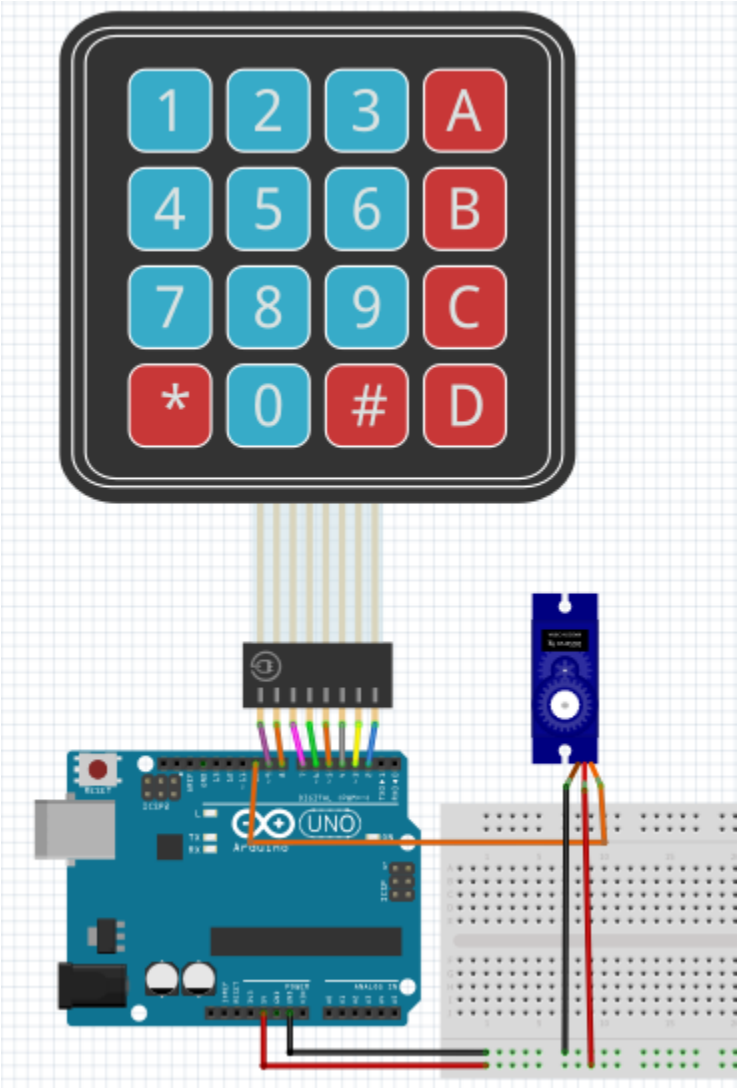
1. Open **Arduino IDE**.
2. Go to **Sketch → Include Library → Manage Libraries**.
3. In the search bar, type **Keypad**.
4. Select **"Keypad by Mark Stanley, Alexander Brevig"** and click **Install**.

2️⃣ Install Servo Library *(Pre-installed in Arduino IDE, but verify it's there)*

1. Go to **Sketch → Include Library → Manage Libraries**.
2. Search for **Servo**.
3. If it's not installed, click **Install**.

🔌 Circuit Connections

🔢 Keypad Connection (4x4)



Keypad Pin	Arduino Pin
Row 1 (R1)	D9
Row 2 (R2)	D8
Row 3 (R3)	D7
Row 4 (R4)	D6
Col 1 (C1)	D5
Col 2 (C2)	D4
Col 3 (C3)	D3

Col 4 (C4)	D2

🔄 Servo Motor Connection

Servo Wire	Arduino Connection
Red (VCC)	**5V**
Black/Brown (GND)	**GND**
Yellow/Orange (Signal)	**D10**

📝 Code for 4-Digit Password Lock Using Keypad & Servo Motor

```
#include <Keypad.h>  // Include Keypad library
#include <Servo.h>   // Include Servo library


// Define password
const String password = "1234"; // Set your password
String inputPassword = "";

// Servo setup
Servo lockServo;
int servoPin = 10;


// Keypad setup
const byte ROWS = 4;
const byte COLS = 4;


char hexaKeys[ROWS][COLS] = {
  {'1', '2', '3', 'A'},
  {'4', '5', '6', 'B'},
  {'7', '8', '9', 'C'},
  {'*', '0', '#', 'D'}
};
```

```
byte rowPins[ROWS] = {9, 8, 7, 6};
byte colPins[COLS] = {5, 4, 3, 2};


Keypad customKeypad = Keypad(makeKeymap(hexaKeys), rowPins, colPins, ROWS,
COLS);


void setup() {
  Serial.begin(9600);
  lockServo.attach(servoPin);
  lockServo.write(0); // Locked position
  Serial.println("Enter 4-digit password:");
}


void loop() {
  char customKey = customKeypad.getKey(); // Read Keypad Input


  if (customKey) {
    Serial.print(customKey);
    inputPassword += customKey; // Append entered key to the password
string


    if (inputPassword.length() == 4) { // When 4 digits are entered
      Serial.println(); // New line for readability


      if (inputPassword == password) {
        Serial.println(" Access Granted!");
        lockServo.write(90); // Unlock position
        delay(3000);         // Hold for 3 seconds
        lockServo.write(0);  // Lock position again
      } else {
        Serial.println("  Incorrect Password! Try Again.");
      }
```

```
      inputPassword = ""; // Reset input after checking
      Serial.println("Enter 4-digit password:");
    }
  }
}
```

🛠️ How It Works

1. **User Inputs Password** using the keypad.
2. **Password Verification**:
    - If correct → **Servo rotates 90° (Unlock)** + **Message on Serial Monitor**
    - If incorrect → **Servo remains at 0° (Locked)** + **Error message**
3. **Auto-Lock**: After 3 seconds, servo returns to 0° (Locked).
4. **Password Reset**: After checking, the system resets and waits for a new input.

💡 Additional Features (For Students to Try)

- 🔄 **Change Password Feature:** Modify the code to allow setting a new password.
- 📟 **LCD Display:** Show messages on a **16x2 LCD** instead of the Serial Monitor.
- 🚨 **Buzzer Alarm:** If the wrong password is entered **3 times**, trigger a buzzer.

This project is great for learning **Arduino, security systems, keypad interfacing, and servo motor control**! 🚀
