



# University of Asia Pacific

Department of Computer Science and Engineering

## CSE 316: Microprocessors and Microcontrollers Lab

### LAB REPORT

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**Experiment Number:** 03

**Experiment Title:** Mini Project 3: Touch Sensor Based Door Lock with Buzzer and Servo Motor

**Date of Submission:** 18.09.2025

**Submitted by:**

**Name :** H. M. Tahsin Sheikh

**Student ID :** 22201243

**Section :** E-1

**Submitted to:**

**Zaima Sartaj Taheri**

**Lecturer,**

**Department of Computer Science and  
Engineering**

## 1. Experiment Name

Mini Project 3: Touch Sensor Based Door Lock with Buzzer and Servo Motor

## 2. Objective

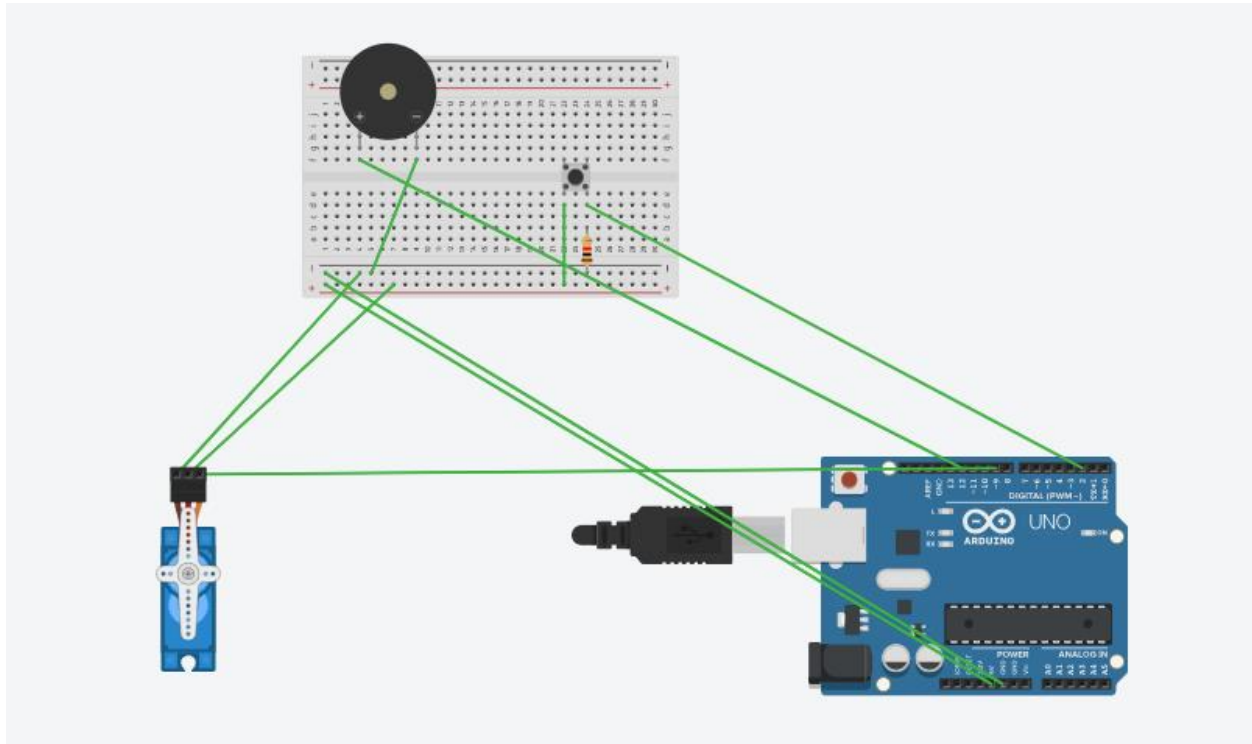
To design and implement a door locking system using a touch sensor (pushbutton), servo motor, and piezo buzzer. The system allows toggling between lock and unlock states, with the buzzer providing audio feedback for each action.

## 3. Apparatus / Hardware & Software Requirements

All required tools and components:

- Arduino Uno (microcontroller)
- Servo Motor (door locking mechanism)
- Pushbutton (touch sensor input)
- Piezo Buzzer (for alerts)
- Breadboard (trainer board)
- Resistors (1k $\Omega$  or 10k $\Omega$  pull-down)
- Jumper Wires

#### 4. Circuit Diagram / Schematic



#### 5. Code / Assembly Program

```
#include <Servo.h>
Servo barrierServo;

int touchPin = 2;
int buzzerPin = 12;

bool doorLocked = true;

void setup() {
  barrierServo.attach(9);

  barrierServo.write(0);

  pinMode(buzzerPin, OUTPUT);
  pinMode(touchPin, INPUT);
}
```

```

void loop() {
  int touchState = digitalRead(touchPin);

  if (touchState == HIGH) {
    if (doorLocked) {
      // Unlock the door
      barrierServo.write(90);
      tone(buzzerPin, 1000, 400);
      delay(400);
      noTone(buzzerPin);
      digitalWrite(buzzerPin, HIGH);
      doorLocked = false;
    } else {
      // Lock the door
      barrierServo.write(45);
      tone(buzzerPin, 1000, 200);
      delay(200);
      noTone(buzzerPin);
      digitalWrite(buzzerPin, LOW);
      doorLocked = true;
    }

    delay(1000); //
  }
}

```

## Output / Observations

When the pushbutton (touch sensor) is pressed:

- If the door is locked, the servo rotates to 90° (unlock position), and the buzzer produces a long beep.

- If the door is unlocked, the servo rotates to 45° (lock position), and the buzzer produces a short beep.

The buzzer gives distinct audio feedback for locking and unlocking.

The doorLocked flag ensures proper toggling between states.

## **7. Result**

The touch sensor-based door lock was successfully built and tested. The pushbutton effectively toggles the servo motor between locked and unlocked positions. The buzzer clearly indicates the state of the lock, making the system more user-friendly and reliable.

## **8. Conclusion**

The project shows how an automated door locking system may be made using an Arduino and simple electronic components. By controlling locking and unlocking with a touch-based input and providing feedback via a buzzer, it improves convenience and security. For increased security, this project can be expanded by adding more sophisticated sensors (such as RFID, fingerprint, and keypad).