TECHNOLOGICAL UNIVERSITY OF THE PHILIPPINES

Ayala Boulevard, Ermita, Manila

CIT-ELECTRONICS DEPARTMENT

**CPET11L-M – Microprocessor and Microcontroller Systems, Lab**

**1st Semester, SY 2-24-2025**

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| **Course & Section:** BET-CPET- 3A | **Date Submitted:** September 20, 2025 |

**Activity 1**

**Topic 1: LED with Potentiometer**

**Topic 2: LED with Switch**

**Topic 3: LED with combination of Potentiometer and Switch**

1. **OBJECTIVES**

* To apply practical knowledge in using the Arduino Uno R3
* To explain the functions and components of the related topics
* To implement LED Blinking and LED Chaser using code and circuit diagrams
* To develop and enhance problem-solving skills related to the topics

1. **EQUIPMENT AND MATERIALS**

**HARDWARE**

* Arduino Uno/Mega 2560
* Breadboard
* Jumper Wires
* Laptop
* Red Light-emitting diode
* Resistors: 220Ω and 10K Ω
* 10K Ω Potentiometer
* Push/Tactile Button
* Arduino USBVCC

**SOFTWARE**

* Arduino IDE
* MS Word
* TinkerCad Simulator

1. **DIAGRAM**

**===== TOPIC 1: LED with Potentiometer =====**

1. **TinkerCad Simulation**

**A circuit board with wires

AI-generated content may be incorrect.**

1. **Breadboard**

**A close-up of a circuit board

AI-generated content may be incorrect.**

1. **Source Code**

for (int i = 7; i >= 0; i--) {

delayTime = analogRead(potPin);

digitalWrite(ledPin[i], HIGH);

delay(delayTime);

digitalWrite(ledPin[i], LOW);

}

}

int ledNum = 8;

int ledPin[] = {4, 5, 6, 7, 8, 9,10,11};

int delayTime;

int potPin = A0;

void setup() {

for (int x = 0; x < ledNum; x++) {

pinMode(ledPin[x], OUTPUT);

}

}

void loop() {

for (int i = 0; i < 8; i++) {

delayTime = analogRead(potPin);

digitalWrite(ledPin[i], HIGH);

delay(delayTime);

digitalWrite(ledPin[i], LOW);  
}

**===== TOPIC 2: LED with Push Button =====**

1. **TinkerCad Simulation**

**A circuit board with wires

AI-generated content may be incorrect.**

1. **Breadboard**

**A circuit board with red lights

AI-generated content may be incorrect.**

1. **Source Code**

void pattern1(){

for(int x = 4; x<=11 ; x++){

digitalWrite(x, HIGH);

delay(100);

digitalWrite(x, LOW);

delay(100);}}

void pattern2(){

for(int x = 4; x<=11 ; x++){

digitalWrite(x, HIGH);

delay(100);}

for(int x = 11 ; x>=4 ; x--){

digitalWrite(x, LOW);

delay(100);}}

void pattern3(){

for(int x = 4; x<=11 ; x++){

digitalWrite(x, HIGH);

delay(100);

digitalWrite(x, LOW);}

for(int x = 11; x>=4 ; x--){

digitalWrite(x, HIGH);

delay(100);

digitalWrite(x, LOW);}}

void pattern4(){

digitalWrite(4, HIGH);

digitalWrite(11, HIGH);

delay(100);

digitalWrite(4, LOW);

digitalWrite(11, LOW);

delay(100);

digitalWrite(5, HIGH);

digitalWrite(10, HIGH);

delay(100);

digitalWrite(5, LOW);

digitalWrite(10, LOW);

delay(100);

int t = 0;

void setup()

{

for(int x = 4 ; x<=11 ; x++){

pinMode(x,OUTPUT);}

pinMode (4 , OUTPUT);

pinMode (5 , OUTPUT);

pinMode (6 , OUTPUT);

pinMode (7 , OUTPUT);

pinMode (8 , OUTPUT);

pinMode (9 , OUTPUT);

pinMode (10 , OUTPUT);

pinMode (11 , OUTPUT);

pinMode(3, INPUT);

}

void loop()

{

if (digitalRead(3)==HIGH){

t++;

delay(100);

}

if (t==1){

pattern1();}

if (t==2){

pattern2();}

if (t==3){

pattern3();}

if (t==4){

pattern4();}

if (t==5){

pattern5();}

}

digitalWrite(4, HIGH);

digitalWrite(11, HIGH);

delay(100);

digitalWrite(4, LOW);

digitalWrite(11, LOW);

delay(100);}

void pattern5 (){

digitalWrite(4, LOW);

digitalWrite(5, LOW);

digitalWrite(6, LOW);

digitalWrite(7, LOW);

digitalWrite(8, LOW);

digitalWrite(9, LOW);

digitalWrite(10, LOW);

digitalWrite(11, LOW);

t=0;}

digitalWrite(6, HIGH);

digitalWrite(9, HIGH);

delay(100);

digitalWrite(6, LOW);

digitalWrite(9, LOW);

delay(100);

digitalWrite(7, HIGH);

digitalWrite(8, HIGH);

delay(100);

digitalWrite(7, LOW);

digitalWrite(8, LOW);

delay(100);

digitalWrite(7, HIGH);

digitalWrite(8, HIGH);

delay(100);

digitalWrite(7, LOW);

digitalWrite(8, LOW);

delay(100);

digitalWrite(6, HIGH);

digitalWrite(9, HIGH);

delay(100);

digitalWrite(6, LOW);

digitalWrite(9, LOW);

delay(100);

digitalWrite(5, HIGH);

digitalWrite(10, HIGH);

delay(100);

digitalWrite(5, LOW);

digitalWrite(10, LOW);

delay(100);

**=== TOPIC 3: LED with combination of Potentiometer and Switch ===**

1. **TinkerCad Simulation**

**A circuit board with wires connected to it

AI-generated content may be incorrect.**

1. **Breadboard**

**A close-up of a machine

AI-generated content may be incorrect.**

1. **Source Code**

int t = 0;

int potentio= A0;

int delayTime;

void setup(){

for(int x = 4 ; x<=11 ; x++){

pinMode(x, OUTPUT);}

pinMode(3, INPUT);

}

void loop(){

if (digitalRead(3)==HIGH){

t++;

delay(10);

}

if (t==1){

pattern1();}

if (t==2){

pattern2();}

if (t==3){

pattern3();}

if (t==4){

pattern4();}

if (t==5){

reset();}

}

void pattern1(){

for(int x = 4; x<=11 ; x++){

delayTime= analogRead(potentio);

digitalWrite(x, HIGH);

delay(delayTime);

digitalWrite(x, LOW);

delay(delayTime);}}

void pattern2(){

for(int x = 4; x<=11 ; x++){

delayTime= analogRead(potentio);

digitalWrite(x, HIGH);

delay(delayTime);}

for(int x = 11 ; x>= 4 ; x--){

delayTime= analogRead(potentio);

digitalWrite(x, LOW);

delay(delayTime);}}

void pattern3(){

for(int x = 4; x<=11 ; x++){

delayTime= analogRead(potentio);

digitalWrite(x, HIGH);

delay(delayTime);

digitalWrite(x, LOW);}

for(int x = 11; x>=4 ; x--){

delayTime= analogRead(potentio);

digitalWrite(x, HIGH);

delay(delayTime);

digitalWrite(x, LOW);}}

delayTime= analogRead(potentio);

digitalWrite(7, HIGH);

digitalWrite(8, HIGH);

delay(delayTime);

digitalWrite(7, LOW);

digitalWrite(8, LOW);

delay(delayTime);

delayTime= analogRead(potentio);

digitalWrite(6, HIGH);

digitalWrite(9, HIGH);

delay(delayTime);

digitalWrite(6, LOW);

digitalWrite(9, LOW);

delay(delayTime);

delayTime= analogRead(potentio);

digitalWrite(5, HIGH);

digitalWrite(10, HIGH);

delay(delayTime);

digitalWrite(5, LOW);

digitalWrite(10, LOW);

delay(delayTime);

delayTime= analogRead(potentio);

digitalWrite(4, HIGH);

digitalWrite(11, HIGH);

delay(delayTime);

digitalWrite(4, LOW);

digitalWrite(11, LOW);

delay(delayTime);}

void reset(){

for (int i = 0 ; i < 8 ; i++){

digitalWrite(i, LOW);

t = 0;}}

void pattern4(){

delayTime= analogRead(potentio);

digitalWrite(4, HIGH);

digitalWrite(11, HIGH);

delay(delayTime);

digitalWrite(4, LOW);

digitalWrite(11, LOW);

delay(delayTime);

delayTime= analogRead(potentio);

digitalWrite(5, HIGH);

digitalWrite(10, HIGH);

delay(delayTime);

digitalWrite(5, LOW);

digitalWrite(10, LOW);

delay(delayTime);

delayTime= analogRead(potentio);

digitalWrite(6, HIGH);

digitalWrite(9, HIGH);

delay(delayTime);

digitalWrite(6, LOW);

digitalWrite(9, LOW);

delay(delayTime);

delayTime= analogRead(potentio);

digitalWrite(7, HIGH);

digitalWrite(8, HIGH);

delay(delayTime);

digitalWrite(7, LOW);

digitalWrite(8, LOW);

delay(delayTime);

1. **PROCEDURE**

**A. Preparation**

* Gather the required components: Arduino Uno R3, breadboard, LEDs, resistors, potentiometer, buttons, and jumper wires.
* Install the Arduino IDE on the computer.
* Review the circuit diagrams for each topic. Simulate your circuit diagram to a circuit simulator such as TinkerCADor Wokwi.

**B. Actual**

* Connect the LED with a potentiometer according to the diagram and upload the code.
* Set up the LED with a switch and test the on/off function.
* Combine the potentiometer and switch to control the LED in different ways.

**C. Checking**

* Observe if the LED responds correctly to the potentiometer and/or switch.
* Verify the wiring connections and the uploaded code.
* Adjust values or fix errors if the output is not working as expected.

**D. Uploading**

* Upload the final and corrected code to the Arduino Uno R3.
* Ensure that all three topics (potentiometer, switch, and combination) work properly.

1. **CONCLUSION**

The activities have been a great help for me to understand further on how to make a row of LED lights light up in a “running” manner. In this activity, I learned how to utilize function in an effective manner to group light patterns. However, this lesson is among other things. With this activity, I am slowly grasping the proper functions and things needed to understand the Arduino.

A close-up of a document

AI-generated content may be incorrect.