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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**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
* Breadboard
* Jumper Wires
* Laptop
* Light-emitting diode (blue and red)
* Resistors 220Ω

**SOFTWARE**

* Arduino IDE
* MS Word
* TinkerCad Simulator

1. **DIAGRAM**

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

1. **A circuit board with wires connected to it

   AI-generated content may be incorrect.TinkerCad Simulation**

**A circuit board with wires and wires

AI-generated content may be incorrect.**

1. **Breadboard**
2. **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 Switch =====**

1. **TinkerCad Simulation**

**A circuit board with wires connected to it

AI-generated content may be incorrect.**

**A circuit board with wires and wires

AI-generated content may be incorrect.**

1. **Breadboard**
2. **Source Code**

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();}

}

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, LOW);

digitalWrite(10, LOW);

delay(100);

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(5, HIGH);

digitalWrite(10, HIGH);

delay(100);

digitalWrite(5, LOW);

digitalWrite(10, LOW);

delay(100);

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);

**=== 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 circuit board with wires and wires

AI-generated content may be incorrect.**

1. **Source Code**

int t = 0;

int delayTime;

int potPin = A0;

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();}

}

void pattern1(){

  for(int x = 4; x<=11 ; x++){

    delayTime = analogRead(potPin);

    digitalWrite(x, HIGH);

    delay(delayTime);

    digitalWrite(x, LOW);

    delay(delayTime);}}

void pattern2(){

  for(int x = 4; x<=11 ; x++){

    delayTime = analogRead(potPin);

    digitalWrite(x, HIGH);

    delay(delayTime);}

  for(int x = 11 ; x>=4 ; x--){

    delayTime = analogRead(potPin);

    digitalWrite(x, LOW);

    delay(delayTime);}}

void pattern3(){

  for(int x = 4; x<=11 ; x++){

    delayTime = analogRead(potPin);

    digitalWrite(x, HIGH);

    delay(delayTime);

    digitalWrite(x, LOW);}

  for(int x = 11; x>=4 ; x--){

    delayTime = analogRead(potPin)

  digitalWrite(7, LOW);

  digitalWrite(8, LOW);

  delay(delayTime);

  digitalWrite(6, HIGH);

  digitalWrite(9, HIGH);

  delay(delayTime);

  digitalWrite(6, LOW);

  digitalWrite(9, LOW);

  delay(delayTime);

  digitalWrite(5, HIGH);

  digitalWrite(10, HIGH);

  delay(delayTime);

  digitalWrite(5, LOW);

  digitalWrite(10, LOW);

  delay(delayTime);

  digitalWrite(4, HIGH);

  digitalWrite(11, HIGH);

  delay(delayTime);

  digitalWrite(4, LOW);

  digitalWrite(11, LOW);

  delay(delayTime);}

  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(x, HIGH);

    delay(delayTime);

    digitalWrite(x, LOW);}}

void pattern4(){

  delayTime = analogRead(potPin);

  digitalWrite(4, HIGH);

  digitalWrite(11, HIGH);

  delay(delayTime);

  digitalWrite(4, LOW);

  digitalWrite(11, LOW);

  delay(delayTime);

  digitalWrite(5, HIGH);

  digitalWrite(10, HIGH);

  delay(delayTime);

  digitalWrite(5, LOW);

  digitalWrite(10, LOW);

  delay(delayTime);

  digitalWrite(6, HIGH);

  digitalWrite(9, HIGH);

  delay(delayTime);

  digitalWrite(6, LOW);

  digitalWrite(9, LOW);

  delay(delayTime);

  digitalWrite(7, HIGH);

  digitalWrite(8, HIGH);

  delay(delayTime);

  digitalWrite(7, LOW);

  digitalWrite(8, LOW);

  delay(delayTime);

  digitalWrite(7, HIGH);

  digitalWrite(8, HIGH);

  delay(delayTime);

1. **PROCEDURE**

**A. Preparation**

* Gather the required components: Arduino Uno R3, breadboard, LEDs, resistors, potentiometer, switches, and jumper wires.
* Install the Arduino IDE on the computer.
* Review the circuit diagrams for each topic.

**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**

Through the activities, we successfully learned how to control an LED using a potentiometer, a switch, and their combination with the Arduino Uno R3. The experiments demonstrated how hardware components interact with coding, improving our understanding of circuit behavior. This also enhanced our problem-solving skills by testing, debugging, and applying the correct solutions to achieve the desired output.

A close-up of a document

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