LED Pattern Project using Arduino

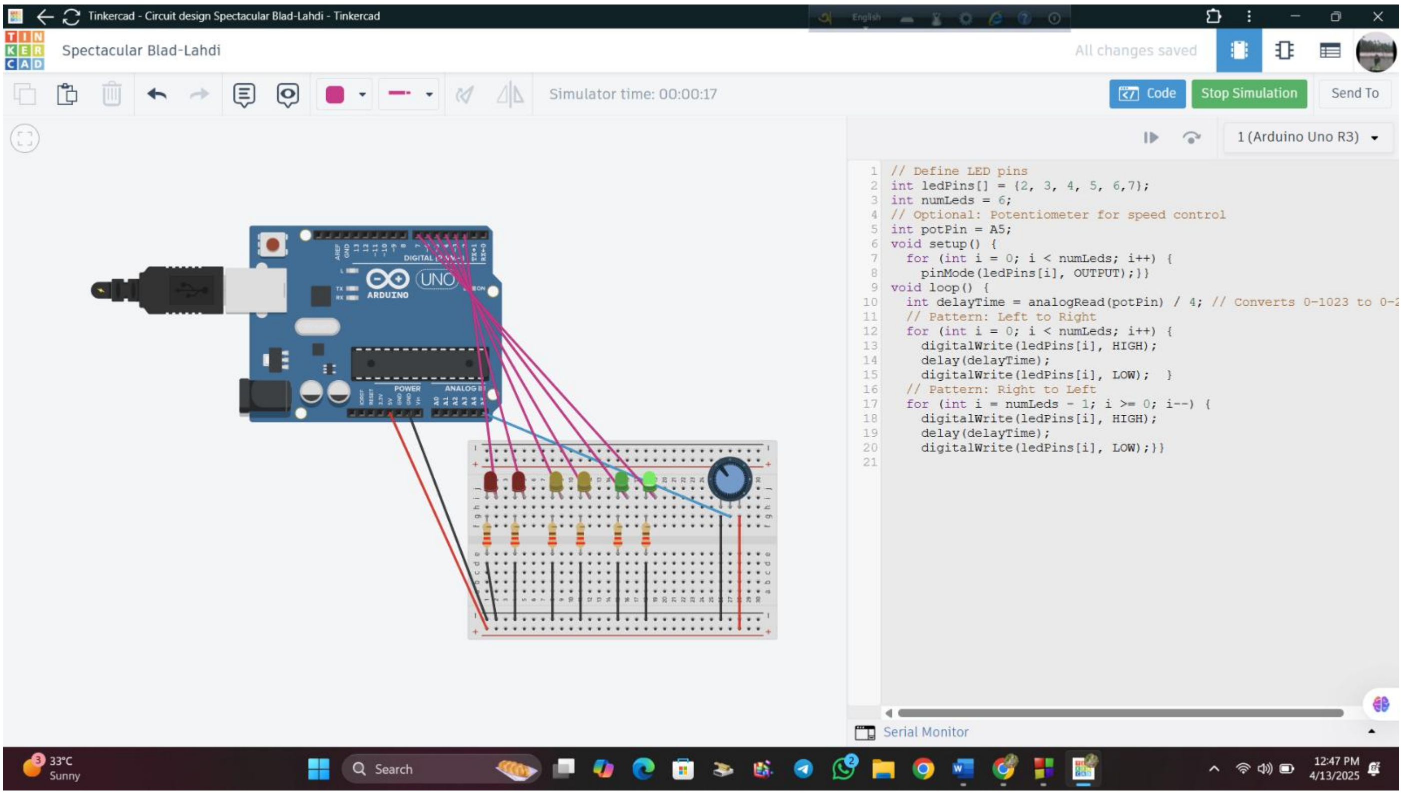
Objective:

To create a sequence of LED patterns controlled by an Arduino, with an optional potentiometer to adjust speed or change modes.

Components Needed:

- Arduino Uno (or compatible board)
- Breadboard
- LEDs (x5 or more)
- Resistors (220Ω for each LED)
- Potentiometer (optional – for speed or mode control)
- Jumper wires
- USB cable (for programming the Arduino)

Circuit Connections:



```
// Define LED pins
int ledPins[] = {2, 3, 4, 5, 6,7};
int numLeds = 6;
// Optional: Potentiometer for speed control
int potPin = A5;
void setup() {
  for (int i = 0; i < numLeds; i++) {
    pinMode(ledPins[i], OUTPUT);}}
void loop() {
  int delayTime = analogRead(potPin) / 4; // Converts 0-1023 to 0-2
  // Pattern: Left to Right
  for (int i = 0; i < numLeds; i++) {
    digitalWrite(ledPins[i], HIGH);
    delay(delayTime);
    digitalWrite(ledPins[i], LOW);  }
  // Pattern: Right to Left
  for (int i = numLeds - 1; i >= 0; i--) {
    digitalWrite(ledPins[i], HIGH);
    delay(delayTime);
    digitalWrite(ledPins[i], LOW);}}

```

LEDs:

- Connect the anode (long leg) of each LED to a digital pin on Arduino (e.g., pins 2–6).
- Connect a 220Ω resistor from each LED's cathode to GND.

Potentiometer (optional):

- Connect middle pin to A0 (analog input).
- Connect side pins to 5V and GND.

Code Overview:

```
// Define LED pins
int ledPins[] = {2, 3, 4, 5, 6,7};
int numLeds = 6;
// Optional: Potentiometer for speed control
int potPin = A5;
void setup() {
  for (int i = 0; i < numLeds; i++) {
    pinMode(ledPins[i], OUTPUT);}}
void loop() {
  int delayTime = analogRead(potPin) / 4; // Converts 0–1023 to 0–255 ms
  // Pattern: Left to Right
  for (int i = 0; i < numLeds; i++) {
    digitalWrite(ledPins[i], HIGH);
    delay(delayTime);
    digitalWrite(ledPins[i], LOW);  }
  // Pattern: Right to Left
  for (int i = numLeds - 1; i >= 0; i--) {
    digitalWrite(ledPins[i], HIGH);
    delay(delayTime);
    digitalWrite(ledPins[i], LOW);}}
```

Project Extensions:

- Add multiple patterns and use the potentiometer to switch between them.
- Add a push button to change modes manually.
- Simulate the project on Tinkercad Circuits.

Learning Outcomes:

- Understand digital output control with Arduino.
- Use of arrays and loops to simplify code.
- Reading analog values with analogRead().
- Basic understanding of PWM and timing using delay().