University of Information Technology & Sciences

Department of

Computer Science and Engineering

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**Lab Report 02**

Course Title: Internet Of Things Lab

Course Code: CSE-402

Submitted To

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**Experiment No. 02**

**Experiment Title:** Controlling the LED blink rate with the potentiometer interfacing with Arduino

**Objectives**

* Write an Arduino program to interface a potentiometer and LED.
* Use the analog input from a potentiometer to control the blink rate of the LED.
* Understand the use of analogRead() and delay() functions in Arduino.
* Learn how to build and test a basic Arduino circuit on a breadboard.

**Introduction**

Arduino Uno is an open-source microcontroller board based on the ATmega328P. It has 14 digital I/O pins, 6 analog input pins, a 16 MHz quartz crystal, a USB connection, a power jack, and a reset button.

The pin diagram of Arduino Uno shows:

* Digital Pins (0–13): Used for input/output, some with PWM capability.
* Analog Pins (A0–A5): Used to read analog values (0–1023).
* Power Pins: Provide 3.3V, 5V, and GND for external components.

In this experiment, we use a potentiometer connected to pin A0 as an analog input device. The resistance of the potentiometer changes when rotated, and Arduino reads this value to adjust the delay time for the LED connected to pin 13, thus controlling the blink rate.

**Apparatus Required**

|  |  |  |
| --- | --- | --- |
| Component | Quantity | Description |
| Arduino Uno R3 | 1 | Microcontroller board |
| Breadboard | 1 | For circuit assembly |
| LED | 1 | Output indicator |
| Resistor (220Ω) | 1 | To limit current for LED |
| Potentiometer | 1 | Variable resistor for input |
| Jumper Wires | As req. | For connections |
| USB Cable | 1 | To connect Arduino to PC |

**Circuit Diagram**

A computer screen shot of a computer

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**Working Procedure**

* Connect the LED to digital pin 13 of Arduino through a 220Ω resistor.
* Connect the potentiometer middle terminal (wiper) to analog input pin A0.
* Connect the other two potentiometer terminals to 5V and GND.
* Upload the given Arduino code to the board.
* When the potentiometer knob is rotated, Arduino reads different analog values (0–1023).
* The read value is used as the delay time in milliseconds, which increases or decreases the LED blink rate.

**Code**

|  |
| --- |
| // C++ code  const int ledpin = 13;  const int regpin = A0;  int value;  void setup()  {  pinMode(ledpin, OUTPUT);  pinMode(regpin, INPUT);  }  void loop()  {  value = analogRead(regpin); // Read potentiometer value (0–1023)    digitalWrite(ledpin, HIGH); // Turn LED ON  delay(value); // Delay based on potentiometer    digitalWrite(ledpin, LOW); // Turn LED OFF  delay(value); // Delay based on potentiometer  } |

**Discussion and Conclusion**

In this experiment, the potentiometer successfully controlled the LED blinking rate. When the potentiometer resistance was low, the delay was short, and the LED blinked faster. When the resistance was high, the delay increased, and the LED blinked slower.

This experiment demonstrates how analog inputs can be used to control digital outputs in Arduino. It also provides hands-on understanding of analog-to-digital conversion (ADC) and timing functions (delay()).

Final Verdict: The experiment achieved its objective of controlling the LED blink rate with a potentiometer using Arduino Uno.