Experiment No: 01

Experiment Title: Basics of Arduino with Simple Application (LED Blinking)

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Experiment 01: Basics of Arduino with Simple Application (LED Blinking)

Objectives:

The main objective of this lab is to introduce the basics of Arduino programming and its application in the Internet of Things (IoT). In this lab, we understand the basic components of an Arduino board and learn the syntax of Arduino programming. We also write a simple program to control an LED. In this lab, we focus on a simple yet fundamental project – blinking an LED using an Arduino board.

Apparatus:

- ➢ Arduino Uno Board
- ➢ USB Cable
- ➢ Breadboard
- ➢ LED
- ➢ Jumper Wires
- ➢ Resistors
- ➢ Internet-connected device (e.g., computer)

Introduction:

Arduino is an open-source electronics platform that provides a user-friendly environment for creating interactive projects. It consists of both hardware and software components. The Arduino board serves as the hardware platform, and the Arduino IDE (Integrated Development Environment) is used to program the board.

Internet of Things (IoT) refers to the network of interconnected devices that communicate and exchange data. The primary goal of IoT is to enable these devices to communicate and interact with each other without direct human intervention, creating a seamless and intelligent network. Arduino can be a powerful tool in IoT applications due to its versatility and ease of use.

Procedure:

Experimental Setup:

1. Connect the Arduino Uno board to the computer using the USB cable.
2. Place the LED on the breadboard, connecting the longer leg (anode) to digital pin 13 and the shorter leg (cathode) to the ground through a resistor.
3. Open the Arduino IDE on the computer and write a simple program to blink the LED.
4. Upload the program to the Arduino Uno board.

Source Code:

We use the following basic code to make an LED blink:

```
void setup() {
  pinMode(LED_BUILTIN, OUTPUT);
}

void loop() {
  digitalWrite(LED_BUILTIN, HIGH);
  delay(1000);
  digitalWrite(LED_BUILTIN, LOW);
  delay(1000);
}
```

If we want to wait for 3 seconds when the LED is 'HiGH' and wait for 1 second when the LED is 'LOW', then we need to modify the above code as follows:

```
void setup() {
  pinMode(LED_BUILTIN, OUTPUT);
}

void loop() {
  digitalWrite(LED_BUILTIN, HIGH);
  delay(3000);
  digitalWrite(LED_BUILTIN, LOW);
  delay(1000);
}
```

Uploading the Code:

➢ Select the correct board and port in the Arduino IDE.
➢ Click on the "Upload" button to transfer the code to the Arduino board.

Execution:

➢ Power up the Arduino board by connecting it to the computer.
➢ Observe the LED connected to pin 13 blinking on and off with a 1-second interval.
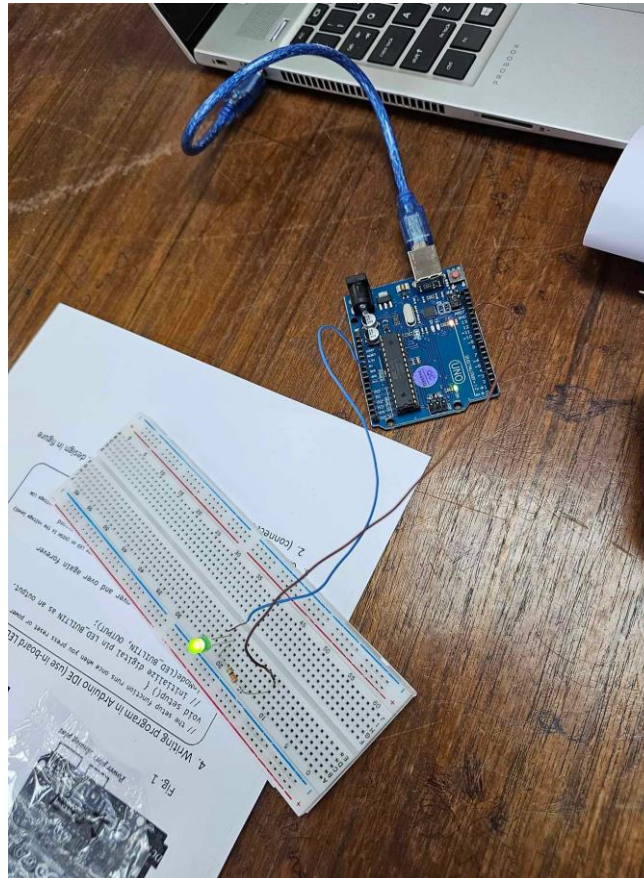
Results and Discussions:

Fig. 1: Implementation

In Fig. 1, the LED is in 'on' state when the voltage is 'HIGH'. So, the LED successfully blinks according to the programmed code. This simple project lays the foundation for more complex IoT applications. Understanding how to control an LED is crucial for more advanced projects involving sensors, actuators, and communication with other devices.

Conclusion:

This lab provided us an introduction to the basics of Arduino programming and its application in IoT by implementing a simple LED blinking project. We gained hands-on experience with the Arduino platform, setting the stage for more advanced projects in the field of electronics and IoT. This foundational knowledge will serve as a springboard for more advanced experiments and projects in the realm of Arduino and IoT.