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Title of Lab Assignment: Introduction to Basic Components: Such as Arduino, Breadboard, Programming the Arduino and Basic electronic components such as LED, Resistors, Battery etc.		
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Practical No. 1

Aim: Introduction to Basic Components such as Arduino, Breadboard, Programming the Arduino and Basic electronic components such as LED, Resistors, Battery etc.

Theory:**IOT :**

The Internet of Things (IoT) is a system of interrelated computing devices, mechanical and digital machines, objects, animals or people that are provided with unique identifiers and the ability to transfer data over a network without requiring human-to-human or human-to-computer interaction.

An IoT system consists of sensors/devices which “talk” to the cloud through some kind of connectivity. Once the data gets to the cloud, software processes it and then might decide to perform an action, such as sending an alert or automatically adjusting the sensors/devices without the need for the user.

But if user input is needed or if the user simply wants to check in on the system, the user interface allows them to do so. Any adjustments or actions that the user makes are then sent in the opposite direction through the system: from the user interface, to the cloud, and back to the sensors/devices to make some kind of change.

Basic Components:**1. Arduino:**

Arduino acts as the brain of the system and processes the data from the sensor. Arduino is an open source hardware platform that is readily available for hobbyists & enthusiasts across the globe to build projects. It comes with an ATMEGA microcontroller that processes the data and facilitates the proper working of the IoT system. And the beauty is that the Arduino can be programmed ‘n’ number of times making it possible for you to build various types of IoT projects just by changing a simple code. You need to use C++ language for Arduino programming. Also IDE software is needed for Arduino based IoT projects. And you need to use the ESP-8266 WiFi module to establish the WiFi communication between the Arduino and cloud platform.

It is an open-source electronics platform based on easy-to-use hardware and software. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Conclusion:

Hence, we explored the Basic Components and electronic components in IOT.

Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board. To do so you use the Arduino programming language (based on Wiring), and the Arduino Software (IDE), based on Processing. Arduino boards are able to read inputs - light on a sensor, a finger on a button, or a Twitter message - and turn it into an output - activating a motor, turning on an LED, publishing something online. You can tell your board what to do by sending a set of instructions to the microcontroller on the board.

2. Breadboard:

A breadboard is a solderless device for temporary prototypes with electronics and test circuit designs. Most electronic components in electronic circuits can be interconnected by inserting their leads or terminals into the holes and then making connections through wires where appropriate. The breadboard has strips of metal underneath the board and connects the holes on the top of the board. The metal strips are laid out as shown below. Note that the top and bottom rows of holes are connected horizontally and split in the middle while the remaining holes are connected vertically.

It is a construction base for prototyping of electronics. Originally the word referred to a literal bread board, a polished piece of wood used when slicing bread. In the 1970s the solderless breadboard became available and nowadays the term "breadboard" is commonly used to refer to these. Because the solderless breadboard does not require soldering, it is reusable. This makes it easy to use for creating temporary prototypes and experimenting with circuit design. For this reason, solderless breadboards are also popular with students and in technological education. Older breadboard types did not have this property. A stripboard and similar prototyping printed circuit boards, which are used to build semi-permanent soldered prototypes or one-offs, cannot easily be reused.

Basic Electronic Components:

1. LED

In the simplest terms, a light-emitting diode (LED) is a semiconductor device that emits light when an electric current is passed through it. By connecting lighting systems to IoT, it becomes possible to control lighting through user's devices. LED bulbs produce more light than traditional bulbs, but because they do so more efficiently, less of the energy radiates from the bulb as heat. When they were first introduced, they produced more of a "cool" white light; today they offer the same natural-looking "warm" light as incandescents. IoT-based LED lighting has the potential to offer important features and capabilities such as: Ease of monitoring LED luminaire status and the life cycle of LED lighting elements, Generation of analytics to improve lighting system performance, Tracking of user behavior to help optimize the user experience in a home or building, or to attract attention to product displays in retail spaces, Personalization of lighting experiences by connecting, for example, to a profile on a user's smart device.

2. Resistors

Resistors are electronic components, which offer resistance against the current flow, or speaking at a deeper level, against the electrons flow. Resistors, denoted by R, are passive components, which means that they don't generate any electricity at all, but rather reduce voltage and current by dissipating power in the form of heat. The unit of resistance is ohms (Ω) and resistors are usually built using carbon or metal wire. You will also find the resistors being color-coded in order to help convey the value of resistance they offer.

3. Battery

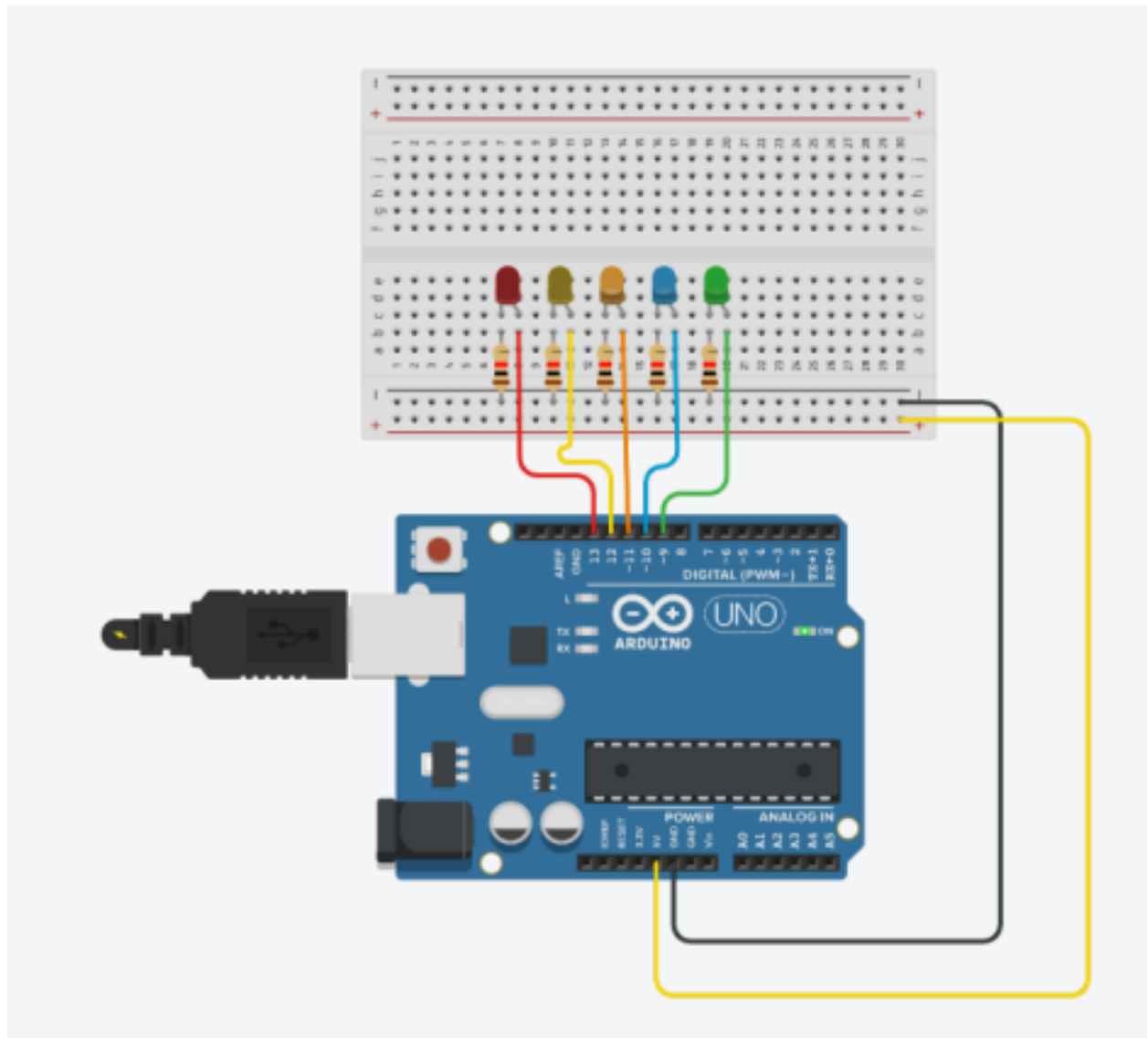
A battery is a power source consisting of one or more electrochemical cells with external connections for powering IOT devices. When a battery is supplying electric power, its positive terminal is the cathode and its negative terminal is the anode. The terminal marked negative is the source of electrons that will flow through an external electric circuit to the positive terminal.

Code:

```
// C++ code
void setup() {
  pinMode(13, OUTPUT);
```

```
pinMode(12, OUTPUT);
pinMode(11, OUTPUT);
pinMode(10, OUTPUT);
pinMode(9, OUTPUT);
pinMode(8, OUTPUT);
}
void loop() {
  for(int i=13;i>7;i--){
    digitalWrite(i,HIGH);
    delay(30);
    digitalWrite(i,LOW);
    delay(30);
  }
  for(int i=7;i<=13;i++){
    digitalWrite(i,HIGH);
    delay(30);
    digitalWrite(i,LOW);
    delay(30);
  }
}
```

Circuit Diagram:

**Conclusion:**

Hence, we explored the Basic Components and electronic components in IOT.