C

Term 3

Julphar Secondary School

[REVISION -11-10 GENERAL-CDI]

Teacher Jawaher Alshehhi

Lesson 1: Embedded System

Electronic devices Send and receive information

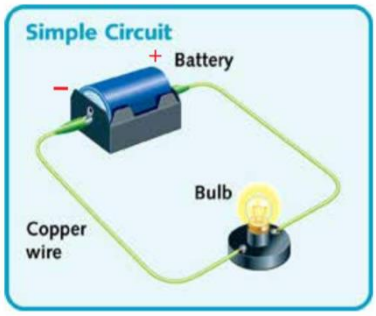
Analog Signal	Digital Signal
Old –fashioned photograph Antenna	Digital Camera -Modern TV and radio- Computer-Cell phones

Electrical circuit

Voltage source: Causes a current to flow through the circuit (Battery)

Load: An electrical device that consumes electrical power (Bulb)

Conductive path: The path through which the current flows. (Wire)



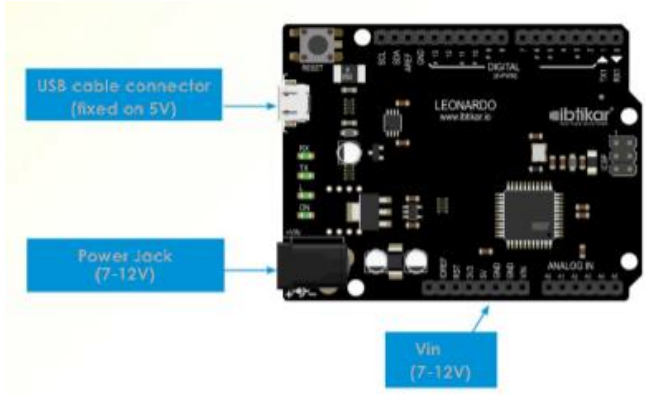
Embedded system: specialized computer system with a specific function within a larger mechanical or electrical system.

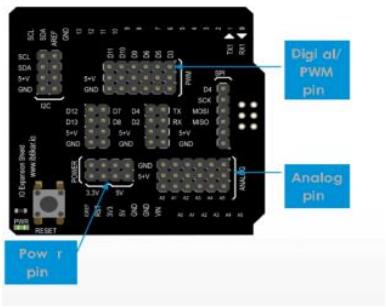
Example: Air conditioner

Senses the temperature of the → Control the cooling process → Change the environment.

Microcontroller

Input signal: collecting or sensing signal from → **Control Unit:** Processing the receives signal → **Output Unit**: for sending output signals





Programming: Operate a machine to do a certain flow of tasks that need to use different commands in a certain order.

Arduino IDE (Integrated I Development Environment) allows you to write a program and upload the program to an Arduino microcontroller board.

Arduino IDE language: C language.

Arduino IDE programs: sketches or code

Diode: A diode is a two-terminal electronic component that allows current to flow only in one direction.

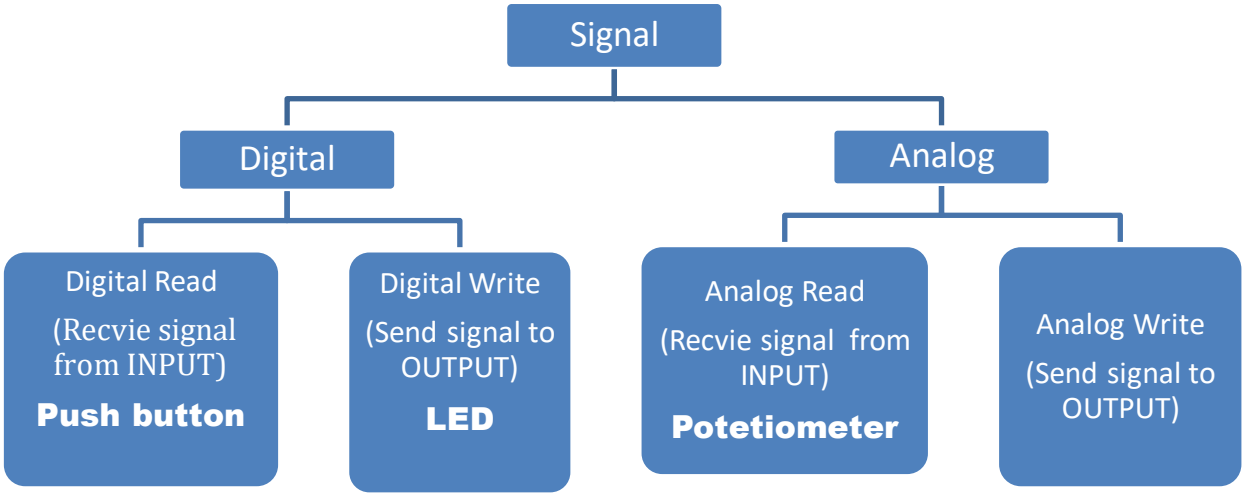
Positive terminal: anode

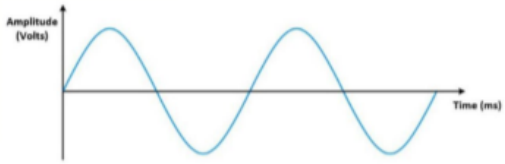
Negative terminal: cathode.

Flowchart: A flow chart is a diagram that describes the flow of a certain process or idea using different block

Start/End Shape	A terminator is a shape that marks the start or end of the system. It usually contains the word 'Start' or 'End'.	
Action or Process Shape	A box can represent a single step within a larger process.	
Decision Shape	A decision or branching point is a diamond shape that represents different decisions.	
Input/ Output Shape	A parallelogram represents information entering (input) or leaving (output) the system.	
Flow Line	An arrow represents the flow between the blocks.	

Lesson 2: Signals



Digital Signal	Analog Signal
Finite number (0V or 5V)	Infinite number
The graph :square	The graph : smooth and continuous
Example : • light in the classroom • Power button of your phone	Example: • The brightness of the sun • The room temperature
	

Digital Signal /Read (LED)	Digital Signal/Write(pushbutton)

void setup() {
pinMode(13, OUTPUT);
}
void loop() {
digitalWrite(13, HIGH);
delay(1000);
digitalWrite(13, LOW);
delay(1000);
}
	int pushButton = 2;
	
	Void setup(){
	Serial.begin(9600);
	pinMode(pushButton, INPUT);
	void loop() {
	int buttonState = digitalRead(pushButton);
	Serial.println(buttonState);
	delay(1);
	}

Analog signal/Read

```
void setup() {
Serial.begin(9600);
}
void loop() {
int sensorValue = analogRead(0);
Serial.println(sensorValue);

delay(1);
```

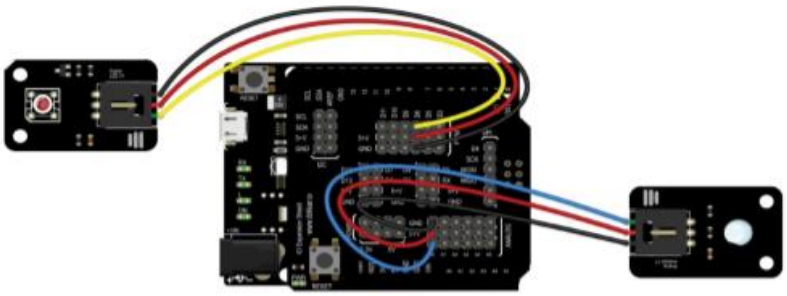
Potentiometer

- 3 leg
- Connect 2 leg =variable resistor
- Connect 3 leg: voltage divider

Lesson 4: Ambient light

High intensity light = resistance **decreased** = electrical current increase

Application: Mobile Phones (screen brightness)–Automobiles automatic lighting system.



```
void setup() {

void loop() {

int lightSensor=analogRead (0) ;

int LEDlight =map(lightSensor 0 1023 0
255);

}

analogWrite(6,LEDlight);

delay (10);
```

Pin number

Input

Output

Time millisecond

Variable

Lesson 6: Gas Valves Safety System

Gas leakage → Solution → Valves:
1-Automatically (controlled using an electrical signal)
2-Manually

Electric valves components

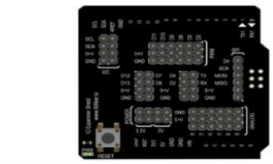
Embedded motor: control the amount of the flow

Gas sensor: Sense the gas leakage

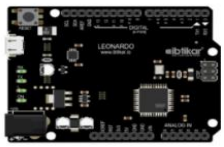
Gas sensor indicates a gas leakage → **Sends an electrical signal to the controller**

Applications:

Home security –Car parks



I/O Expansion shield



The Arduino board

The analog gas sensor

```
void setup() {
Serial.begin(9600); }
void loop()
 int sensorValue = analogRead(A0);
Serial.println(sensorValue);
 delay(1)
```

Pin number

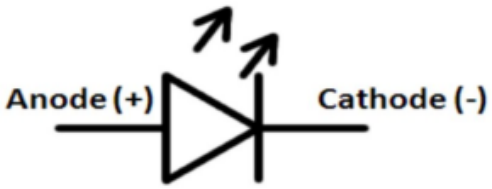
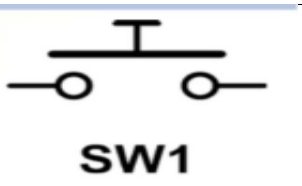
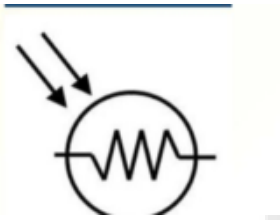
Input

Output

Time millisecond

Variable

Electronic Schematic

LED	
Buzzer	
Push button	
Ambient Light	
Gas sensor