Al-Mustaqbal University
Department of Medical Instrumentation Techniques Engineering
Class: four
Subject: Advanced logic design
Lecturer: Dr. Zahraa hashim kareem
Lecture- 4: Getting Input from Sensors to Arduino

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Getting Input from Sensors to Arduino

Introduction

Getting and using input from sensors enables Arduino to respond to or report on the world around it. This is one of the most common tasks you will encounter. This chapter provides simple and practical examples of how to use the most popular input devices and sensors. Wiring diagrams show how to connect and power the devices, and code examples demonstrate how to use data derived from the sensors. Sensors respond to input from the physical world and convert this into an electrical signal that Arduino can read on an input pin. The nature of the electrical signal provided by a sensor depends on the kind of sensor and how much information it needs to transmit. Some sensors (such as photoresistors and Piezo knock sensors) are constructed from a substance that alters their electrical properties in response to physical change. Others are sophisticated electronic modules that use their own microcontroller to process information before passing a signal on for the Arduino.

- ## Detecting Movement

Problem

You want to detect when something is moved, tilted, or shaken.

Solution

This sketch uses a switch that closes a circuit when tilted, called a tilt sensor. The switch will work with a tilt sensor substituted for the switch.

The sketch below (circuit shown in below) will switch on the LED attached to pin 11 when the tilt sensor is tilted one way, and the LED connected to pin 12 when it is tilted the other way:

```
/*
tilt sketch a tilt sensor attached to pin 2, lights one of the LEDs connected to pins 11
and 12 depending on which way the sensor is tilted
*/
const int tiltSensorPin = 2; //pin the tilt sensor is connected to
const int firstLEDPin = 11; //pin for one LED

const int secondLEDPin = 12; //pin for the other
void setup()
{
pinMode (tiltSensorPin, INPUT); //the code will read this pin
digitalWrite (tiltSensorPin, HIGH); // and use a pull-up resistor
```

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```
pinMode (firstLEDPin, OUTPUT); //the code will control this pin
pinMode (secondLEDPin, OUTPUT); //and this one
}
void loop()
{
if (digitalRead(tiltSensorPin)){ //check if the pin is high
digitalWrite(firstLEDPin, HIGH); //if it is high turn on firstLED
digitalWrite(secondLEDPin, LOW); //and turn off secondLED
}
else{ //if it isn't
digitalWrite(firstLEDPin, LOW); //do the opposite
digitalWrite(secondLEDPin, HIGH);
}
}
```
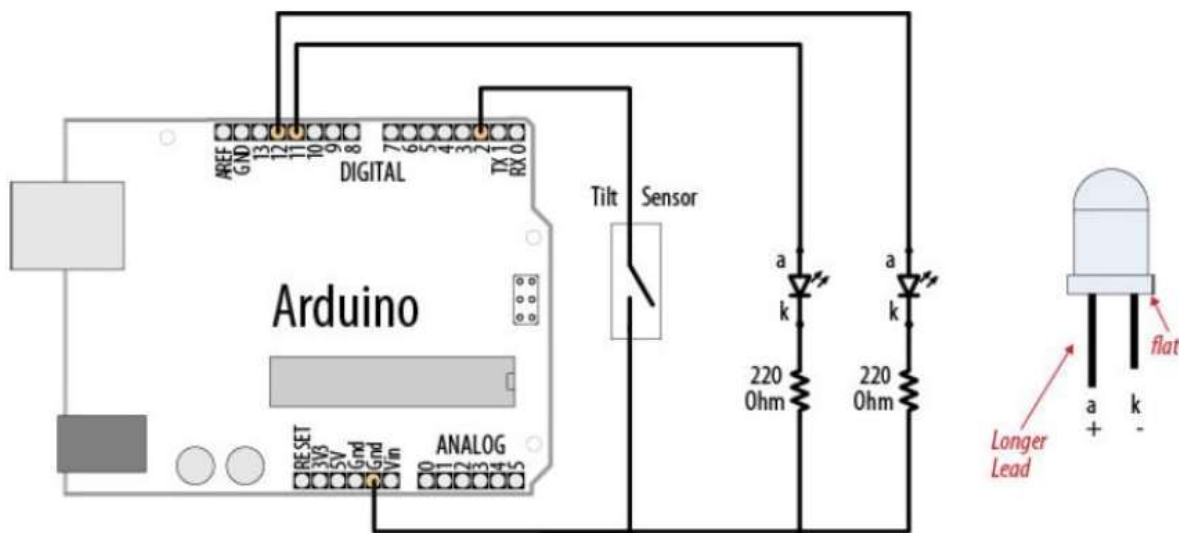

*Tilt sensor and LEDs*

- **Detecting Light**

Problem

You want to detect changes in light levels. You may want to detect a change when something passes in front of a light detector or to measure the light level—for example, detecting when a room is getting too dark.

Solution

The easiest way to detect light levels is to use a light dependent resistor (LDR). This changes resistance with changing light levels, and when connected in the

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circuit shown in Figure below it produces a change in voltage that the Arduino analog input pins can sense.
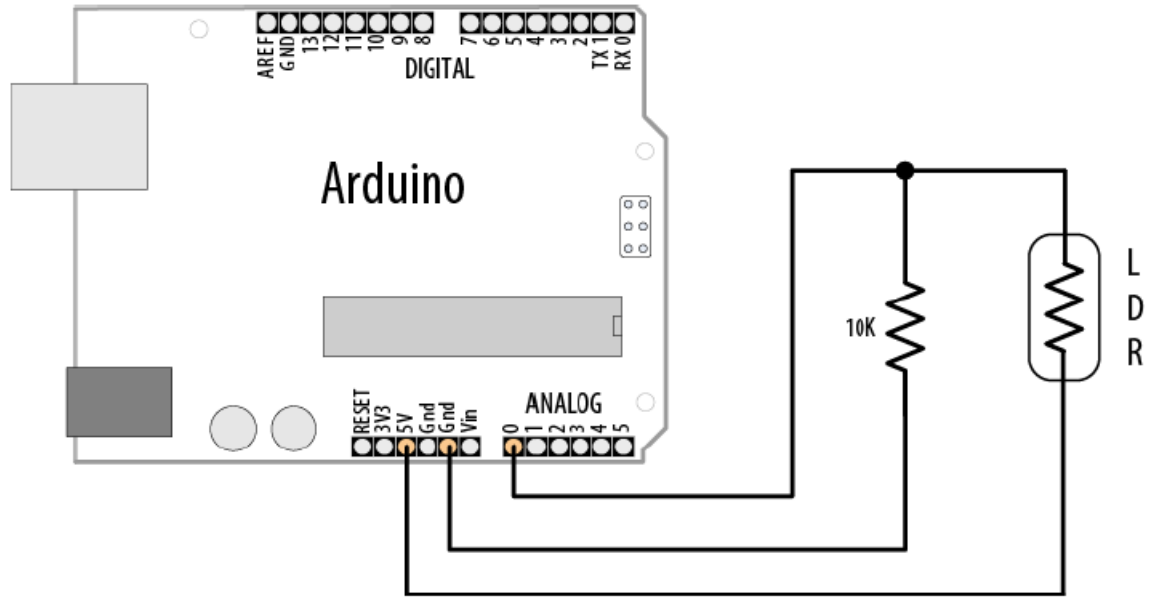
Connecting a light dependent resistor

Please, write the sketch here.


- **Measuring Temperature**

Problem

You want to display the temperature or use the value to control a device; for example, to switch something on when the temperature reaches a threshold.

Solution

This recipe displays the temperature in Fahrenheit and Celsius (Centigrade) using the popular LM35 heat detection sensor. The sensor looks similar to a transistor and is connected as shown in Figure below:

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Audio signal showing DC offset (signal midpoint)
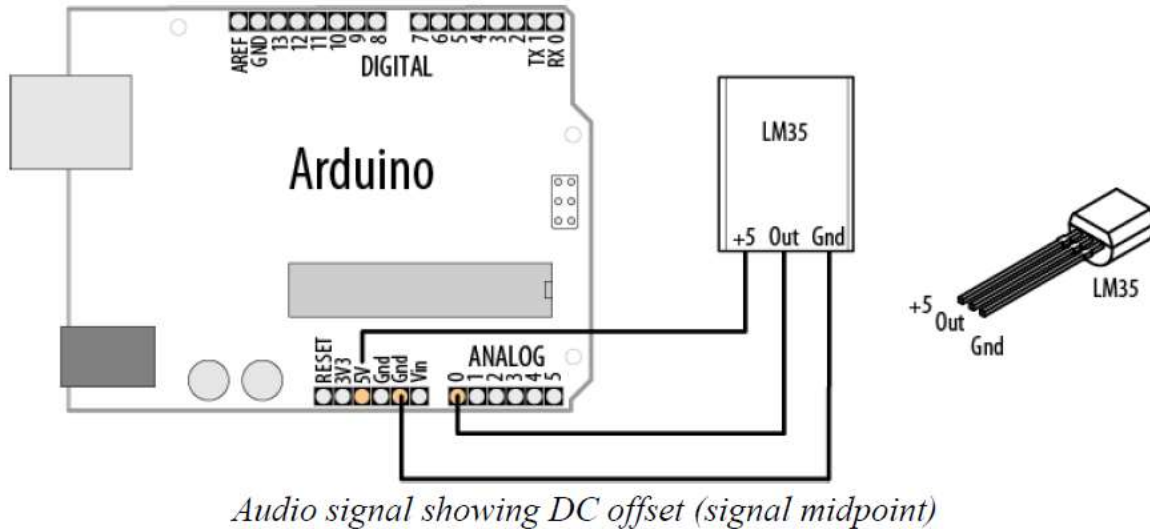
```
/*
lm35 sketch prints the temperature to the Serial Monitor
*/
const int inPin = 0; // analog pin
void setup()
{
Serial.begin(9600);
}
void loop()
{
int value = analogRead(inPin);
Serial.print(value); Serial.print(" > ");
float millivolts = (value / 1024.0) * 5000;
float celsius = millivolts / 10; // sensor output is 10mV per degree Celsius
Serial.print(celsius);
Serial.print(" degrees Celsius, ");
Serial.print( (celsius * 9)/ 5 + 32 ); // converts to fahrenheit
Serial.println(" degrees Fahrenheit");
delay(1000); // wait for one second
}
```

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