Engineering Design – II (Buggy)

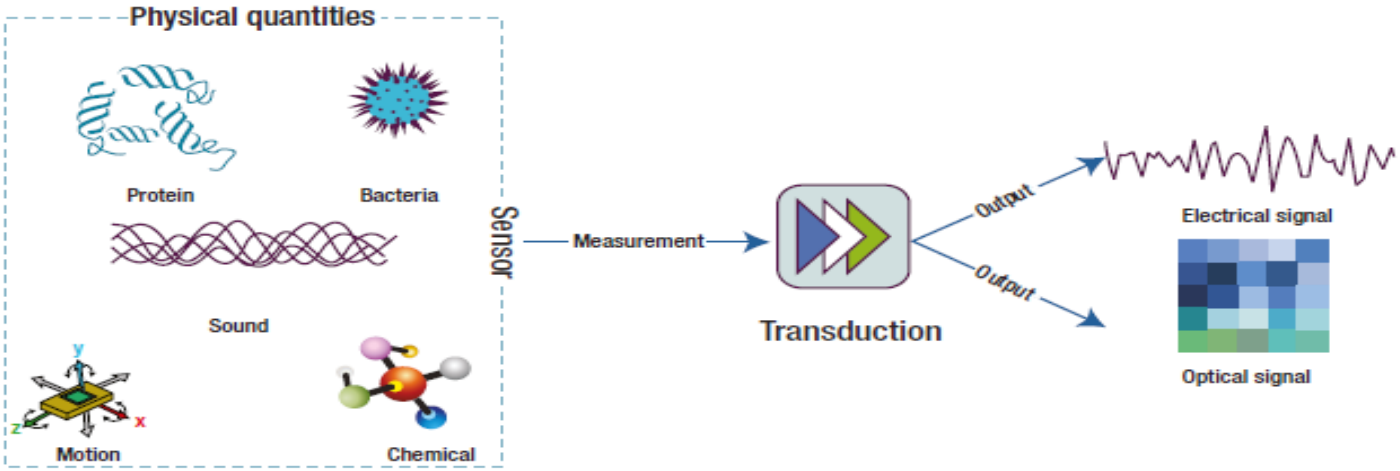
https://sites.google.com/thapar.edu/buggy/home

Introduction to Sensors

Dr. Ashutosh Mishra

What is a sensor?

- A device that receives a stimulus and responds with an electrical signal.
- A special type of transducer (device that converts one type of energy into another.



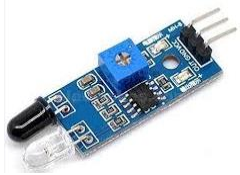
Common Sensors

- Mechanical
  - Accelerometers: measure acceleration forces
  - Gyroscopes: useful for measuring or maintaining orientation.
- Optical
  - Photodetectors: Detect light
  - Infrared: emitting and/or detecting infrared radiation
  - Gas
  - Temperature
  - Magnetic

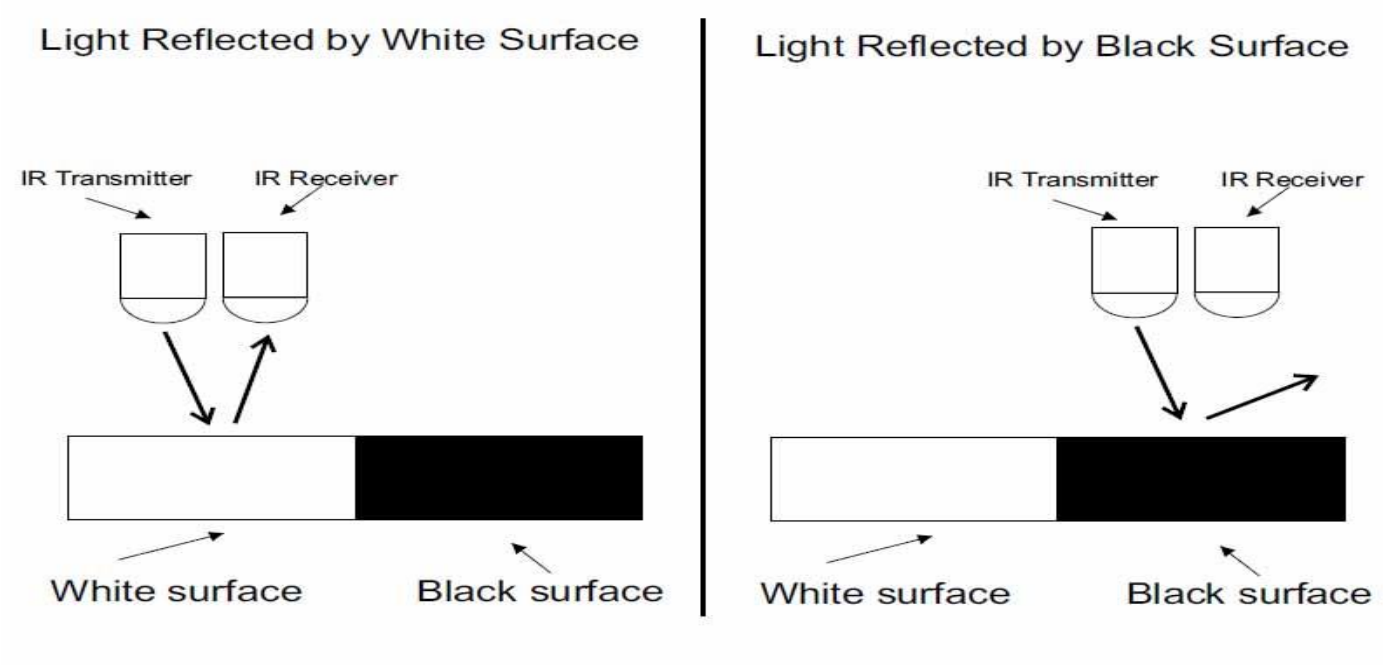
Sensors to be used in this course

- Infra Red (IR) Sensor
- Ultrasonic Sensor
- Pulse Receiver
- Zig-Bee module (For inter buggy and Command centre communication)

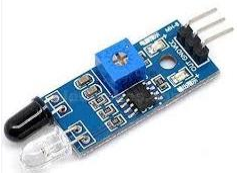
IR- SENSOR

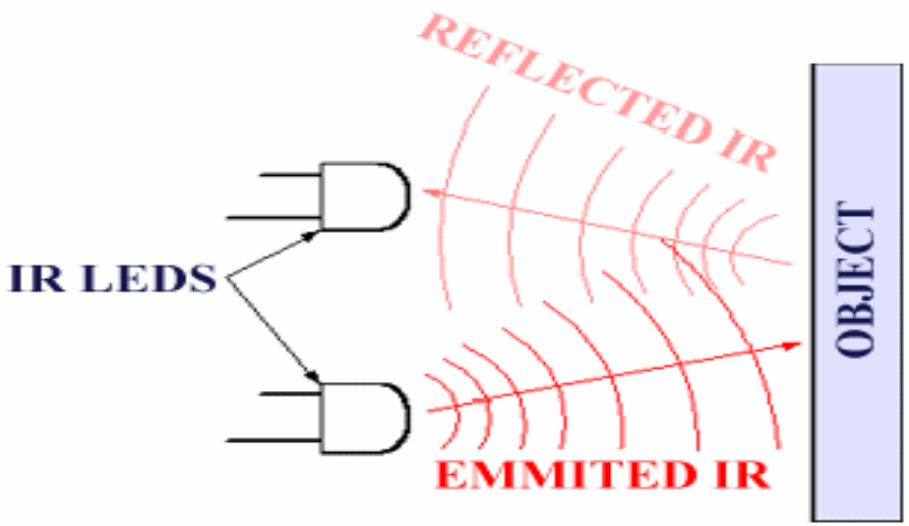


- IR sensor basically works on intensity of light
- RGB code for white is (255,255,255) and for Black is (0,0,0)



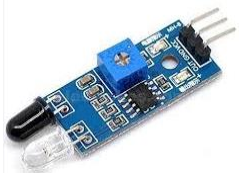
IR LEDS





- IR-LED –Tx
- PD – Rx

IR LED

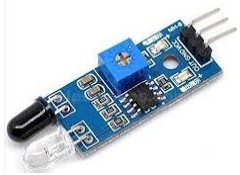


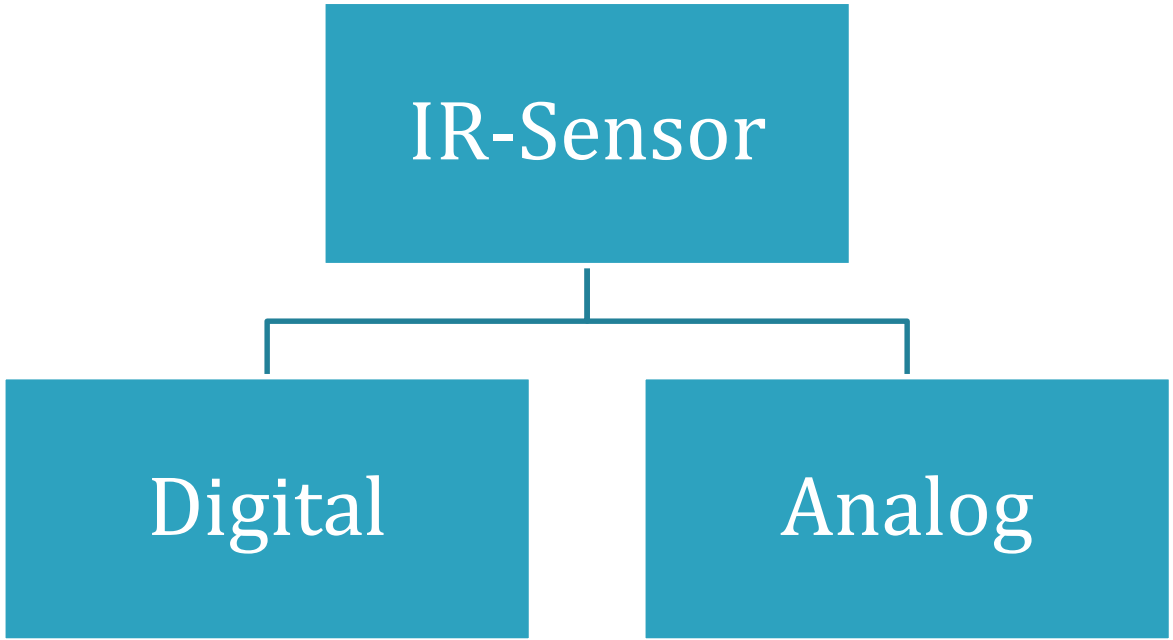
- IR-LED work similar to normal LED
- IR-LED transmit infrared light
- IR light is not visible to our naked eye
- IR light is detected by Photodiode

PHOTODIODE (PD)

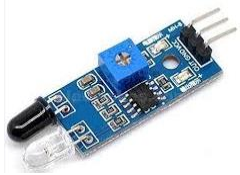
- How PD work ?
- PD generate the voltage depending on the intensity of light

TYPES OF IR-SENSOR



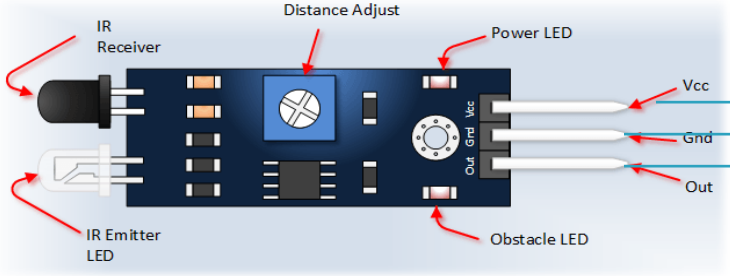


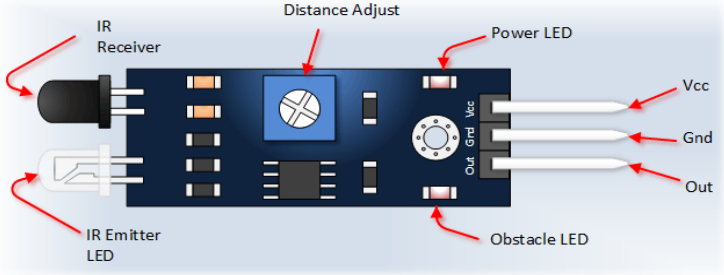
TYPES OF IR-SENSOR



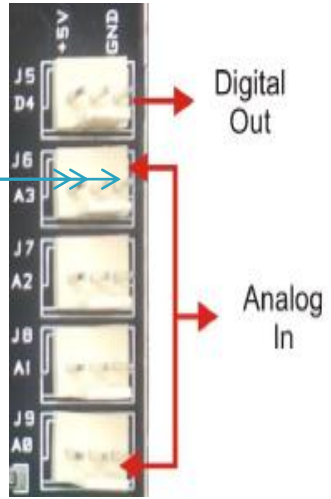
- Digital – In digital sensor output is digital (High or Low).
- Analog – In analog sensor detection depend on intensity of light received.

IR-SENSOR MODULE PIN-OUT



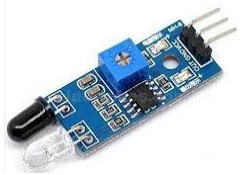


ANALOG INPUT PORT
IN BUGGY



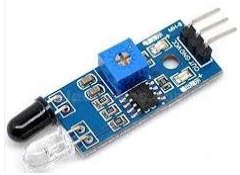
In some module output is middle pin while in other its sideline pin. Extra caution is required to attach these pins to Arduino.

IR SENSOR IN ARDUINO



```
int r1;
int r2;
int r3;
int r4;
void setup() {
Serial.begin(9600);
pinMode(A1,INPUT);
pinMode(A3,INPUT);
}
```

```
void loop() {
r1=analogRead(A1);
r2=analogRead(A3);
r3=digitalRead(A1);
r4=digitalRead(A3);
Serial.println(r1);
Serial.print("\t");
Serial.println(r2);
Serial.print("\t");
Serial.println(r3);
Serial.print("\t");
Serial.println(r4);
}
```

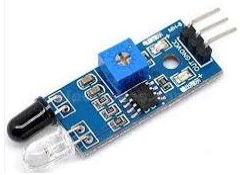


```
if(r1==LOW&&r2==LOW)
  {
    digitalWrite(pin5,HIGH);
    digitalWrite(pin6,LOW);
    digitalWrite(pin7,LOW);
    digitalWrite(pin8,HIGH);

  }
   if(r1==HIGH&&r2==LOW)
  {
    digitalWrite(pin5,LOW);
    digitalWrite(pin6,HIGH);
    digitalWrite(pin7,HIGH);
    digitalWrite(pin8,LOW);

  }
```

Forward

Right

```
if(r1==LOW&&r2==HIGH)
  {
   digitalWrite(pin5,HIGH);
   digitalWrite(pin6,LOW);
   digitalWrite(pin7,LOW);
   digitalWrite(pin8,HIGH);
  }
  if(r1==HIGH&&r2==HIGH)
 {
   digitalWrite(pin5,HIGH);
   digitalWrite(pin6,LOW);
   digitalWrite(pin7,LOW);
   digitalWrite(pin8,HIGH);

 }
```



Left

Forward

Thanks