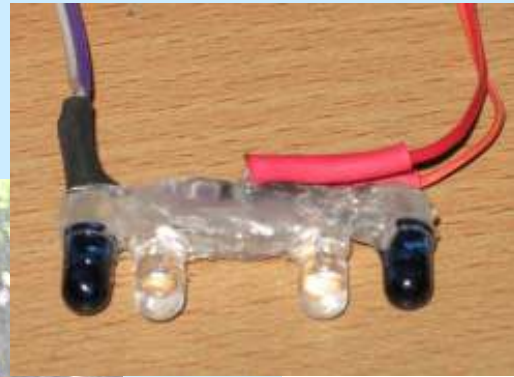
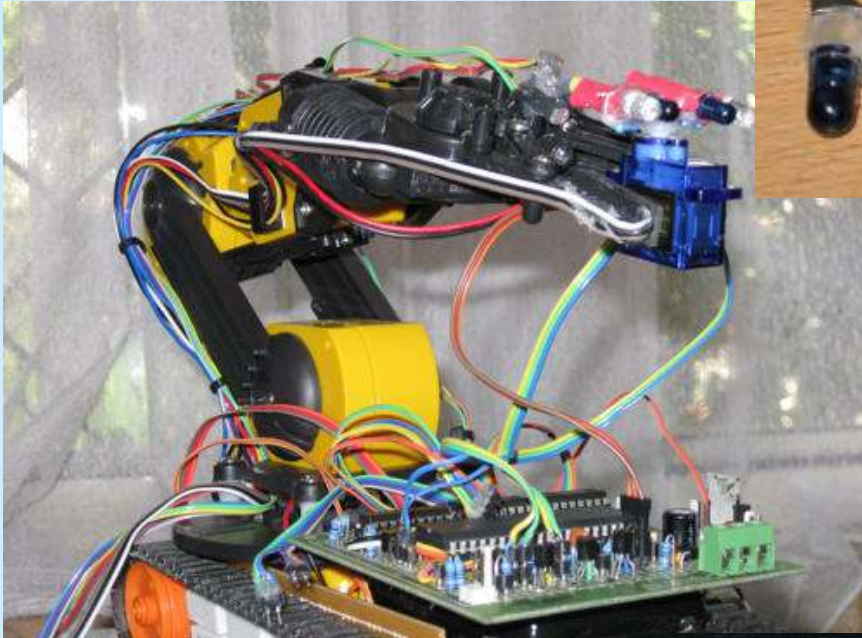
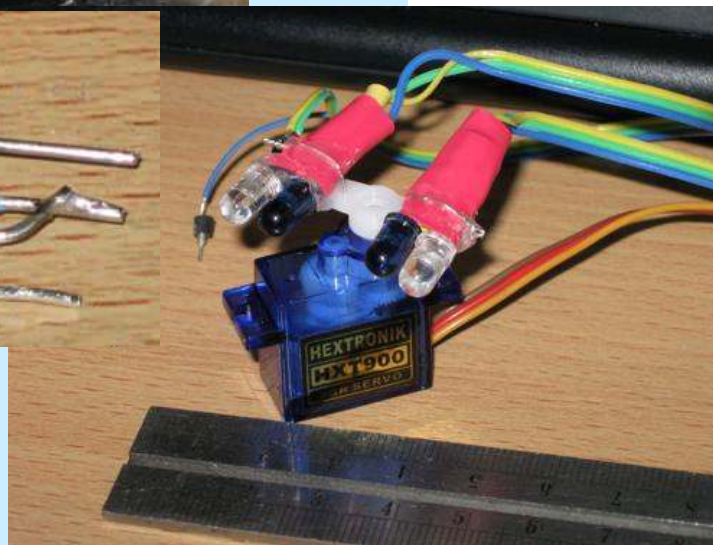
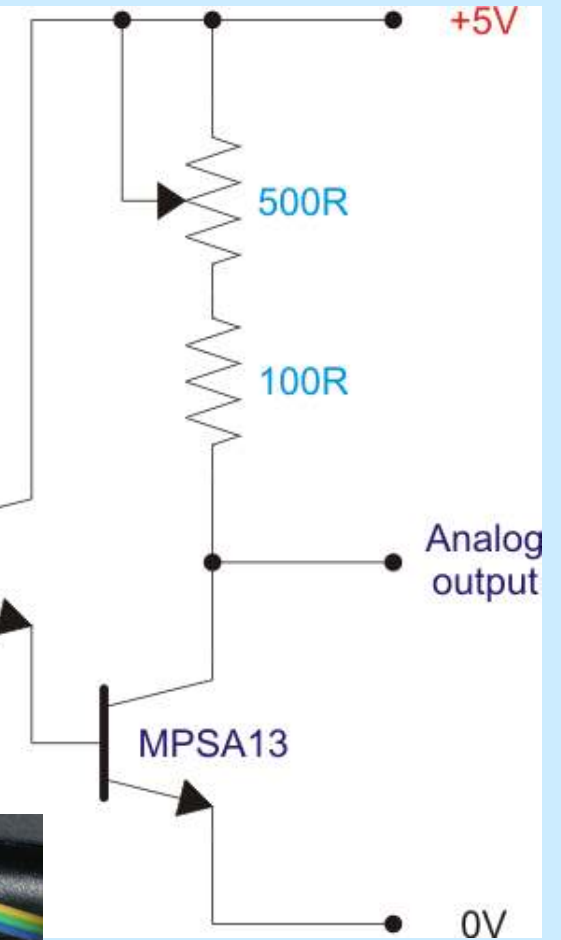


Types Sensor and Transducer

Optical



Phototransistor



Types Sensor and Transducer

Optical

(i) Light Dependent Resistors (LDR)

An LDR will have a resistance that varies according to the amount of visible light that falls on it.

Materials are:

Cadmium Sulphide (Cds)

Cadmium Selenide (Cd Se)



The light falling on the brown zigzag lines on the sensor, causes the resistance of the device to fall. This is known as a negative co-efficient.

When the cell is kept in darkness, its resistance is called dark Resistance, in the range of $M\Omega$

Types Sensor and Transducer

Optical

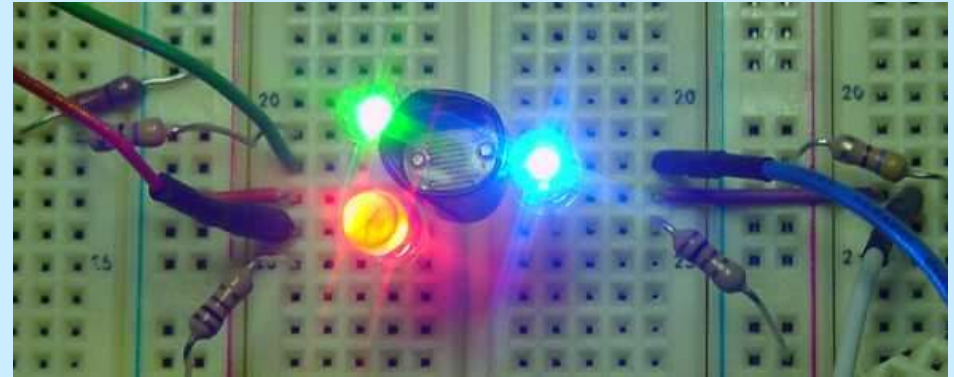
$$r = \left(\frac{1}{r_d} + \frac{I^{\frac{1}{\beta}}}{\alpha} \right)^{-1}$$

Where, r = Resistance of the sensor

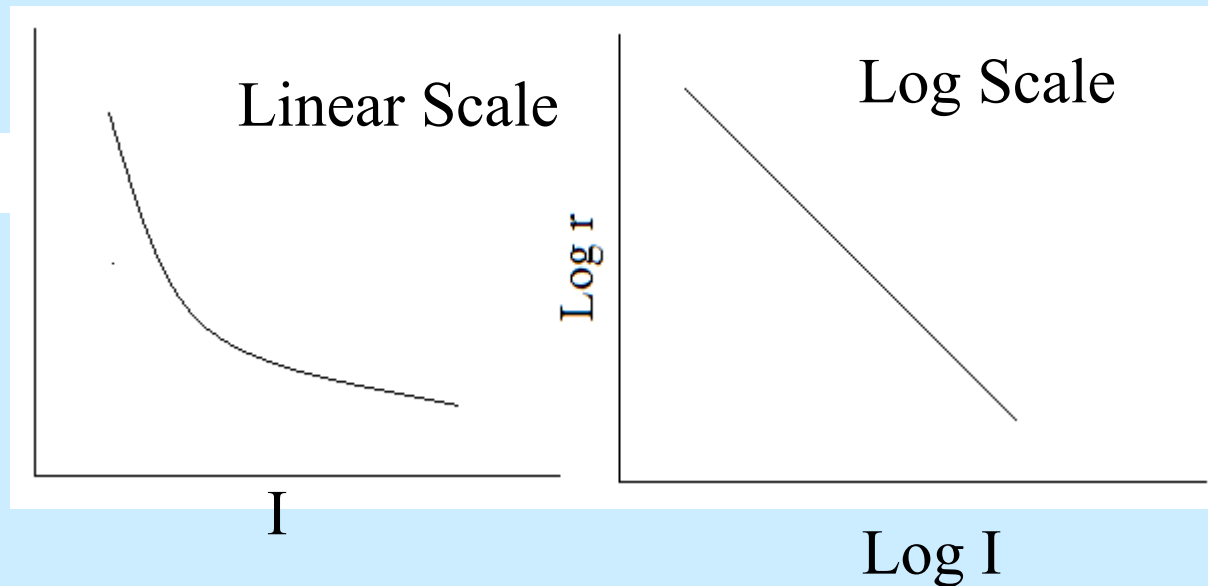
r_d = Dark resistance

I = Intensity of illumination

α, β = Constant, metal dependent



r



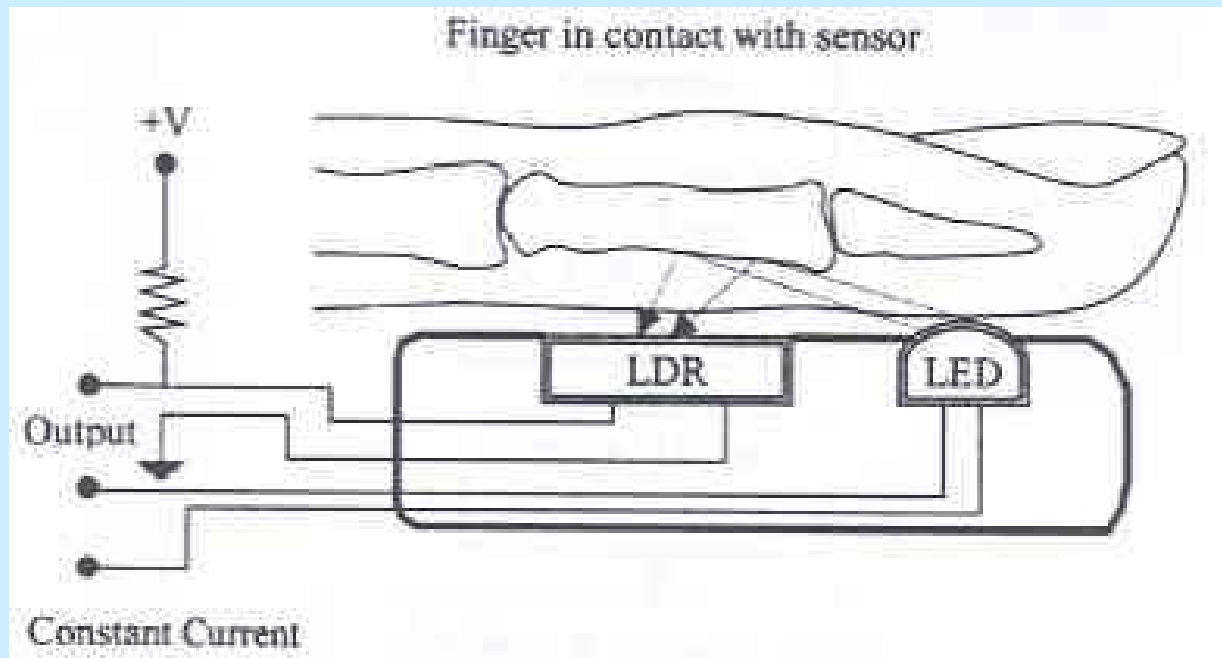
Resistance Vs Intensity of illumination plots

Types Sensor and Transducer

Optical

Application

- *The pulse rate meter uses a finger transducer to detect the peripheral pulse i.e. heart beat.*
- *It is based on photoelectric method. The construction of the sensor or transducer is shown in the fig.*
- *It consists of transmitter & receiver. Here, LED is used as a transmitter and LDR as a receiver.*



Types Sensor and Transducer

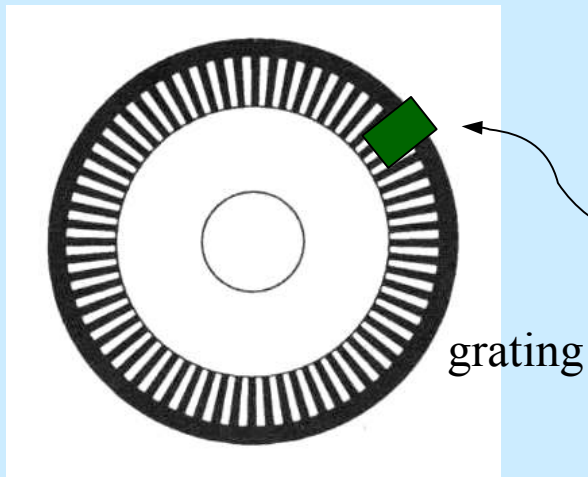
Optical

- They are placed adjacent to each other with a distance of about 3mm. The part of the light emitted by LED is reflected and scattered from the skin & tissues and falls on the LDR.*
- The quantity of the light reflected is determined by the blood saturation of the capillaries.*
- Therefore, the voltage drop across the LDR connected as a voltage divider varies in proportion to the volume changes in the blood vessels.*
- Thus, it provides a voltage pulse for each heart beat. The light source LED is biased from constant current source to have a stable light output*

Types Sensor and Transducer

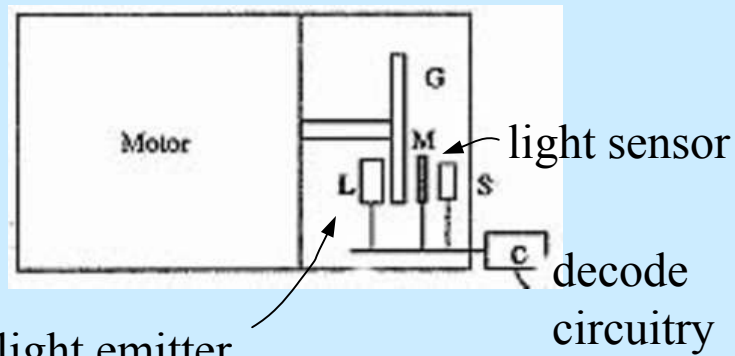
Optical

- Relative position

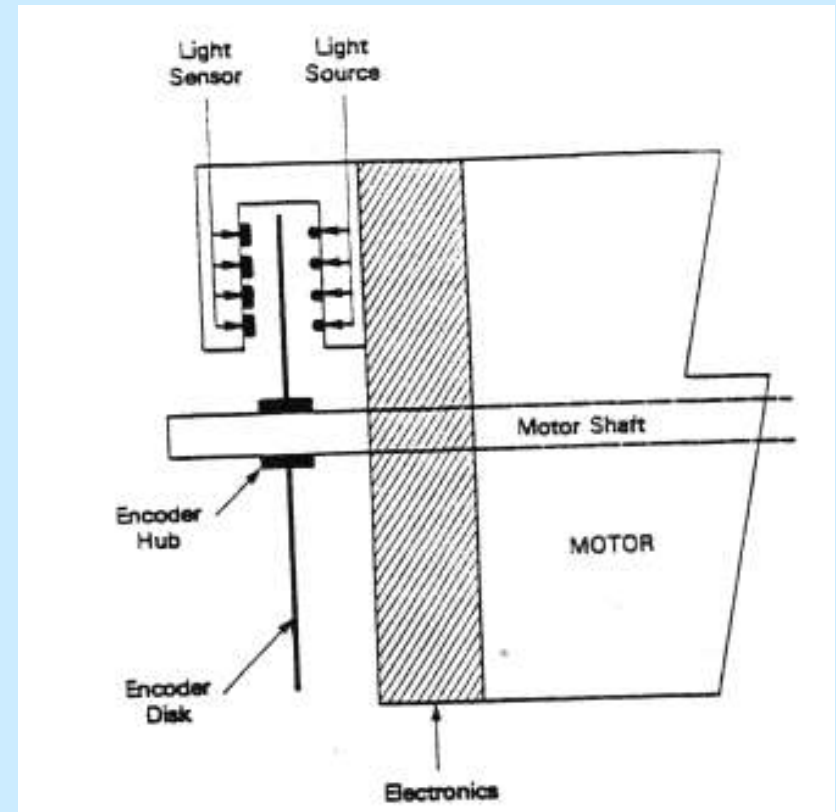


- Incremental
- Absolute

Encoder



- direction
- resolution



Types Sensor and Transducer

Optical

#	Binary	Gray Code
0	0	000
1	1	001
2	10	011
3	11	010
4	100	110
5	101	111
6	110	101
7	111	100
8	1000	
9	1001	

Gray Code



Encoder



- Incremental
- Absolute