

Module 4 : Sensors and Controllers in robots

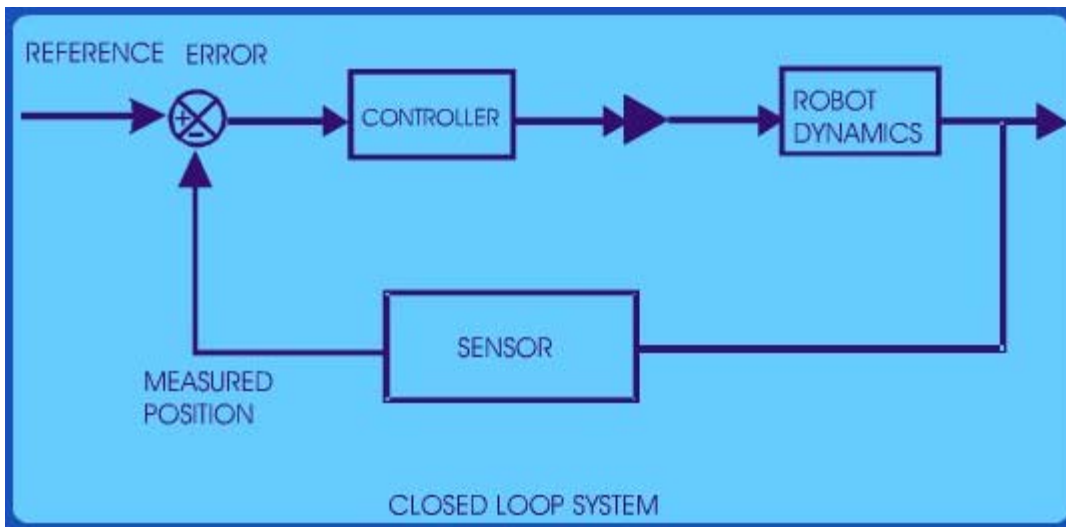
Lecture 9 : Sensors and controllers (sensor types)

Objectives

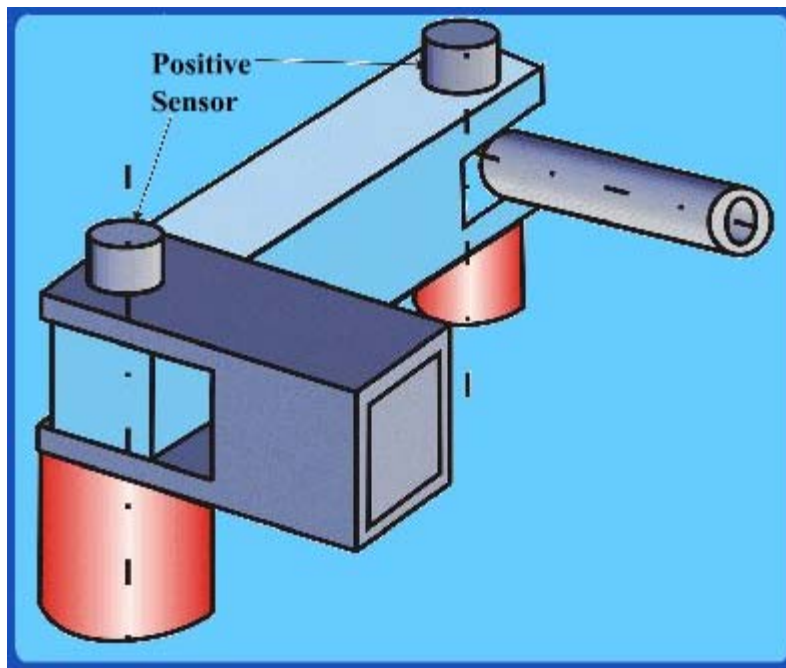
In this course you will learn about

- Actuators: Stepper Motors, Electric DC motors, Hydraulic & Pneumatic Actuators
- Temperature, Bearing Forces, Frequency response
- Brawn Vs. Brain
- Sensors
 - Internal State / External State
- Basic Movements – Position, Velocity, Acceleration
- Interaction with environment – Torques, Forces, Touch, Slip, Range, Vision

CLOSED LOOP SYSTEM



VELOCITY SENSOR

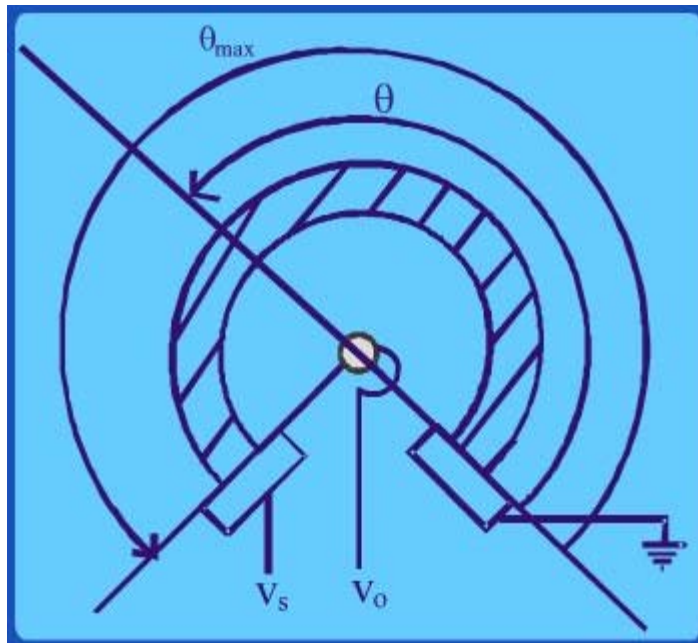


Position Sensors

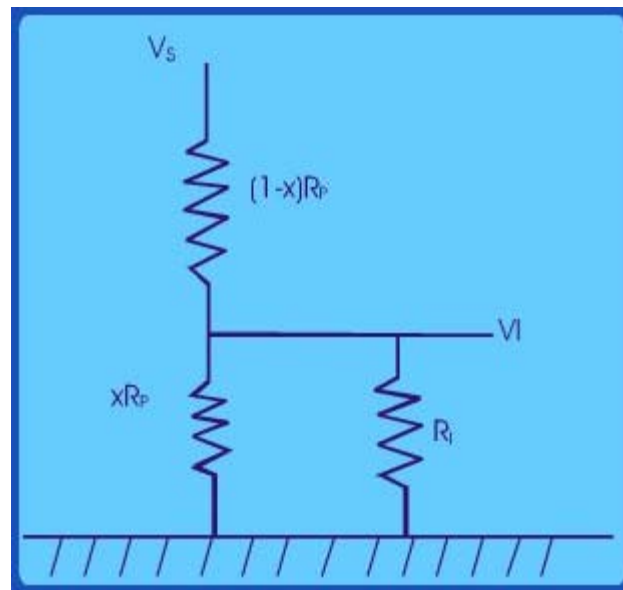
- Potentiometers

Wire wound type (Linearity 3-5% F.S)

Conductive Polymer Type (Linearity <1% FS)



Potentiometer: Analog Output



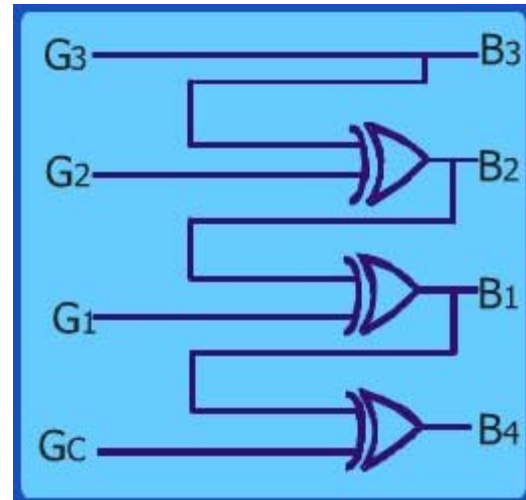
$$V_O = \frac{\theta}{\theta_{\max}} V_S = k\theta = xV_S$$

$$\frac{V_L}{V_S} = \frac{\frac{xR_p R_L}{xR_p + R_L}}{(1-x)R_p + \frac{xR_p R_L}{xR_p + R_L}}$$

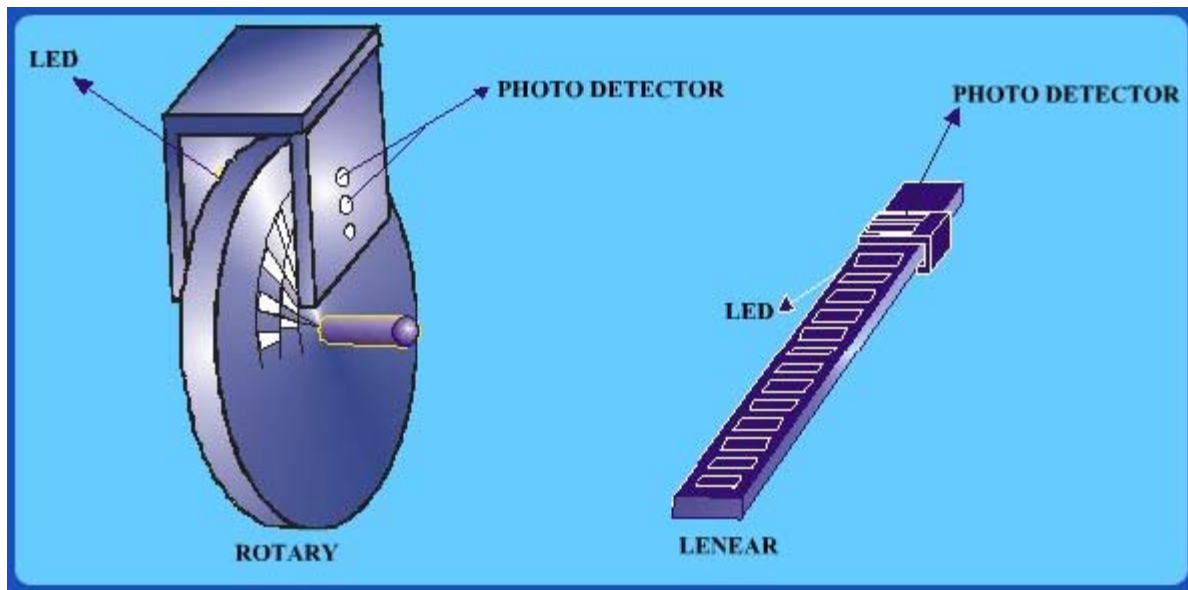
$$\text{Error} = xV_S - V_L$$

$$= xV_S \left\{ \frac{R_p}{R_L} (x - x^2) \right\}$$

0000	0000
0001	0001
0010	0011
0011	0010
0100	0110
0101	0111
0110	0101
0111	0100
1000	1100
1001	1101
1010	1111
1011	1110
1100	1010
1101	1011
1110	1001
1111	1000



Gray to Binary Conversion



Recap

In this course you have learnt the following

- Actuators: Stepper Motors, Electric DC motors, Hydraulic & Pneumatic Actuators
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- Basic Movements – Position, Velocity, Acceleration
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Congratulations, you have finished Lecture 9. To view the next lecture select it from the left hand side menu of the page.

