

Module 4 : Sensors and Controllers in robots

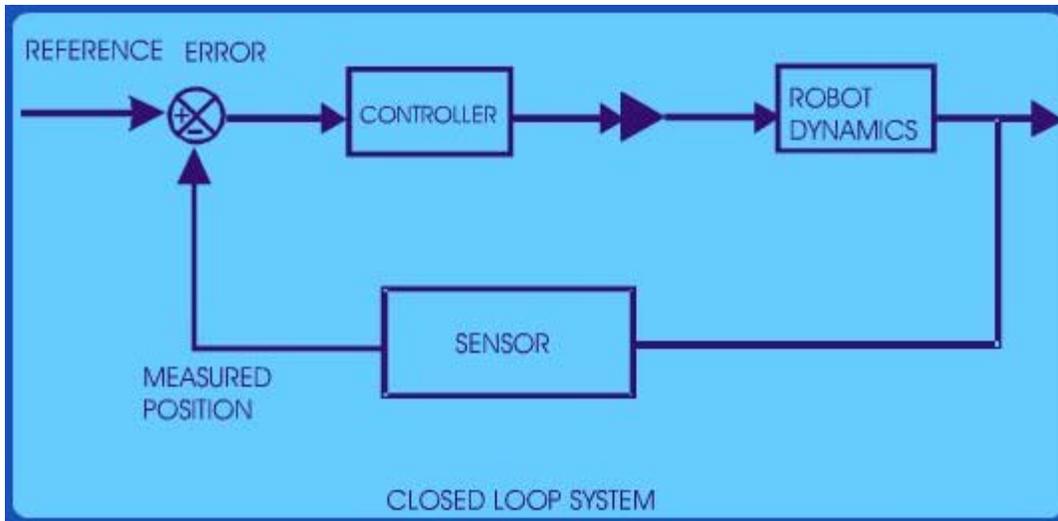
Lecture 9 : Sensors and controllers (sensor types)

Objectives

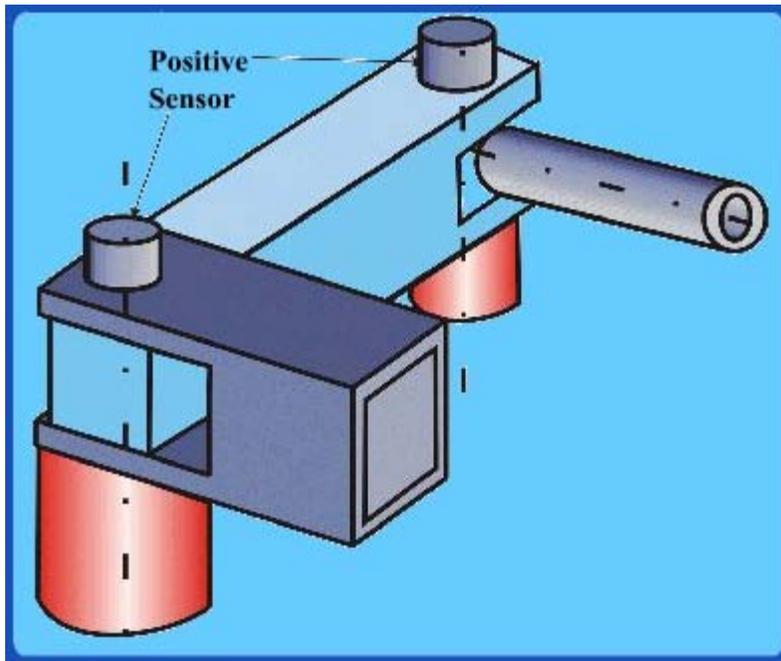
In this course you will learn about

- 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

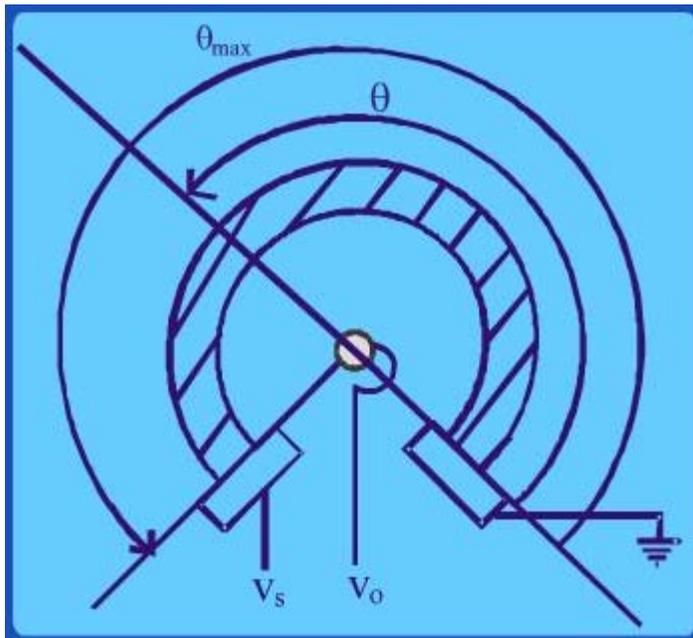


Position Sensors

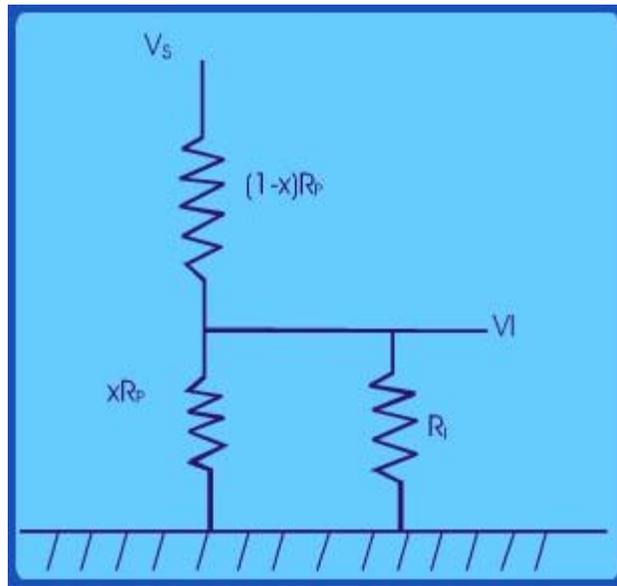
- Potentiometers

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

Conductive Polymer Type (Linearity <1% FS)



Potentiometer: Analog Output



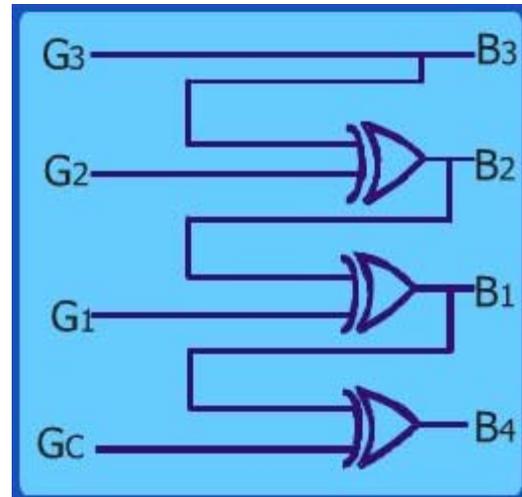
$$V_O = \frac{\theta}{\theta_{\max}} V_S = k\theta = xV_S$$

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

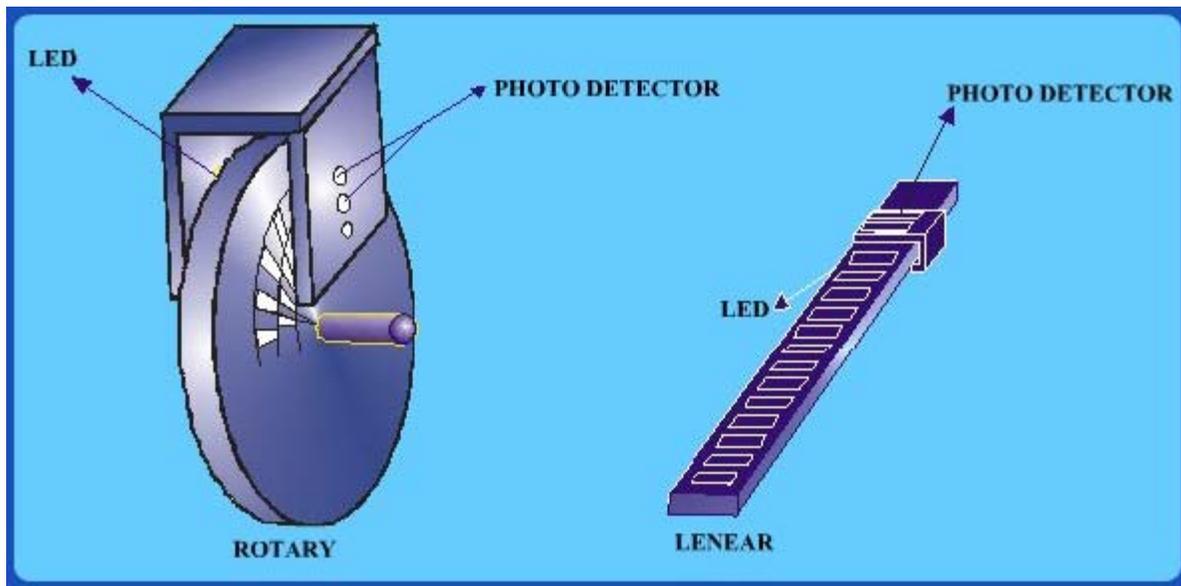
$$\begin{aligned} \text{Error} &= xV_S - V_L \\ &= xV_S \left\{ \frac{R_p}{R_L} (x - x^2) \right\} \end{aligned}$$

				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

Binary Count **Gray**



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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Congratulations, you have finished Lecture 9. To view the next lecture select it from the left hand side menu of the page.

