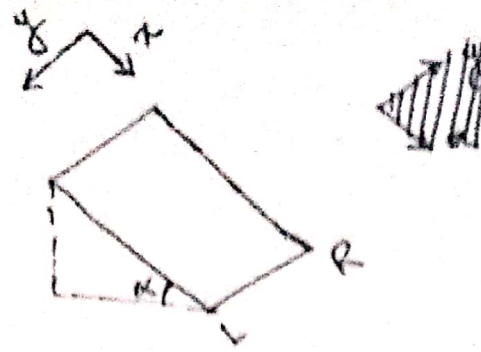


S4 pertains to value read by sensor 4
 → Value read (Sensor 4) ;
 → Make value stored by ip1 ;
 → Get error



y_1 = Value read (Sensor 1) ; Start time (t_1)

y_2 = Value read (Sensor 3) ; Finish time (t_2)

$$\frac{y_2 - y_1}{4.5 \text{ cm}} = 0 \quad ; \quad y_2 - y_1 \geq 0 \text{ ball moving R} \rightarrow \text{L}$$

$$< 0 \text{ ball moving L} \rightarrow \text{R}$$

$$x = v \cos \theta t - \frac{1}{2} (g \sin \alpha - \mu g \cos \alpha \cos \theta) t^2$$

$$y = v \sin \theta t - \frac{1}{2} \mu g \cos \alpha \sin \theta t^2$$

$$\frac{x_2 - x_1}{4.5 \text{ cm}} = v \cos \theta (t_2 - t_1) - \frac{1}{2} \overbrace{(g \sin \alpha - \mu g \cos \alpha \cos \theta)}^P (t_2 - t_1)^2$$

$$v = \frac{4.5 \text{ cm} + 0.5 (P) (t_2 - t_1)^2}{\cos \theta (t_2 - t_1)} \quad [A]$$

Time to reach bottom:-

$$\frac{L}{1 \text{ m}} = [A] \cos \theta t - P t^2$$

$$t = \text{---} [B]$$

Predicting y :-

$\text{L} \rightarrow \text{R}$

$$y' = y_1 - y$$

$$y = [A] \sin \theta [B] - 0.5 \mu g \cos \alpha \sin \theta [B]^2.$$

$$R \rightarrow L$$

$$y' = y_1 + y$$

$$y = [A] \sin \theta [B] - 0.5 \mu g \cos \alpha \sin \theta [B]^2$$

gear specs

Shaft diameter = 6 mm

Pinion diameter = 6 cm

Teeth = 38

Rack length = 2.1 m

gear ratio of pinion : rack = 1

$$\text{No. of rotation required} = \frac{Y}{18.84 \text{ cm}} \quad \blacklozenge (\text{float})$$

$$Y = 100 \text{ cm} - y'$$

$$\text{Pulse count of rotation encoder} = \frac{Y \times 20}{18.84 \text{ cm}} + 0.5$$

(Integer)