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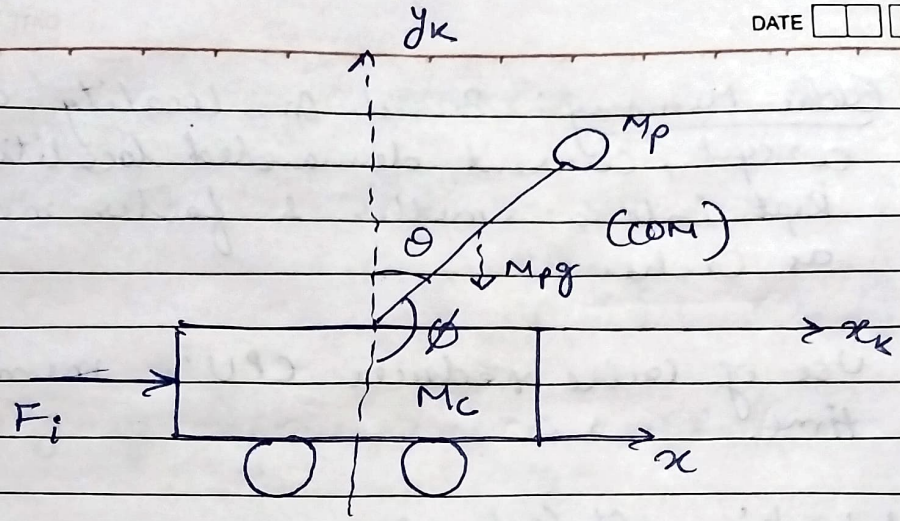
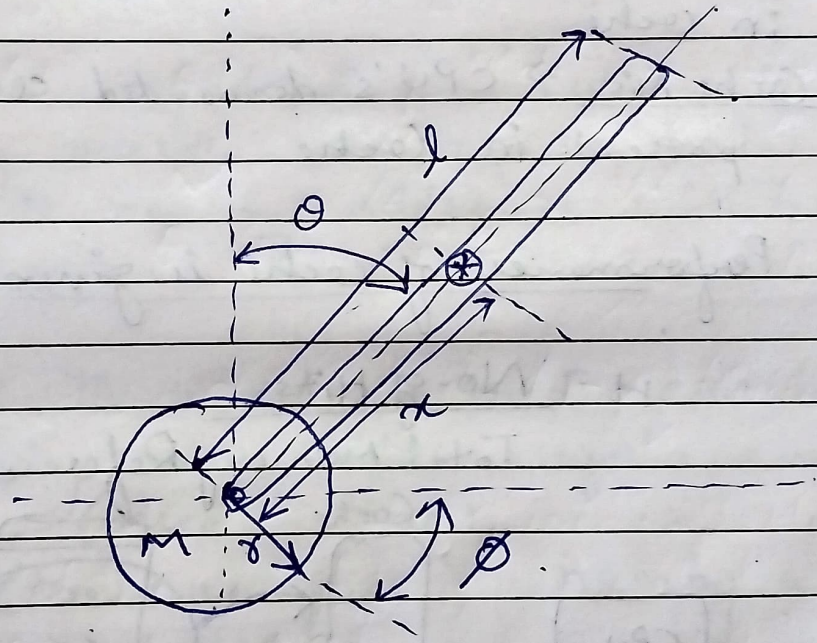


Part of Focus



Schematic Diagram

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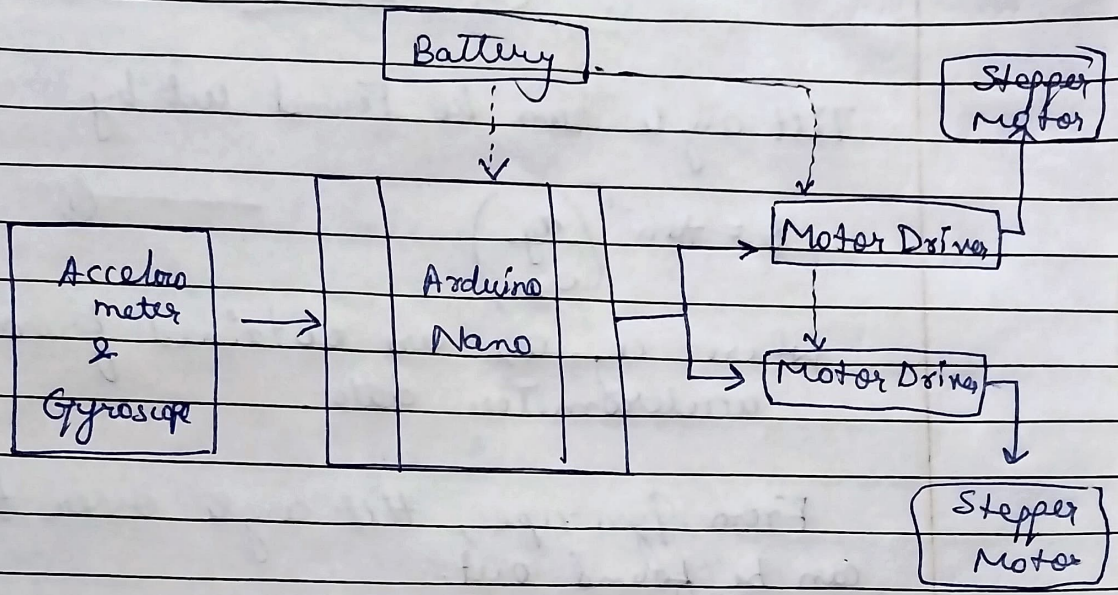
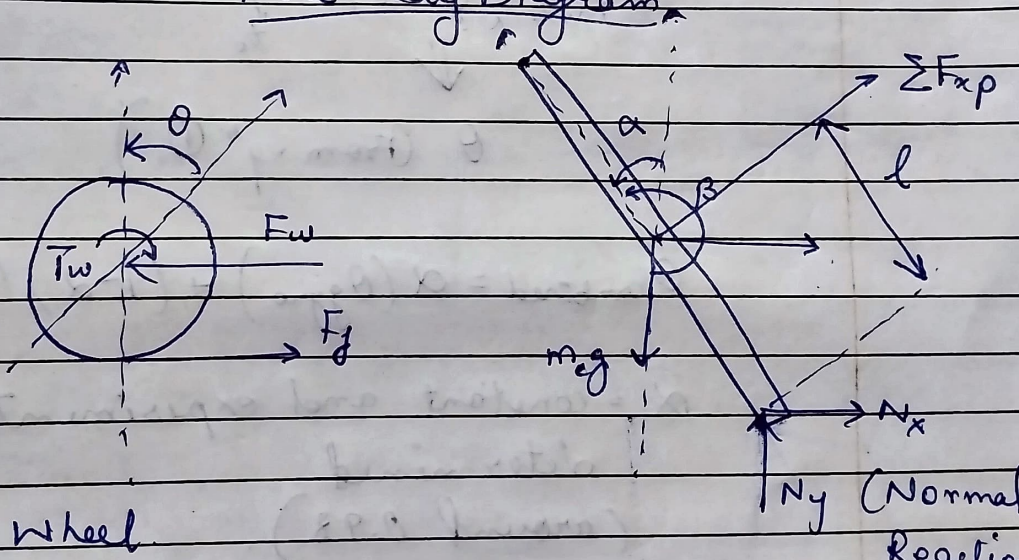


Free Body Diagram



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Calculations

Tilt angle can be Found out by:

$$\theta = \tan^{-1}\left(\frac{a_y}{a_x}\right) \quad \text{——— (1)}$$

where a_y, a_x are obtained from accelerometer data.

From Gyroscope, tilt angle over time can be found out.

$$\theta(t) = \theta(t_0) + \int_{t_0}^{t} \omega \, dt \quad \text{——— (2)}$$

$\Downarrow$

θ (From eq^n (1)).

$$\theta_{combined} = \alpha(\theta_{gyro}) + (1-\alpha)(\theta_{accel})$$

α = constant and experimentally determined (around 0.98).

From PID, we get data to adjust motor speeds.

$$v(t) = K_p e(t) + K_i \int e(t)\,dt + K_d \frac{de(t)}{dt}$$

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Where, $e(t) = \theta_{desired} - \theta_{current}$.

K_p, K_i & K_d are gains. (experimental)

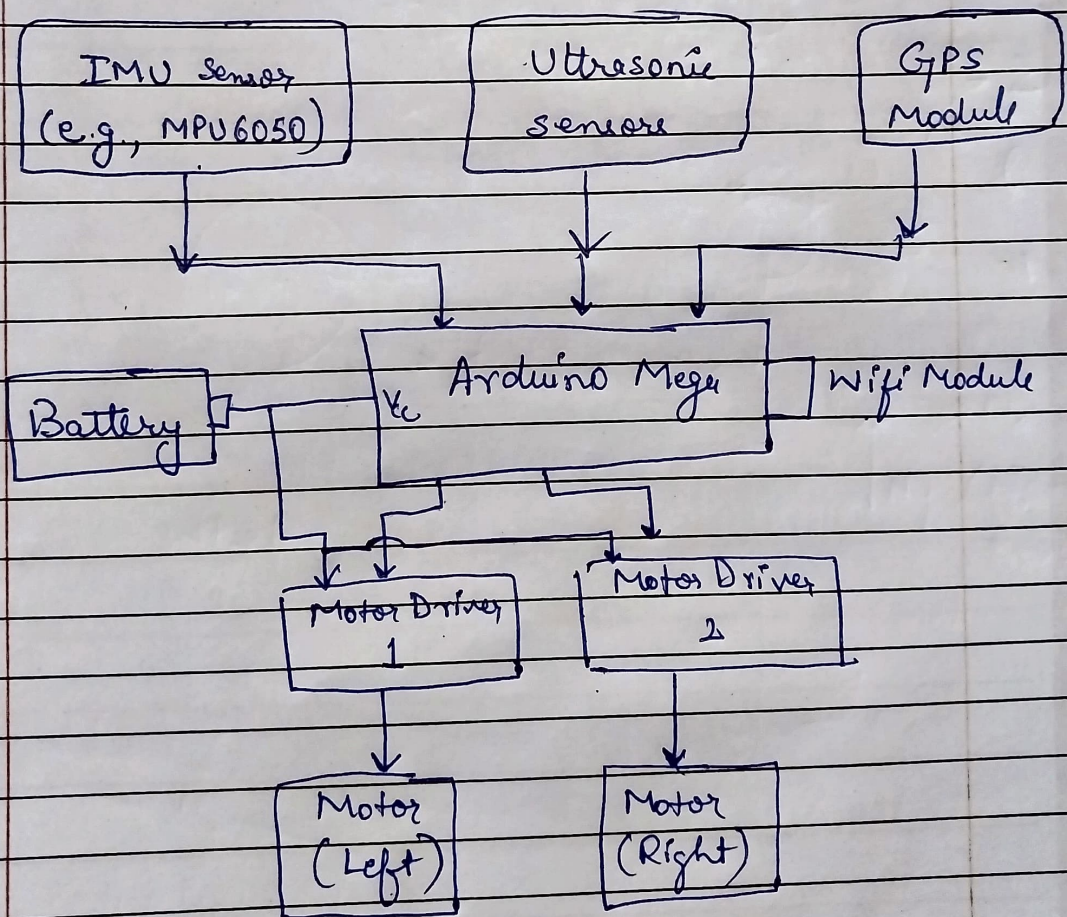
Motor speed Calculations:

$V_{left} = V_0 + U(t)$

$V_{right} = V_0 - U(t)$.

V_0 = base speed.

CIRCUIT DIAGRAM



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