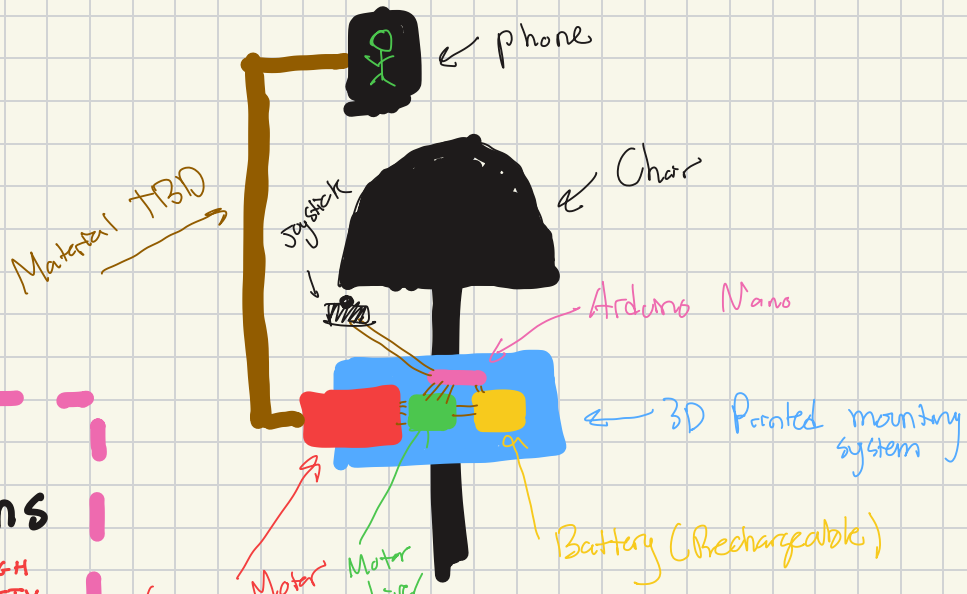
Phone Holder

This is the first iteration of a rotating phone mount, built while participating in the Tikkun Olam Makers : ATL 2025.



Physics Calculations

THESE CALCULATIONS USE EXTREMELY HIGH ESTIMATES FOR LENGTH x WEIGHT FOR SAFETY WHEN CHOOSING A MOTOR!

$\tau = |r| F \sin\theta$

Phone mass: 0.250Kg

Support stick mass (high estimate): 2.00Kg

Length of stick (high estimate): 1.00m

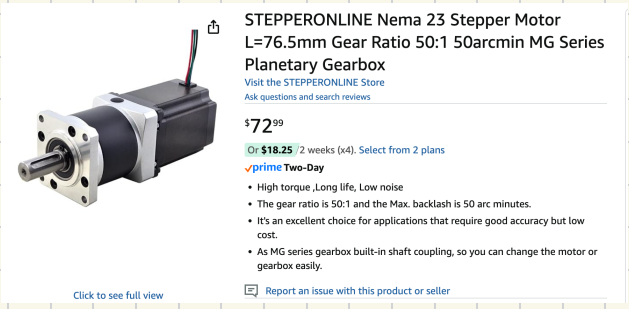
Center of mass: 0.556m

$$\vec{X}_{com} = \frac{\sum m_i x_i}{\sum m_i} = \frac{0.25Kg \cdot 1.00m + 2.00Kg \cdot 0.50m}{0.25Kg + 2.00Kg} = 0.556m$$

Theoretically, the holding torque on the stepper motor would need to be 12.260Nm.

$$\tau_{max} = |r| F \sin(\pi/2)$$
$$= 0.556m \cdot 2.25Kg \cdot 9.8m/s^2 \cdot \sin(\pi/2)$$
$$\tau_{max} = 12.260Nm$$

Motor Feasibility



Rated Current: 2.9A

Max Permissible Torque: 20Nm

Theoretical Max ~~torque~~ with 50:1... Gearbox at 2.9A: 1.89Nm · 50 = 94.5 WAY HIGH!! 94.5 ? 20

how motor torque at 2.9A.

What current to run motor at?

2 conditions

#1 Amperage ≥ 0.5 (min setting on driver)

#2 $\tau \geq 12.60$ AND $\tau \leq 20.0$

$$\frac{2.9A}{?} = \frac{94.5}{20} \quad ? = 0.6137A$$

Condition #1 ✓

Is 0.5A Enough?

$$\frac{2.9A}{0.5} = \frac{94.5}{?} \quad ? = 16.29$$

Condition #2 ✓