

ROBOTICS STUDIO

FALL 2021

ASSIGNMENT1

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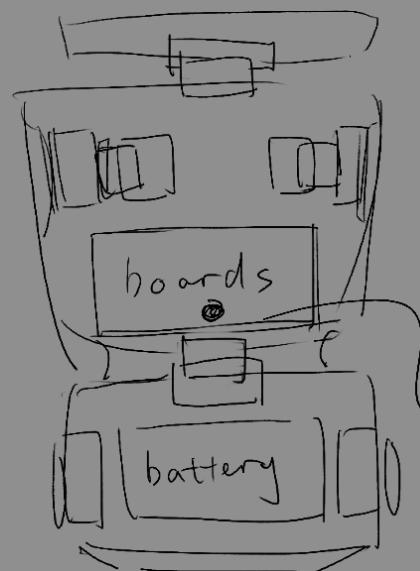
Sep. 22nd



CONCEPT I: BUZZ-BOT

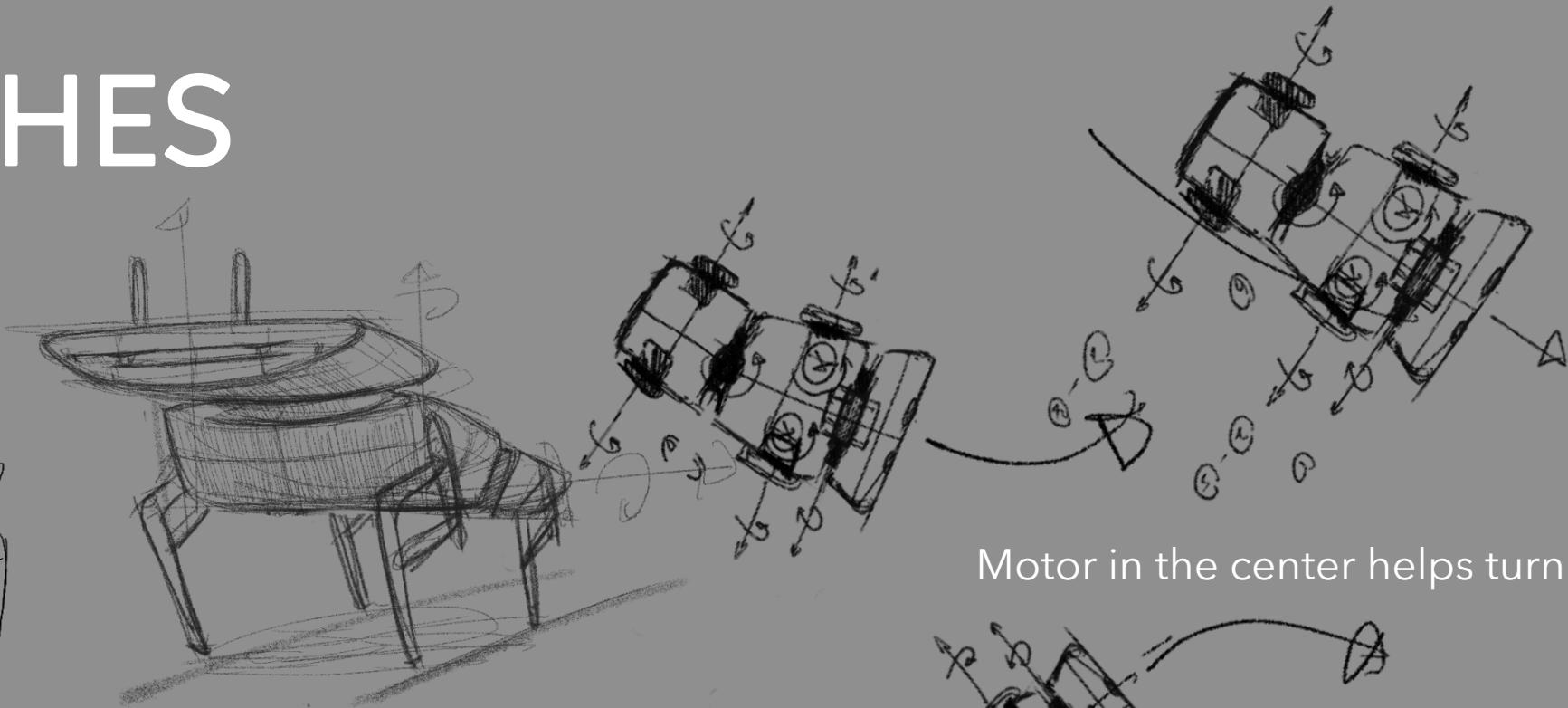


SKETCHES

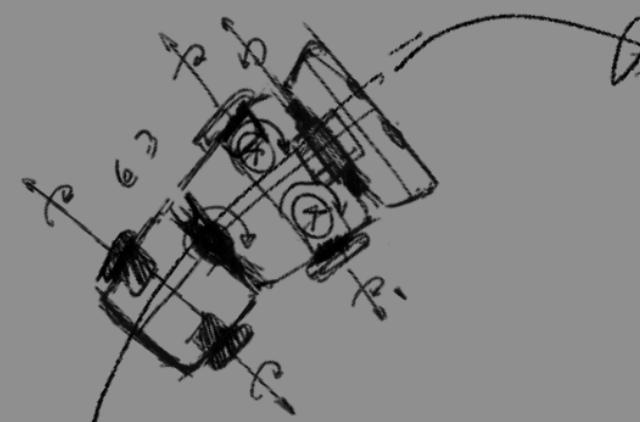


approximate CG

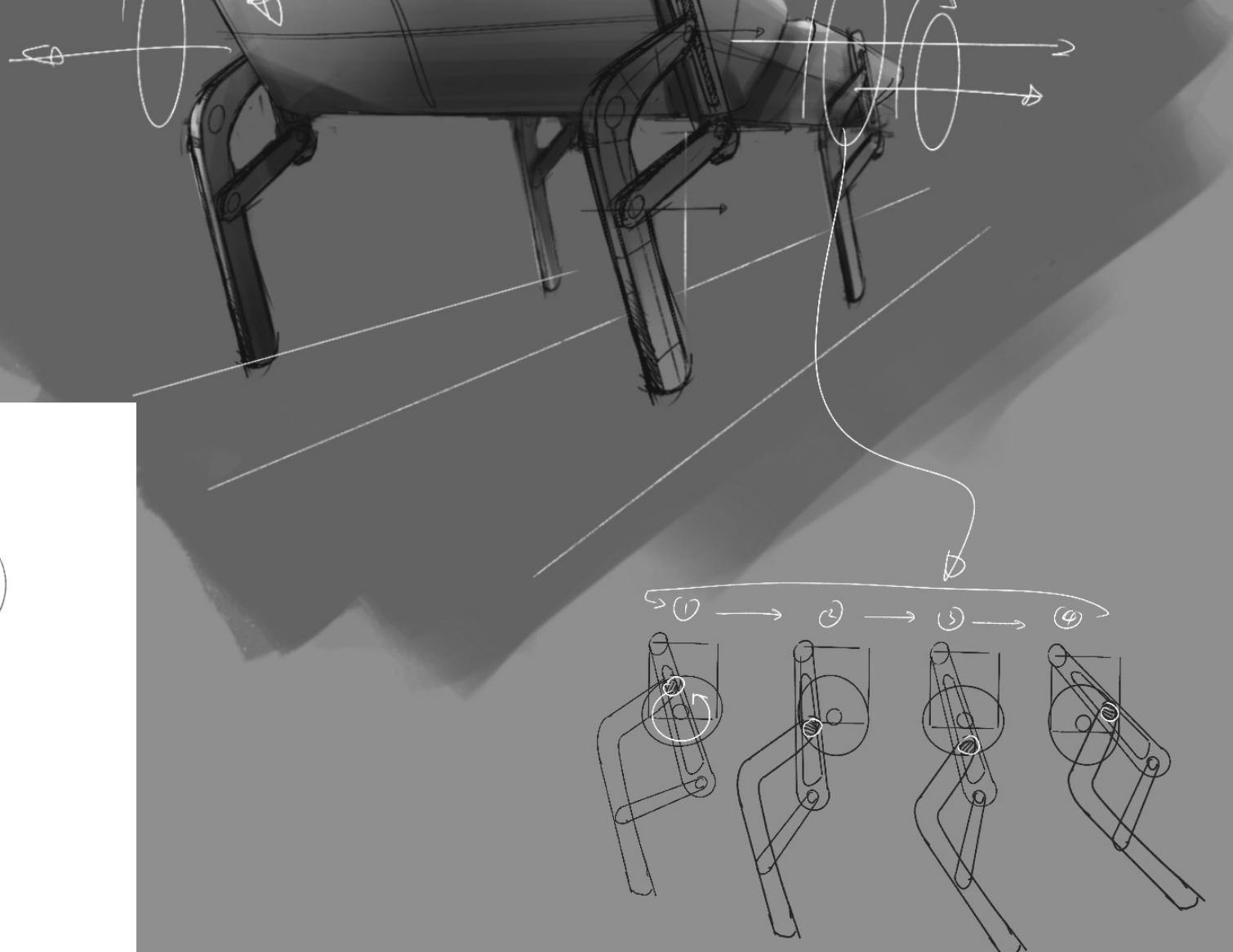
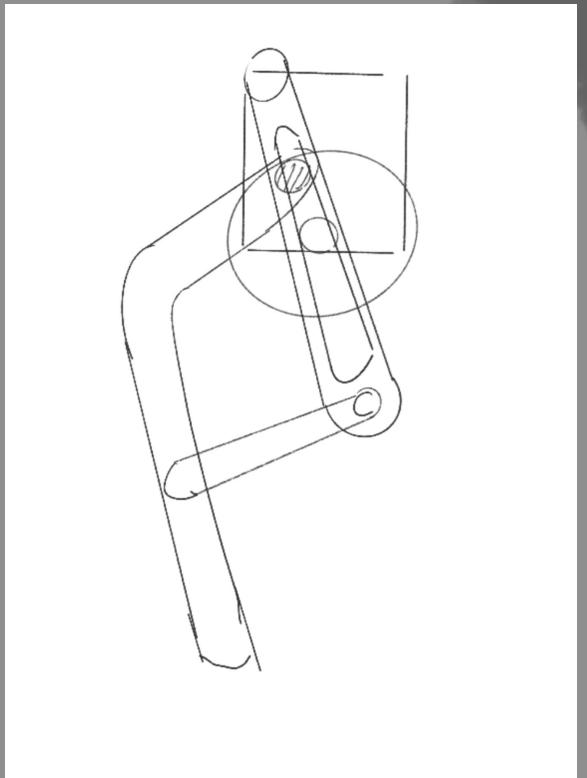
Electronics distribution



Motor in the center helps turning



SKETCHES



CALCULATION

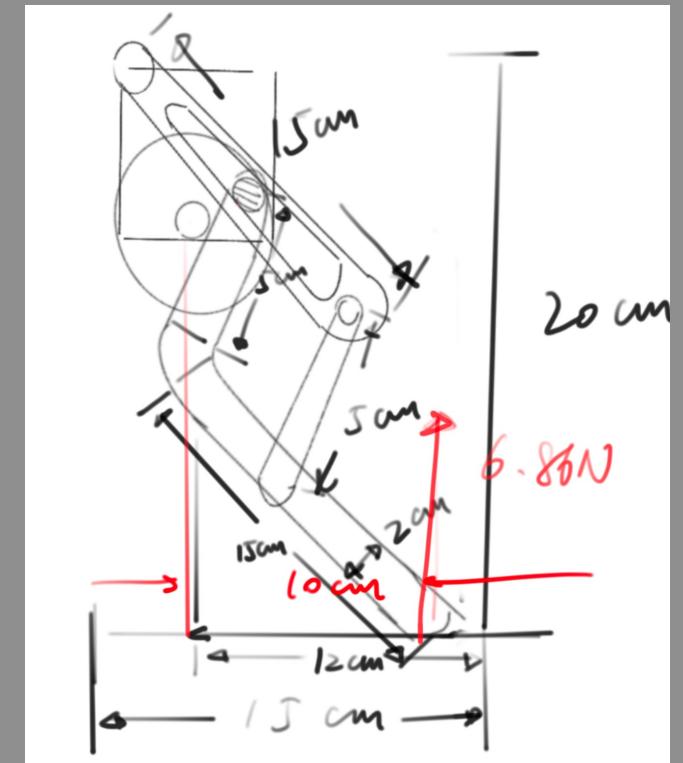
Approximate Weight = PLA Body + Electronics ~ 558g + 833g ~ 1.4kg

Largest torque case --- two legs standing

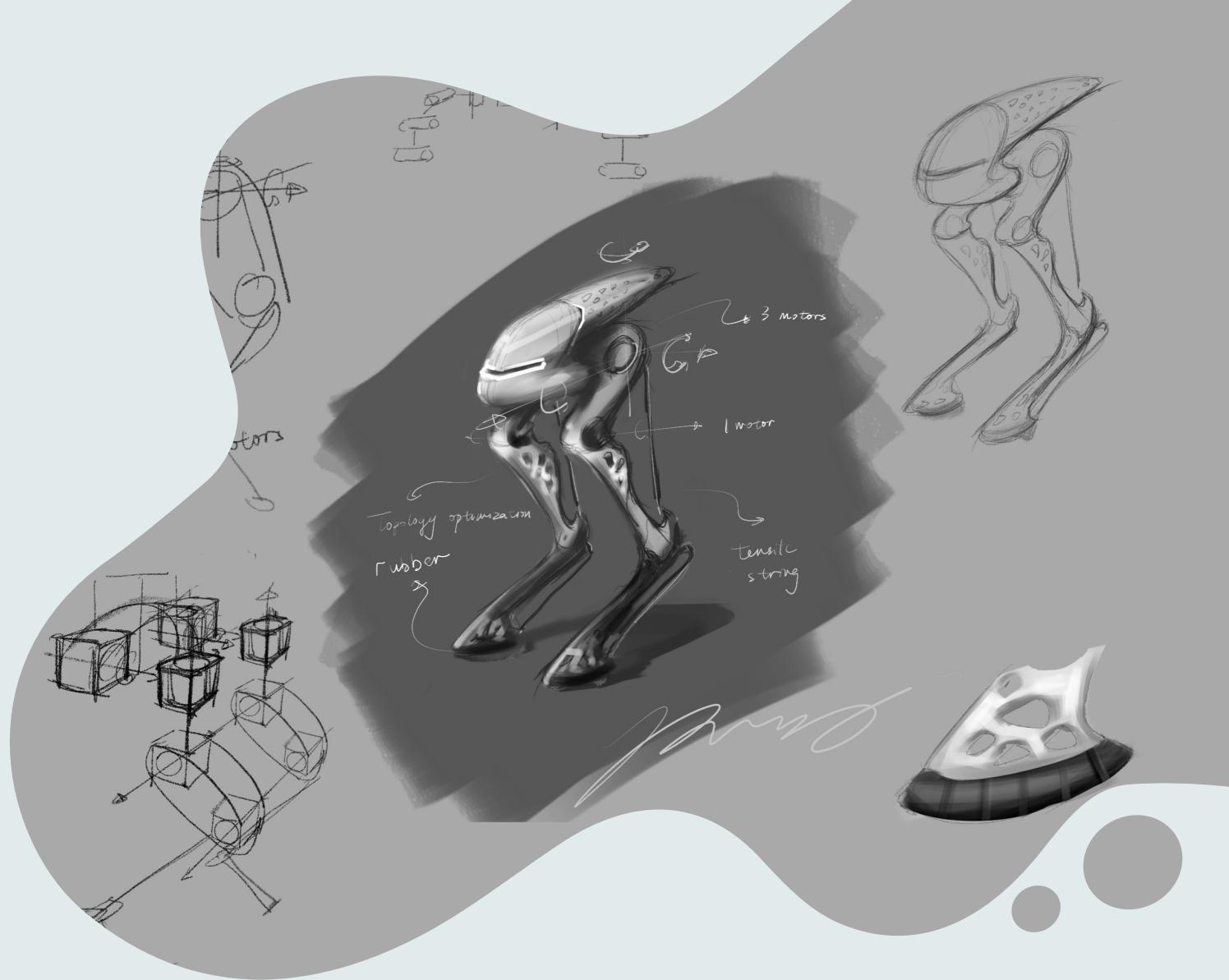
$$\text{Torque on each leg} = (1.4\text{kg} * 9.81\text{m/s}^2)/2 * 10\text{cm} = \mathbf{68.6 \text{ N.cm}}$$

$$\mathbf{68.6 \text{ N.cm} < 166.7 \text{ N.cm}}$$

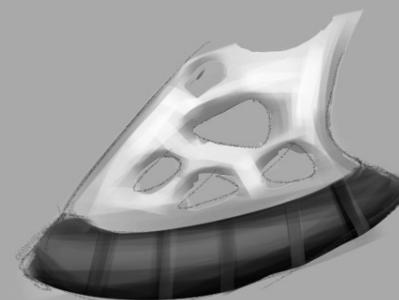
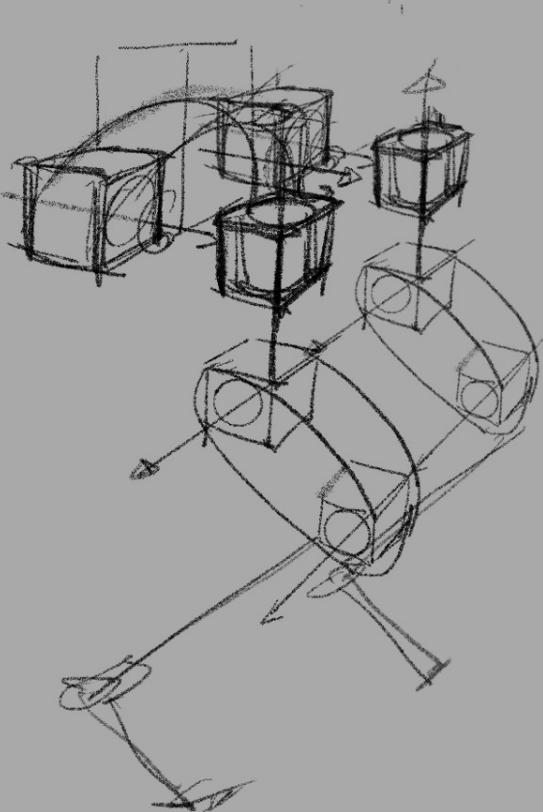
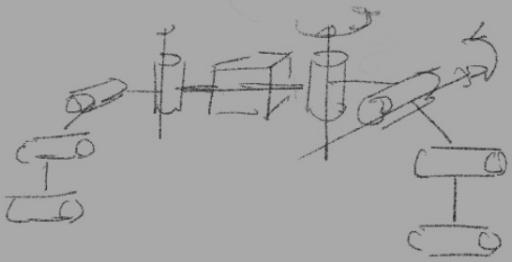
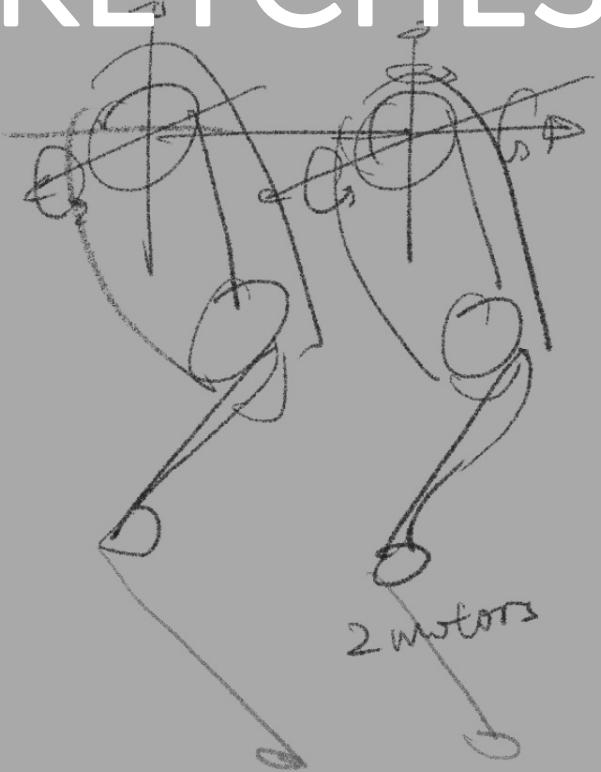
Conclusion: We are **well within** the motor specification



CONCEPT II



SKETCHES



CALCULATION

Approximate Weight = PLA Body + Electronics ~ 368g + 833g ~ 1.2kg

Static torque case --- two legs standing

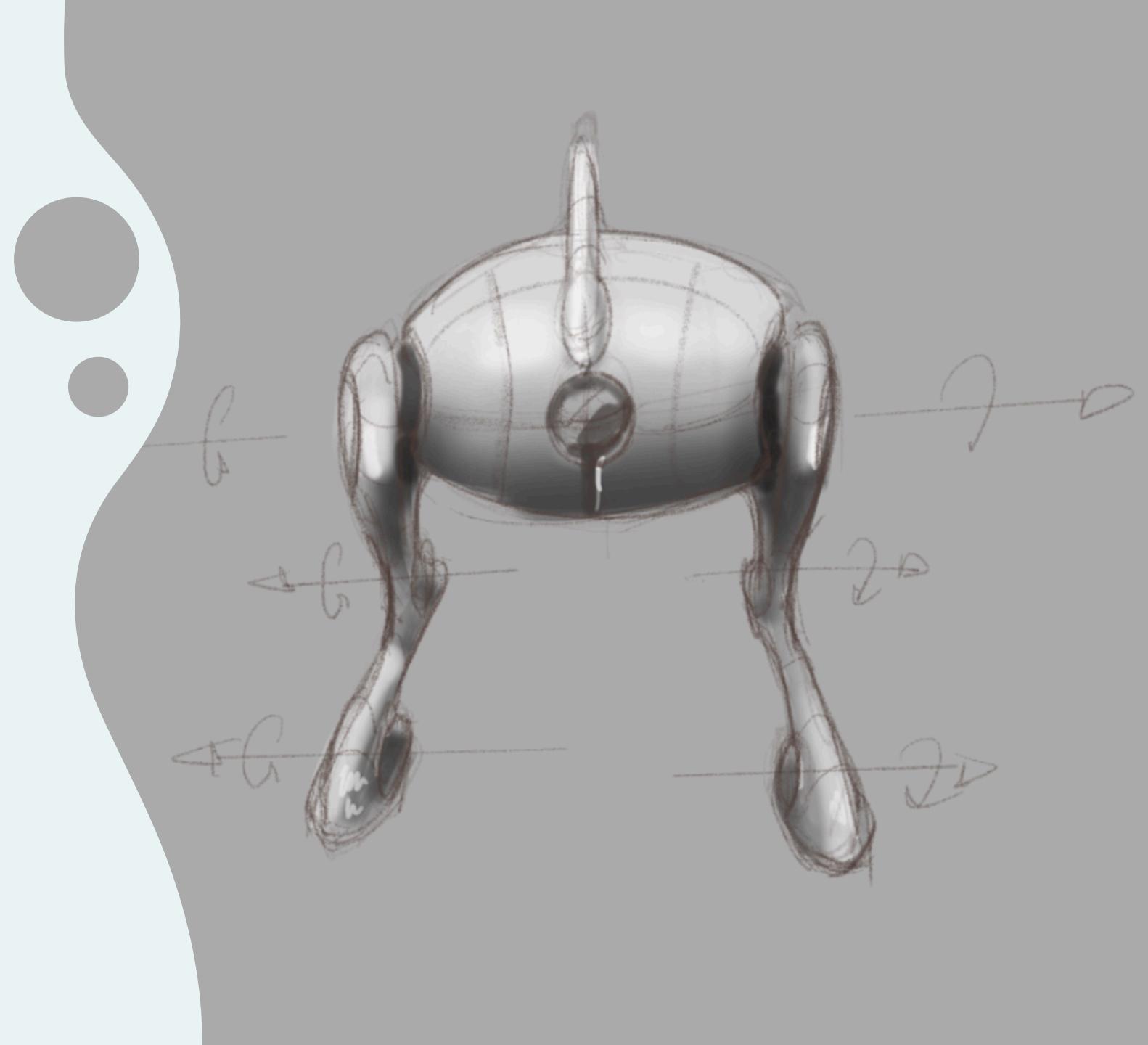
Torque on each leg = $(1.2\text{kg} * 9.81\text{m/s}^2)/2 * 15\text{cm} = 88.2 \text{ N.cm}$

88.2 N.cm < 166.7 N.cm

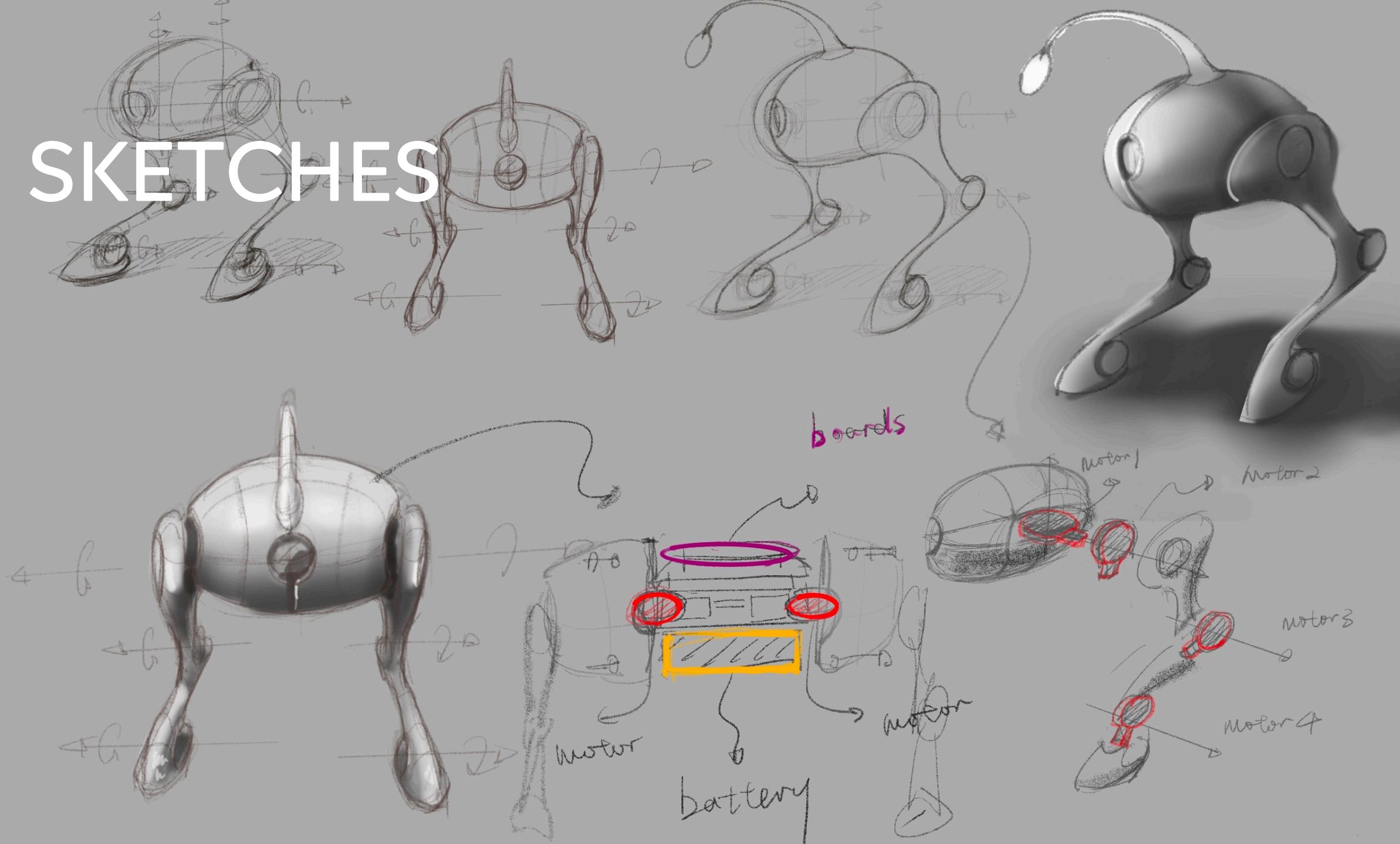
Conclusion: We are **well within** the motor specification

CONCEPT

III



SKETCHES



CALCULATION

Approximate Weight = PLA Body + Electronics ~ 200g + 833g ~ 1.033kg

Static torque case --- two legs standing

Torque on each leg = $(1.033\text{kg} * 9.81\text{m/s}^2)/2 * 7\text{cm} = 35.43 \text{ N.cm}$

35.43 N.cm < 166.7 N.cm

Conclusion: We are **well within** the motor specification