ROBILITYX

Project Naming → [Date]-[Part Type]-[Version]
~swap

RobilityX

Date Nov 11, 2025

↳ RobilityX ⟷ Autonomous Unbound Robotic Appendages

↳ Wearable "extra pair" of 4 legs that carry you in the air + walk around.

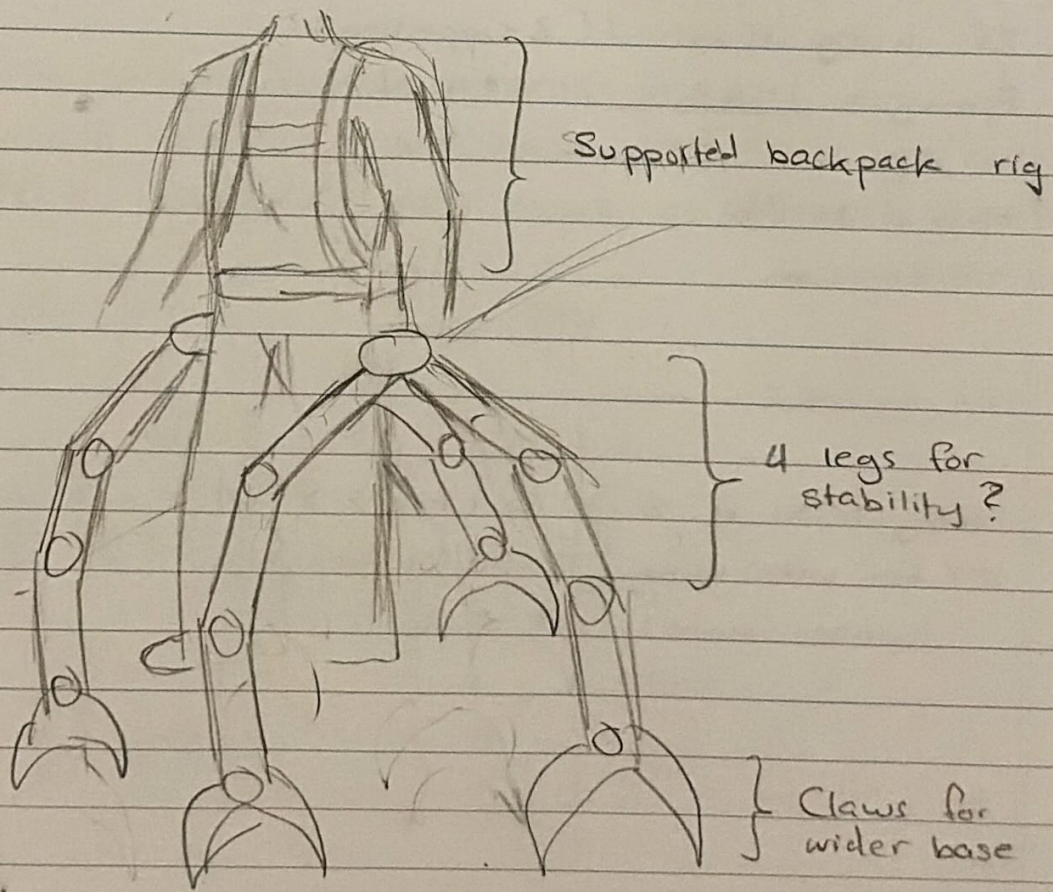
↳ Goal: flexible + autonomous

↳ Today, I opened a YouTube + Instagram account, I will start posting progress.

Day 2 - Nov 12, 2025:

↳ Robot will be made of metal.

Draft sketch:



Date

Total Robot + Human weight:

Human weight ≈ 100 kg max

Robot frame + motors + legs ≈ 100 kg max.

$W_{Total} = 200\ kg$

Load / leg:

$F_{Total} = 200\ kg \times 9.81\ m/s^2$.

$F_{Total} = 1962\ N$

If all 4 legs on the ground:

$F_{per\ leg} = \frac{1962\ N}{4\ legs} = 491\ N$

If 1 leg is raised (3 supporting):

$F_{per\ leg} = \frac{1962\ N}{3} = 654\ N$

Material to Use:

↳ Aluminum

Nov 26, 2025:

Safety Factor of 2 → 654 N × 2 SF ≈ 1308 N / leg

↳ For prototyping, I will be designing a smaller model. → 5 kg

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Date Jan 23, 2026

Total Mass for Small prototype: 2.27 kg + 5.45 kg = 7.72 kg

$F_{Total} = 7.72\ kg \times 9.81\ m/s^2 = 75.7332\ N$

SF of 2 $\rightarrow$ $75.7332\ N \times 2 = \boxed{151.47\ N} \approx 150\ N$

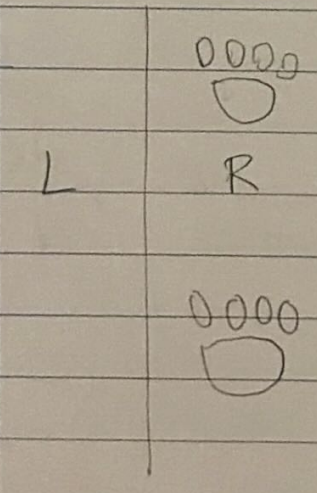
Each leg will also be able to carry this much weight

Taking inspiration from animals (example: dogs):

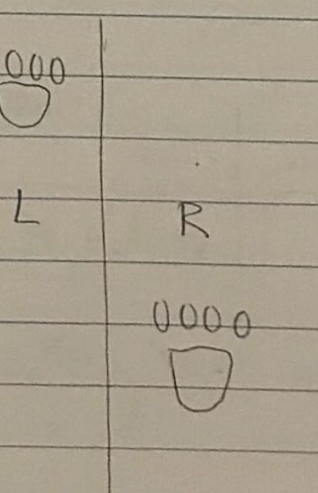
While walking slowly:
Right feet move forward together, left feet together.
$\hookrightarrow$ The back foot hits the ground earlier than front

While walking faster or running:
Opposite side front and back foot down at once.
Feet on the same side move in different directions.

Slow:



Fast.



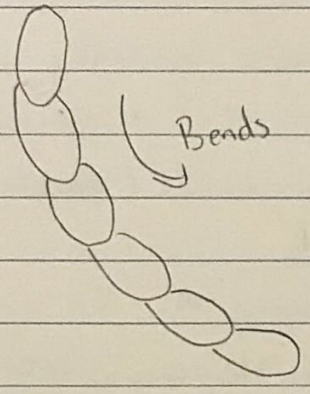
Date Jan 26, 2026

Tentacle Joint Prototype 1:

↳ Doesn't bend fully → Due to internal bendy straw core

↳ Less control + strength over other joints

Goal →



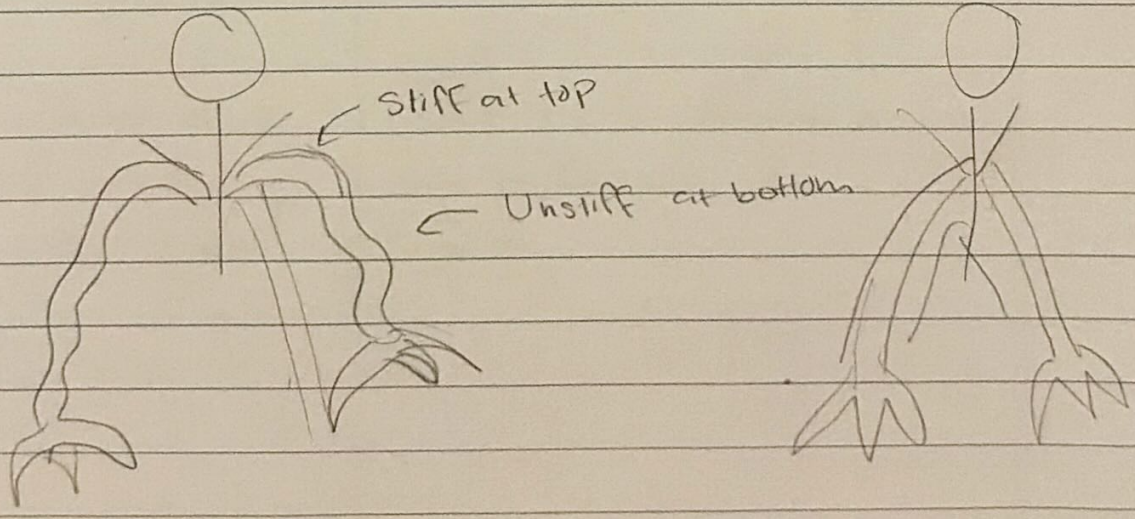
The bending didn't work

Series Elastic Actuators (SEAs):

↳ Power source → Spring → Load

↳ Keep in mind for future, could use for shock absorbing and impact.

Plan → Use ball & socket joints to move better, more effective.



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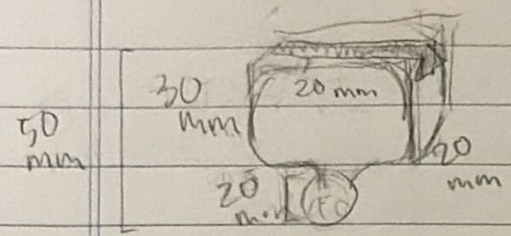
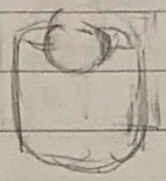
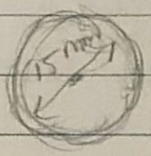
Stiff Joint (Dovetail):



Medium stiff Joint:





The sphere base is weak, so I added a 0.7 mm ring around it.

Feb 1, 2026

↳ Applying to Ycombinator for seed funding and help with incorporation.

~~Feb 12, 2026:~~

↳ CJ-01 pulley system 1

1/2 circumference = 7cm

$C = 2\pi r$

$14 = 2\pi r$

$7 = \pi r$

$r = 2.228\ cm \rightarrow \boxed{d = 4.5\ cm}$

First pulleys can only bring the joints completely up with full 180°. I want in 90°.

1/4 C = 7 cm

C = 28 cm

$28 = 2\pi r$

$14 = \pi r \rightarrow r = 4.5 \rightarrow d = 9\ cm$

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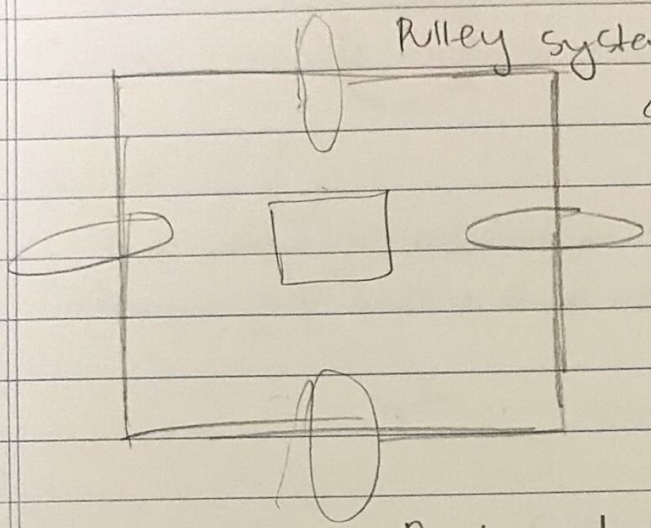
Date

Feb 15, 2026

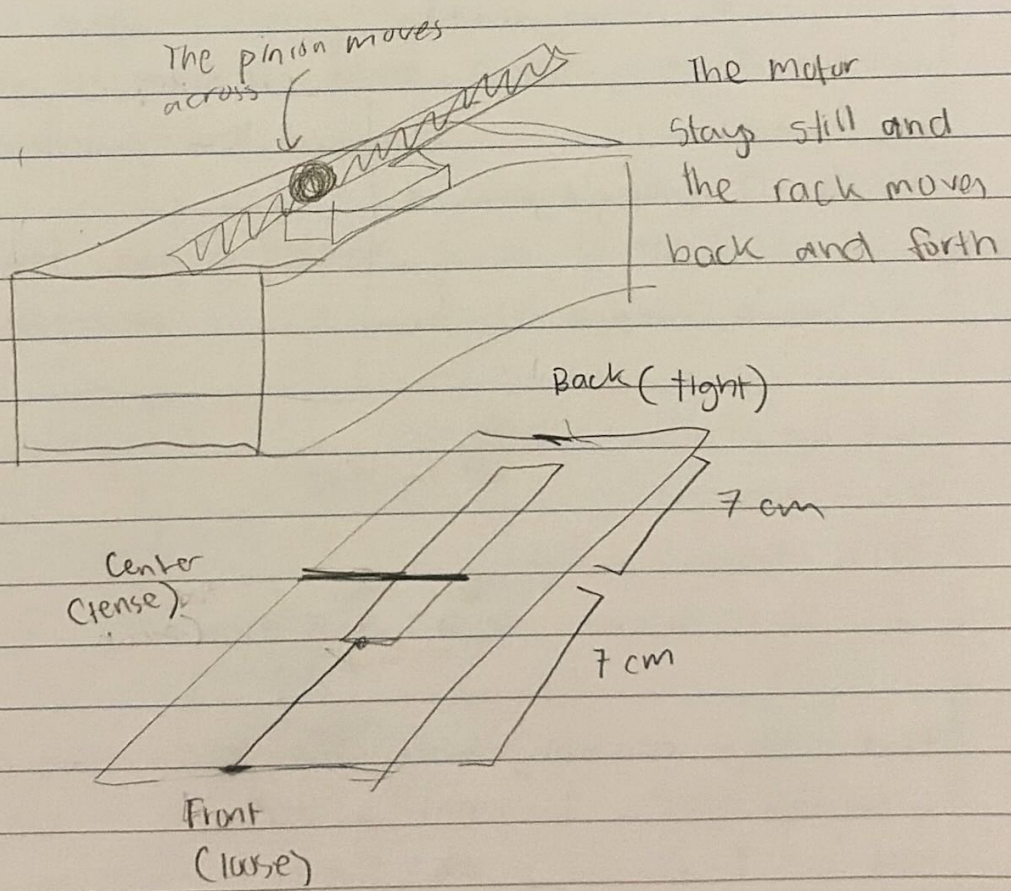
↳ Cardboard box is very weak → 3D PRINT!

Pulley system



← Takes up so much space

Rack and Pinion system



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Date

Rack & Pinion Calculations:

90° → 1/2 of the rack

180° → FULL rack

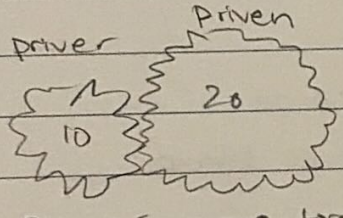
$r_{total} = 140\,mm$

Pinion won't work, too big.

Gear Ratios:

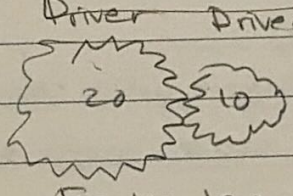
2 options → 2:1 ratio or 1:2 ratio

2:1 ratio:

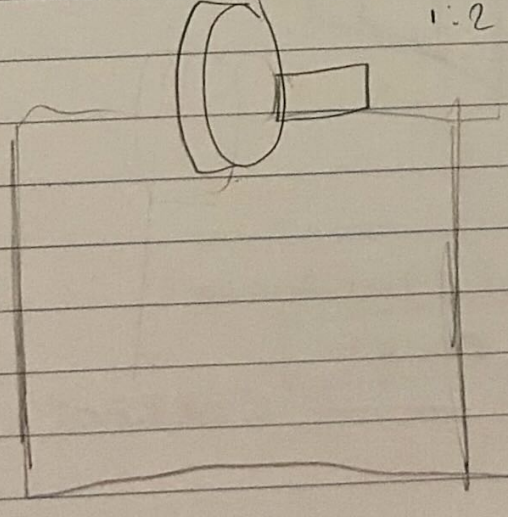


Slower, more torque. Driver gear completes 2 rotations and driven completes 1.

1:2 ratio:



Faster, less torque



1:2 ratio

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Plan for Next Week:

Date Feb 18, 2026

↳ Fill out CYSF platform

↳ 3D print pulleys and cable system → FINAL DESIGN for CYSF

↳ Make Trifold

IF TIME, then move onto business related portions.

Feb 19, 2026

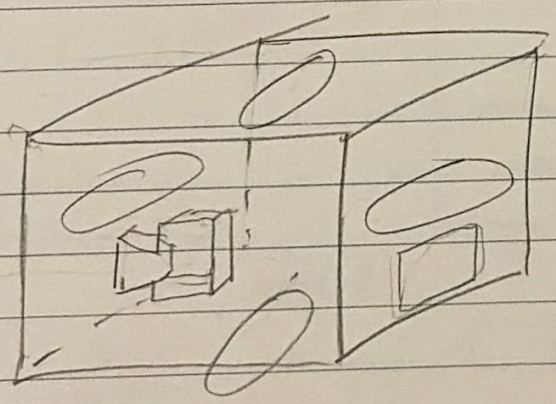
↳ Pretty cold today, unable to print outside too much

↳ Designed continuum joints — Molded Pipes to top and middle joint to keep fishing line consistent.

Feb 27, 2026:

↳ Must design + print compact solution

↳ Pulley space, motor space, driver space.



I'm using a lever arm to pull the string instead of a pulley

Lever Arm Calculations:

↳ r = 4.5 cm → What is circumference?

2(3.14)(4.5cm) = 28.26 cm

c/4 = 7.065 cm → CORRECT!

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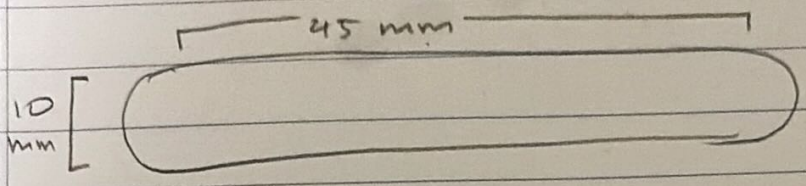
↳ Length of the lever arm = 4.5 cm



Servo motor width = 47mm

Length = 47 mm

March 1st, 2026:

↳ I 3D printed the rig/gantry for a compact CJ-01 design

↳ Very cold outside, likely the print will warp.

March 3rd, 2026:

↳ Finished my platform today.

↳ Sections ☑

↳ Video ☑

↳ Prototype ☑

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