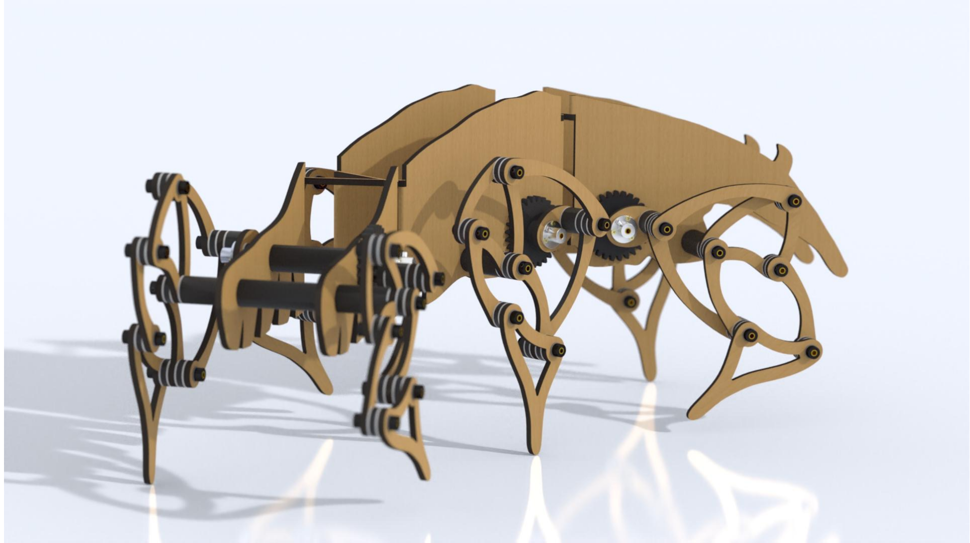


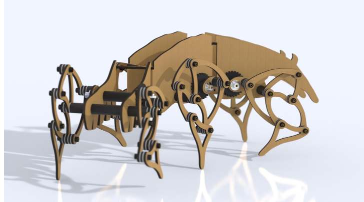
Quad Squad: Steerable Walker Project

Members: Myia Dickens, Justin Lin, Jeremy Jiang, Dylan Salcido

Sponsors: Dr. Michael McCarthy and Kevin Chen

Myia Dickens

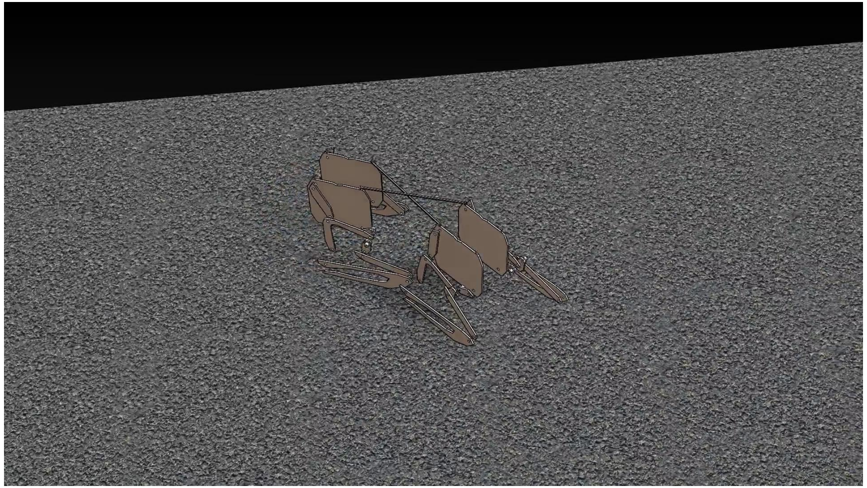
Team Goals and Purpose



The goal of this project to design, build, and test a steerable mechanical walker.

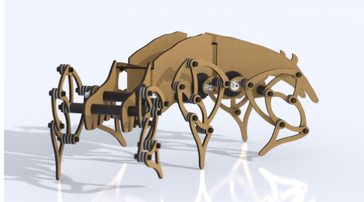
Requirements:

- one drive motor and one steering motor
- RC control to define forward and backward movement and left and right turn to steer
- four legged design (eventually a six legged design)
- a demonstration of its movement around a circle or in figure-eight in both directions



Myia Dickens

Team Organization



Organizational Roles

- Manager: Myia
  - Design: Justin
  - Manufacturing: Dylan
  - Documentation: Myia
  - Website and Powerpoint: Jeremy
  - Testing: Dylan and Justin

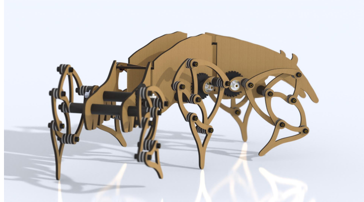
Technical Roles

Electrical	Chassis	Drive System
• Myia	• Justin	• Dylan • Jeremy

Schedule (Tentative)

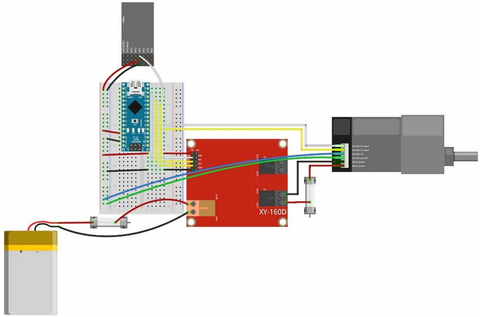
1. Team Organization and Goals
2. Technical Roles and Design Concepts
3. Solidworks design for Subsystem Prototypes
4. Identify parts list and fabricate parts for subsystems
5. Assembly of subsystem prototypes
6. Define A-Walker Prototype
7. Purchase and fabricate parts of the A-Walker
8. Define B-Walker Prototype
9. Purchase and fabricate parts of the B-Walker
10. Demonstration

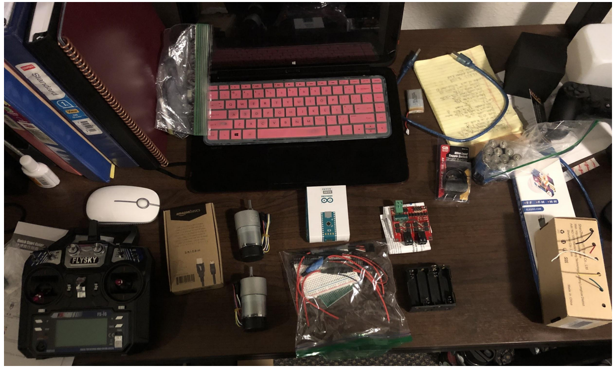
Myia Dickens



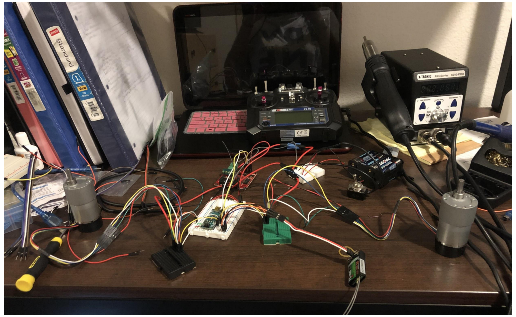
Electrical

Parts for the electrical were pre-chosen by Dr. Brandon Tsuge from the Bored Robot

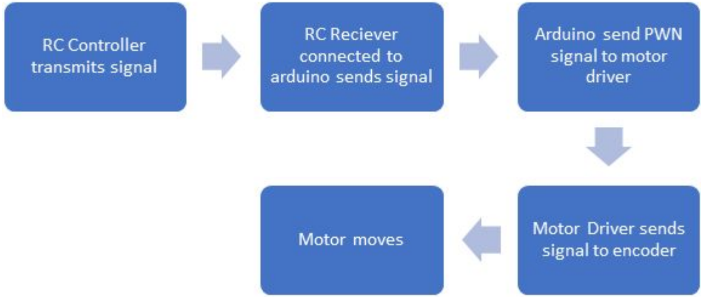




Motors have been wired and we are moving towards proportional control

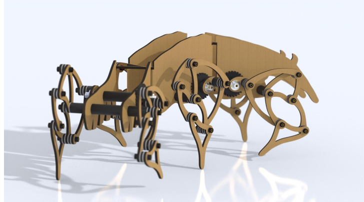


Electrical Flow Chart

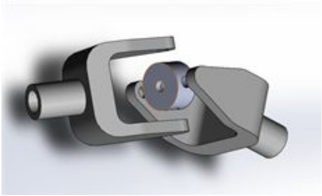


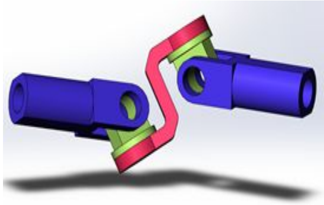
Myia Dickens

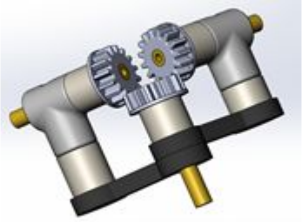
Drive System

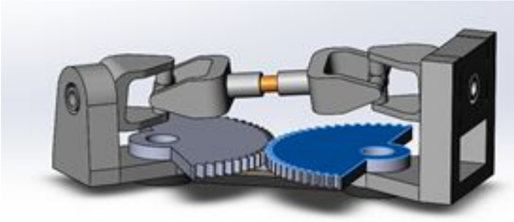


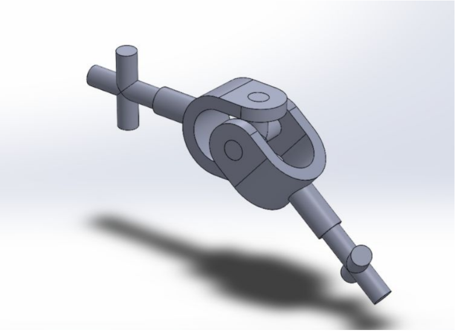
Drive Train Linkage Designs:

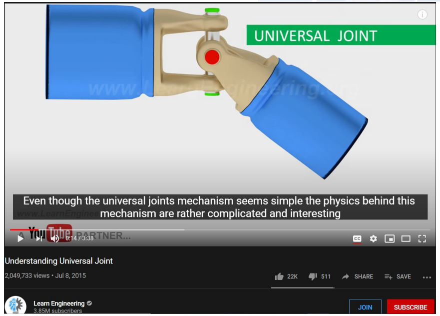


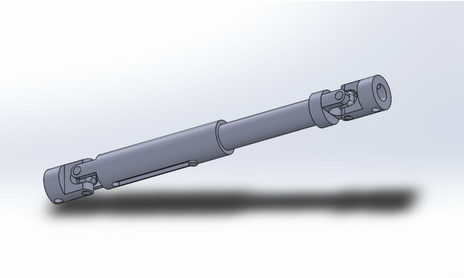




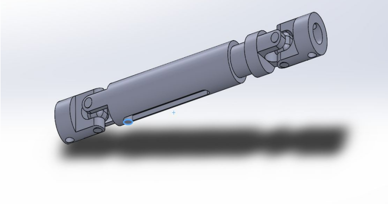








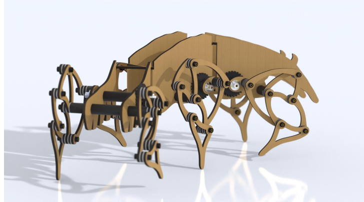
Max:
5.43 in

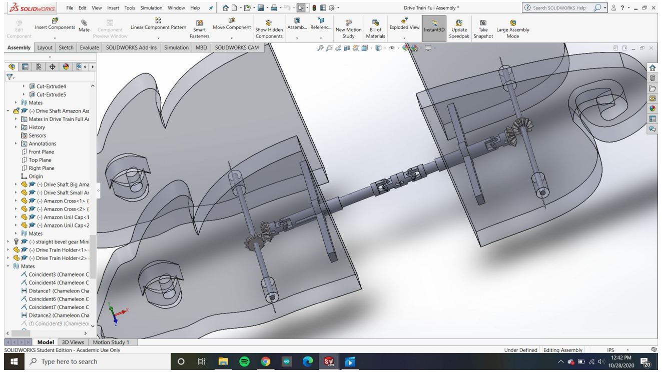


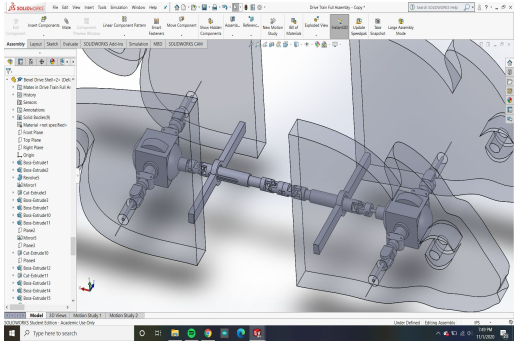
Min:
4.17 in

Dylan Salcido

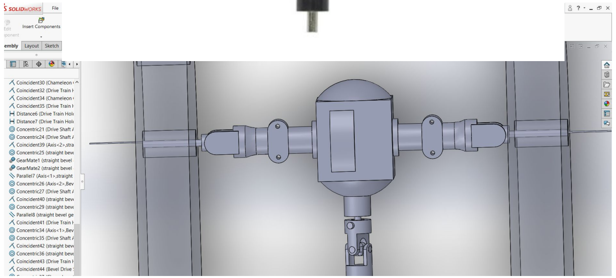
Drive System: Right Angle Bevel

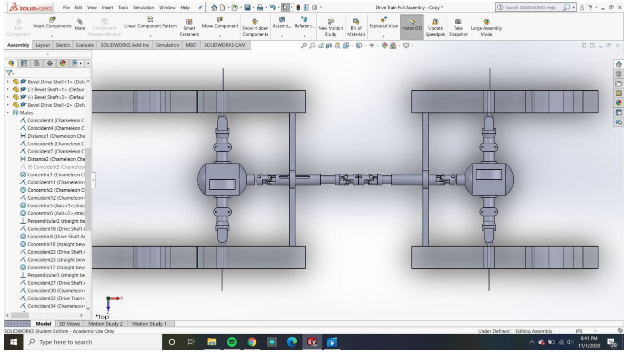


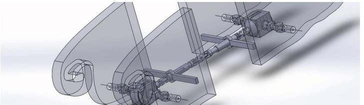


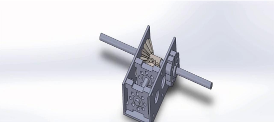


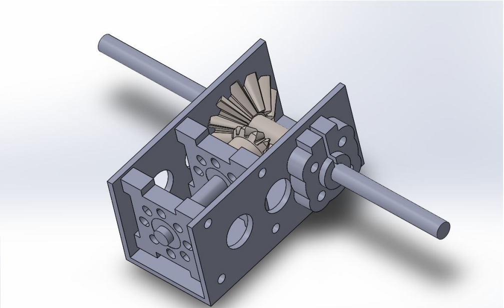
Servo City Model





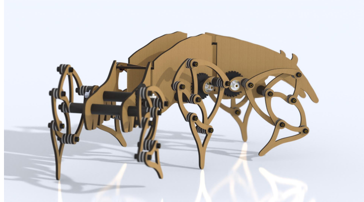






Dylan Salcido

Drive System

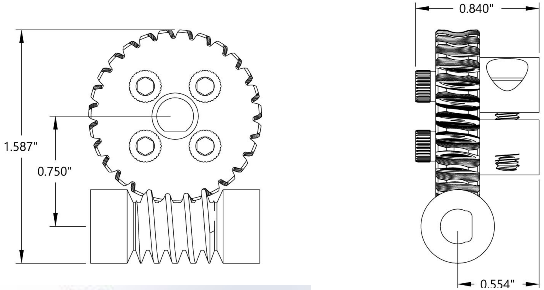


Worm Gear Box in Drive train:

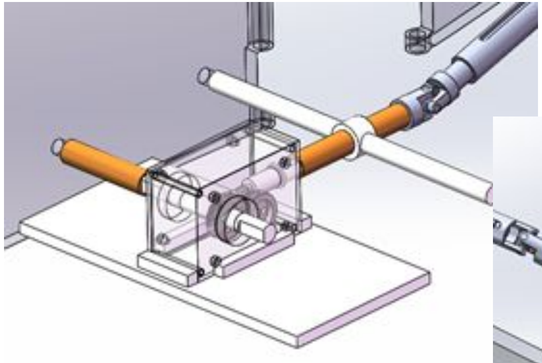
Worm Gear for right angle power transmission

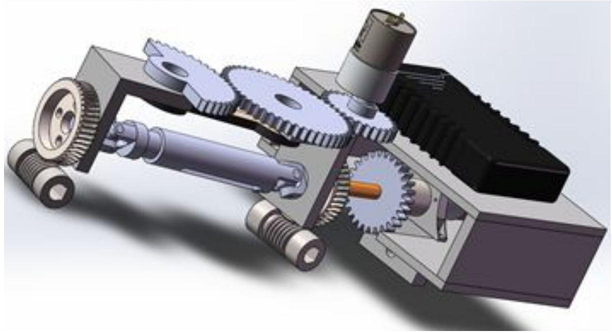
Rated Voltage: DC 12V
Reduction Ratio: 1:32
No-Load Speed: 250RPM
Rated Torque: 2Kg.cm
Rated Current: 1400/1260mA (Positive Rotation / Negative Rotation)
Error: ±10%
D Shaped Output Shaft Size: 8*15mm (0.31" x 0.59") (D*L)
Gearbox Size: 58.1 x 40.11 x 36mm (2.29" x 1.58" x 1.42") (L*W*H)
Motor Size: 31 x 57.2mm (1.22" x 2.25") (D*L)
Mounting Hole Size: M4 (not included)
Main Material: Metal, Electronic component
Wire Length : 20cm

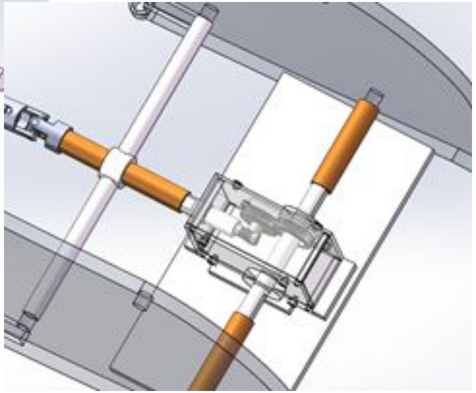
https://www.servocity.com/worm-gears/#worm-gear-sets



https://www.amazon.com/Greartisan-Self-Locking-Reversible-Reduction-Electric/dp/B07YBXTR2P/ref=sr_1_30?dchild=1&gclid=Cj0KCQjwufn8BRCwARIsAKzP695cFhfGugledgQn21qrHjZNJ29-LwXWK2FweMj3jLiCzVk7sTSzj_AaAt9wEALw_wcB&hvadid=431880177527&hvdev=c&hvlocphy=9031590&hvnetw=g&hvqmt=b&hvrand=17007867408234735995&hvtargid=kwd-5241185047&hydadcr=10075_11277067&keywords=worm%2Bdrive%2Bgearbox&qid=1604251876&sr=8-30&tag=googhydr-20&th=1

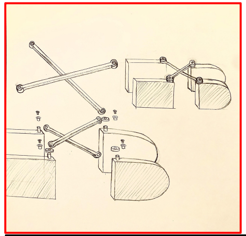


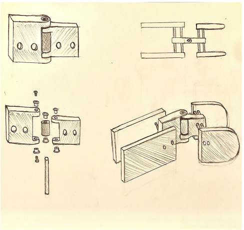


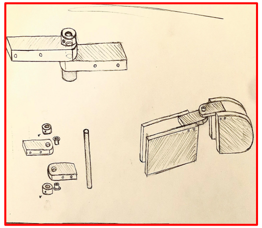


Chassis

Concept Selection for hinge design

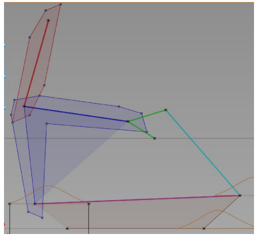


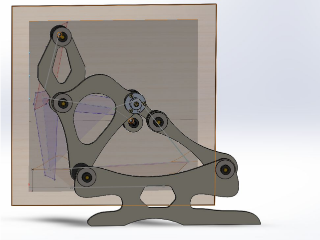


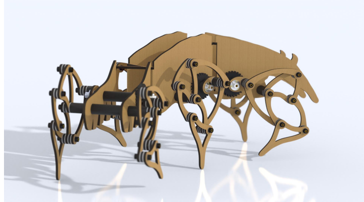


Goal	Weight	Cross Linkage Hinge Design	Vertical Hinge Design	Horizontal Hinge Design
Structural Integrity	0.3	0.6	0.6	0.9
Easy to assemble	0.15	0.3	0.15	0.3
Ease of manufacturing	0.15	0.3	0.15	0.3
Functional with steering mechanism	0.2	0.4	N/A	0.6
Interior space for installment of electronics and gears	0.2	0.4	N/A	0.6
Total Points		2	0.9	2.7
Ranking 1-3				

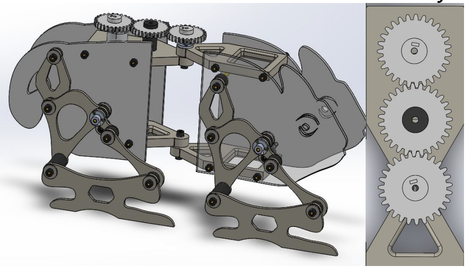
Leg mechanism: were created using the provided geogebra template made by project advisor, Kevin.

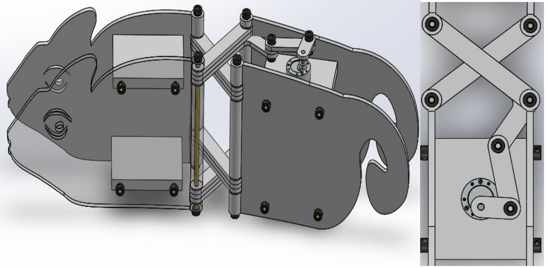




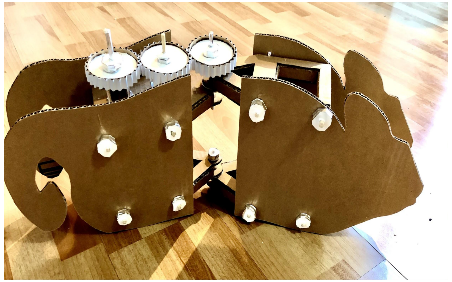


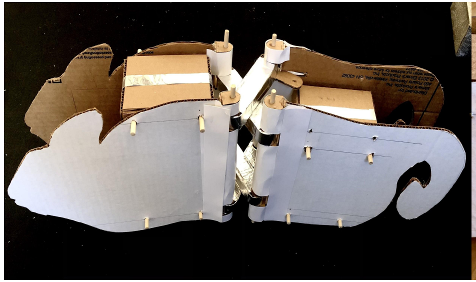
Solid Work Model: Incorporate hinge concept designs in solid work models for subsystem prototype.

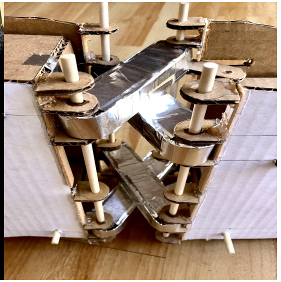




Mock Model: Cardboard model of hinge to chassis assembly were made to test and verify for design feasibility and to estimate the size of the steerable walker.

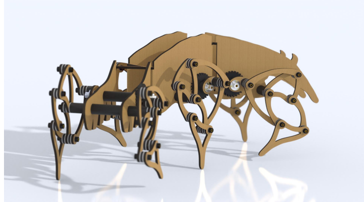






Justin Lin

Summary:



Upcoming Goals:

Week 6 and 7: Finalize the subsystem and create the design for the A-Walker

Week 8 and 9: Evaluate A-Walker performance to determine B-Walker Design

10th Week: Demonstration

Possible Future Work:

Six Legged Walker, Stride Adjustment, Position Sensors, Autonomous operation