Minimally Actuated Robot Walker Design

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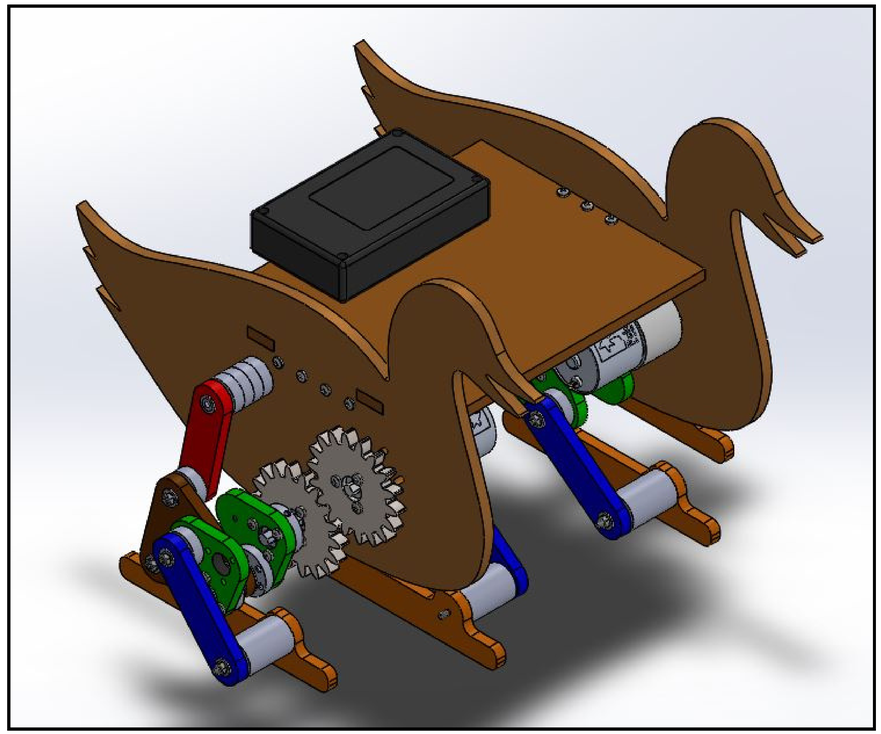
Overview

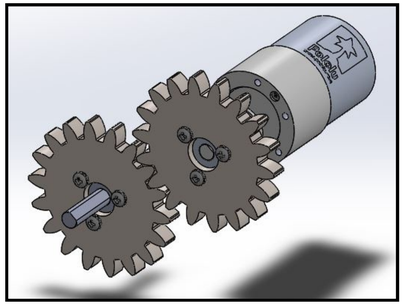
Our team has been tasked with making a 4 legged autonomous walker driven by two DC motors. It is to be capable of autonomous motion through PixyCam vision.



Isometric view of robot walker CAD model.

Drivetrain

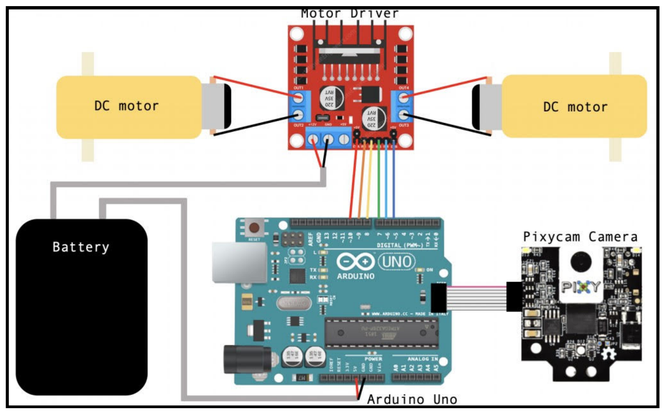
- Two 18-tooth Module 3 spur gears mounted on Al hubs attached to:
  - 60 RPM DC motor.
  - Leg crank D-shaft.



Isolated view of single side drivetrain.

Electronics & Software

- Code will allow:
  - Walker to identify objects and colors.
  - Walker to turn in all directions in a multitude of speeds.



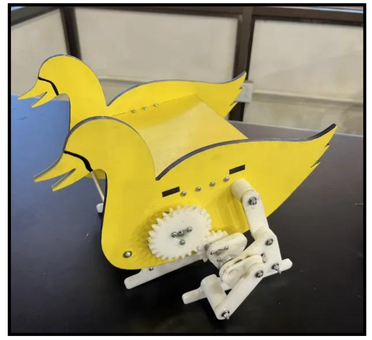
Electronics wiring diagram.

Project Requirements

- Minimum walking speed of 25 cm/s.
- Shall autonomously track a line path.
- Shall be able to pivot in place with skid steering.
- Shall not tip due to sudden accelerating or stopping.
- PixyCam shall be able to identify and track objects/colors.

Chassis

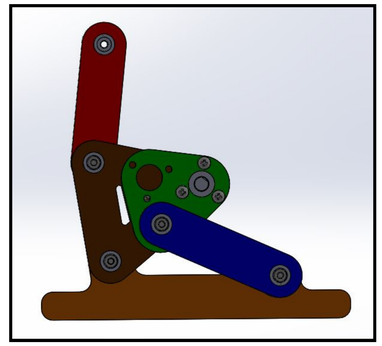
- 1/4" plywood plates, laser cut at UCI Fabworks.
- M3 nut strip hardware to join components.
- aluminum crossbar for added support.



Initial robot assembly without electronics.

Leg Mechanism

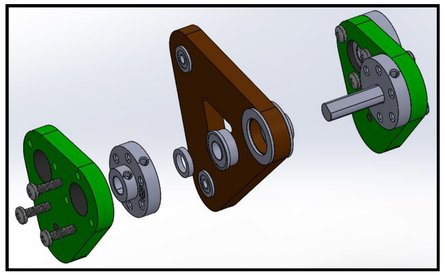
- 6 bar crank driven linkage.
- 1 degree of freedom provides plantigrade walking motion.
- Made of 1/4" white acrylic sheet laser cut at UCI Fabworks.



Side view of leg mechanism.

Future Improvements

- Improve leg mechanism rigidity by reducing play at bearing and linkage interfaces.
- Improve crankshaft rigidity by increasing bearing spacing in the chassis plates.



Partial exploded view of leg crank mechanism.

Acknowledgements

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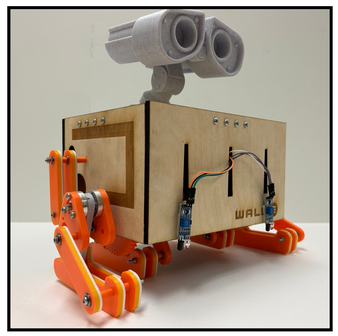
References

Jiaji Li's Wall-E walker project.



Jiaji Li's robot walker.

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