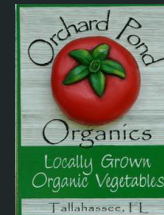




Team 11



Robo-Weeder Design Review II

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Acknowledgements:

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Dr. Hooker

Jeff Phipps

CoE Machine Shop

March 17, 2016

Overview

- Introduction
- Proof of Concept
 - CAD
 - Fabrication
 - Coding
 - Testing
- Current Status
- Budget
- Looking Ahead

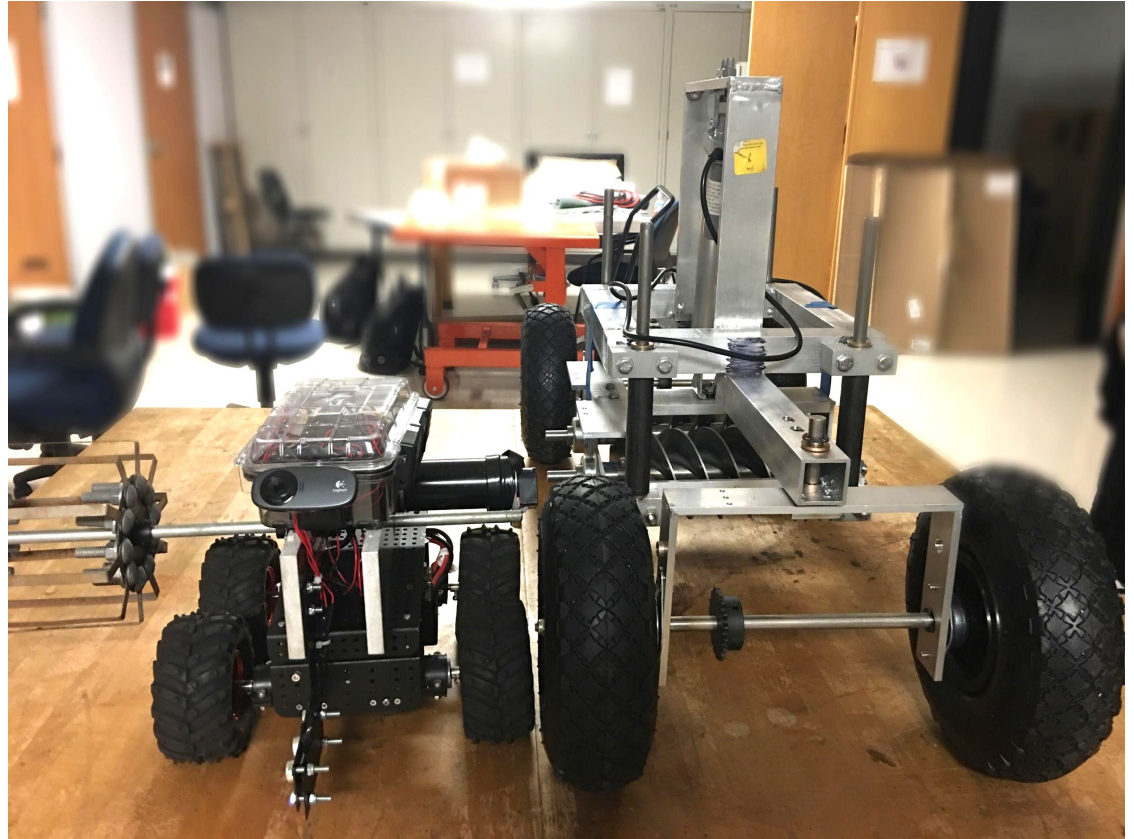


Figure 1: Previous and Current Design.

Need Statement: “Organic farming techniques rely heavily on labor intensive methods which create large production costs for organic produce.”

Goal Statement: “Develop a ‘proof of concept’ robotic system that will enhance the production of organic crops.”

Constraints:

- Remotely Operated
- Auger Style Shearing
- 1” soil disturbance
- No tillage



Figure 2: Orchard Pond Organics.

Past and Present Designs

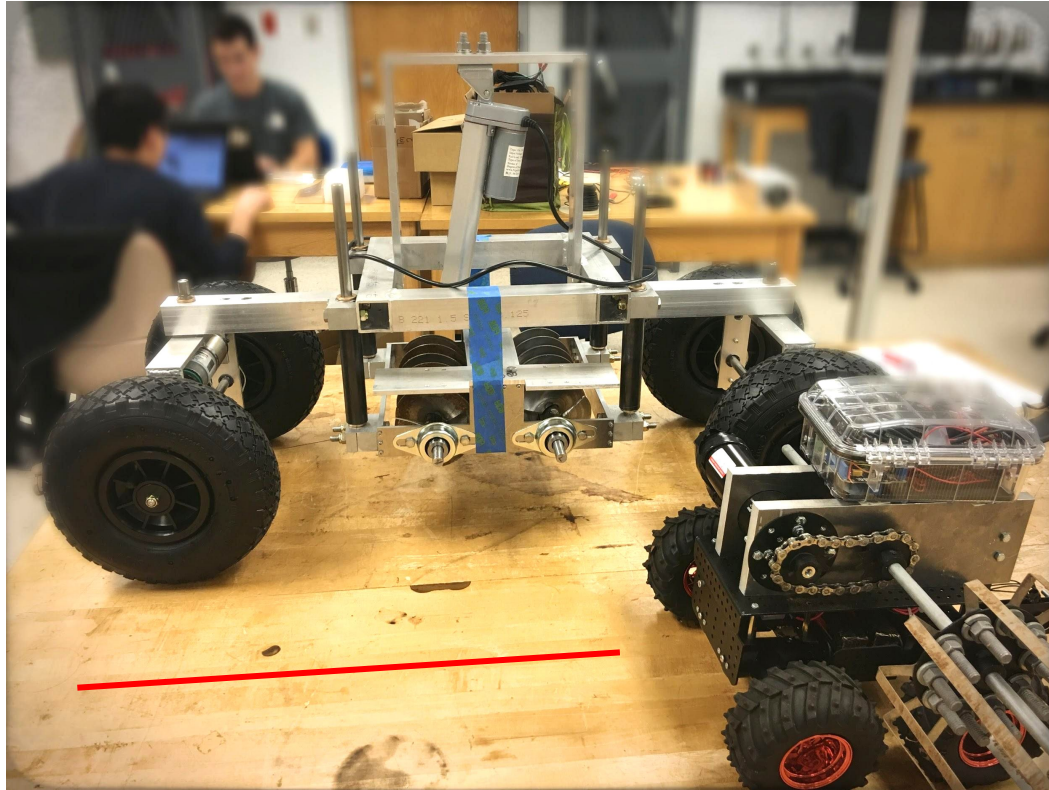


Figure 3: Previous and Current Design.

Previous Design:

- Approximately 10 lbs
- 20" x 14" x 12"
- Autonomous Operation

Current Design:

- Approximately 70 lbs
- 39" x 16" x 23"
- Remote Operation

Mechanical Systems

Major Components

Specifications

- Weight: 70 lbs
- Dimensions:
 - 39" x 16" x 23"
- Subsystems:
 - Chassis
 - Steering & Drive
 - Shearing
 - Lift Assembly

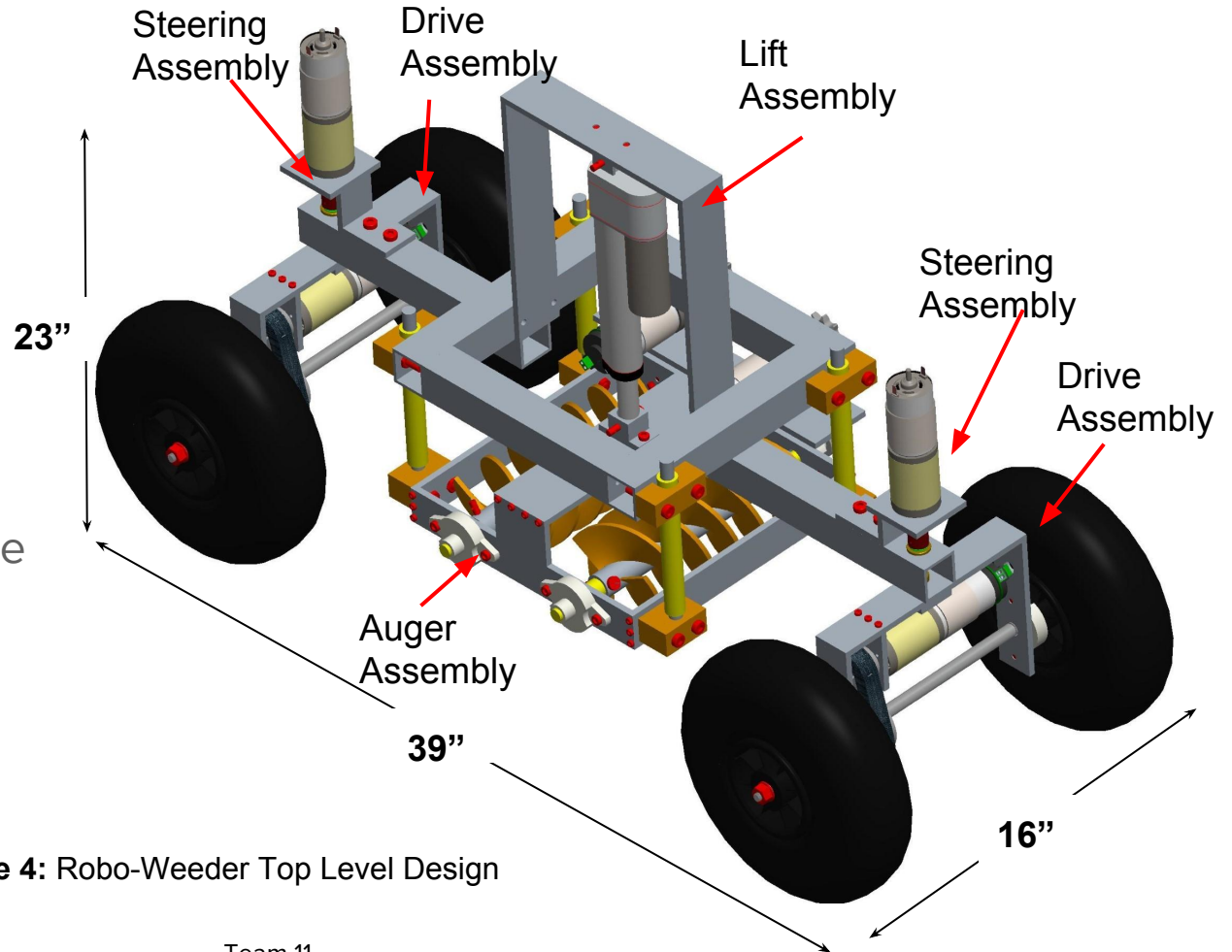


Figure 4: Robo-Weeder Top Level Design

Fabrication of the Robo-Weeder

The current phase of the Robo-Weeder project is one of Fabrication and Testing.

- Fit Checking
- Alignment
- Connecting Electrical-Mechanical Components

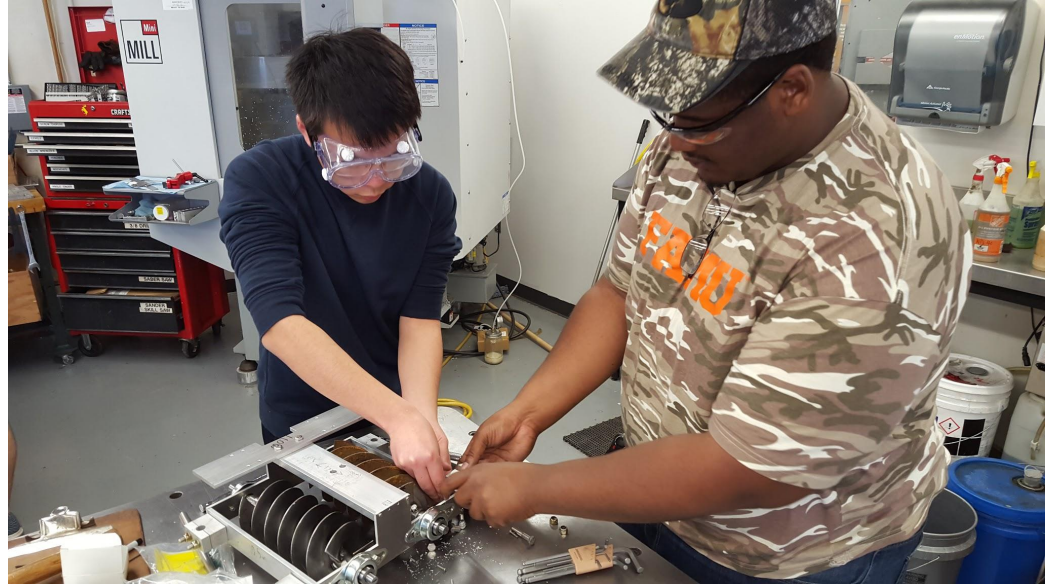


Figure 5: Xiang and Chris assembling the Auger Housing.

Steering and Drive



Figure 6: Steering and Drive Assembly; CAD to Actual Component.

Current Status: Fabrication and Assembly Completed. **Next Step:** Connecting Roller Chain Linkage.

Auger Housing

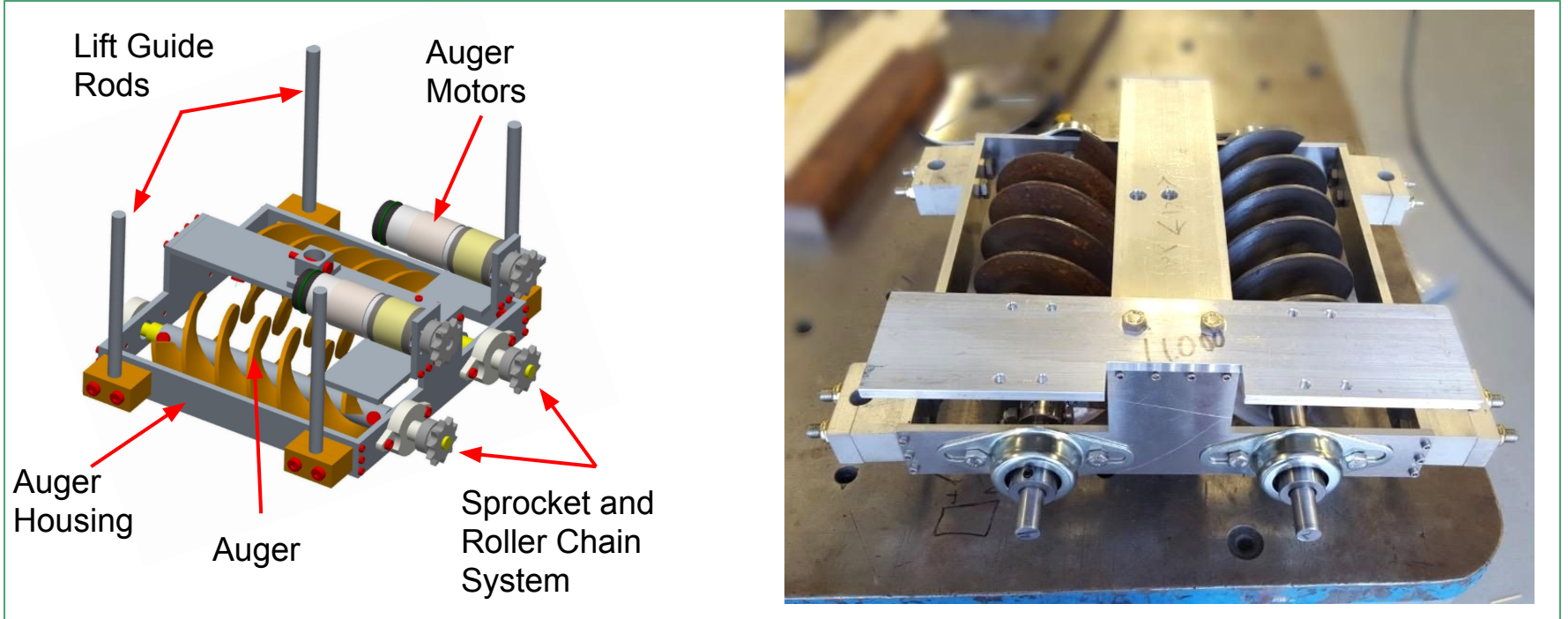


Figure 7: Auger Housing Assembly with Augers; CAD to Actual Component.

Current Status: Fabrication and Assembly Completed. **Next Step:** Connecting Roller Chain Linkage.

Lift System

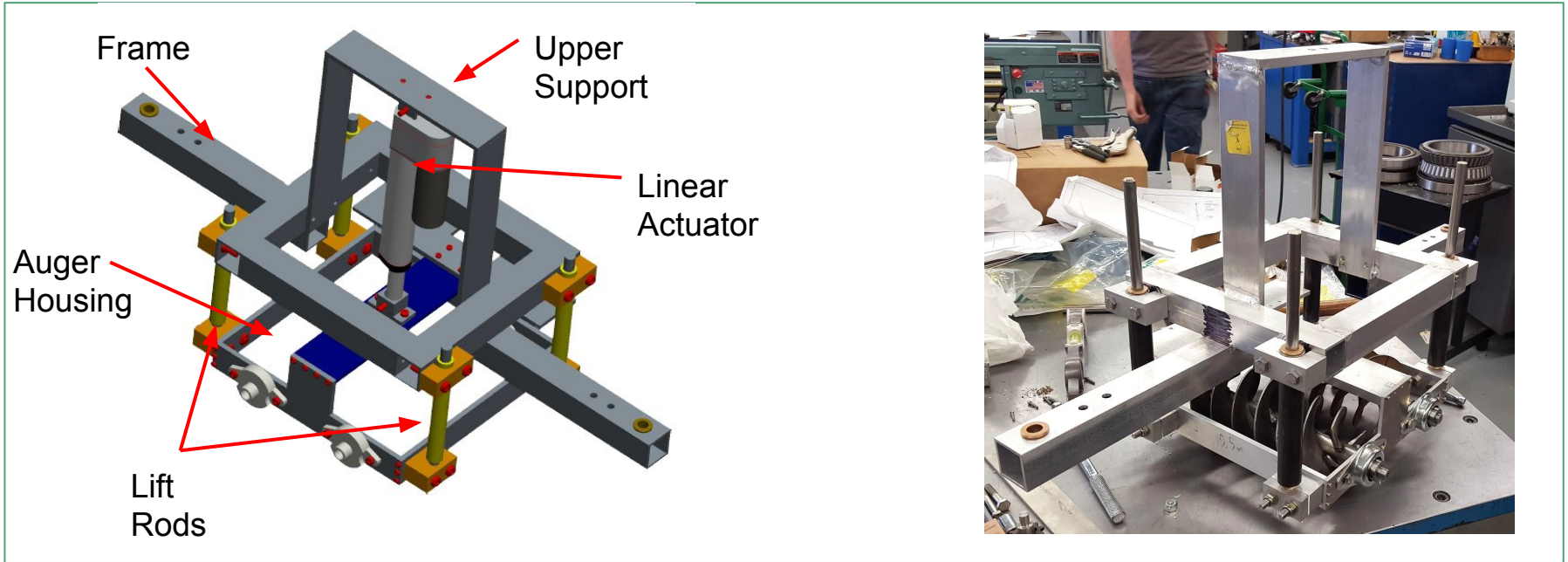


Figure 8: Lift System attached to Auger Housing; CAD to Actual Component.

Current Status: Fabrication and Assembly Completed.

Mechanical Systems

Minor Components

Auger Motor Assembly - Pinion Gear Installation

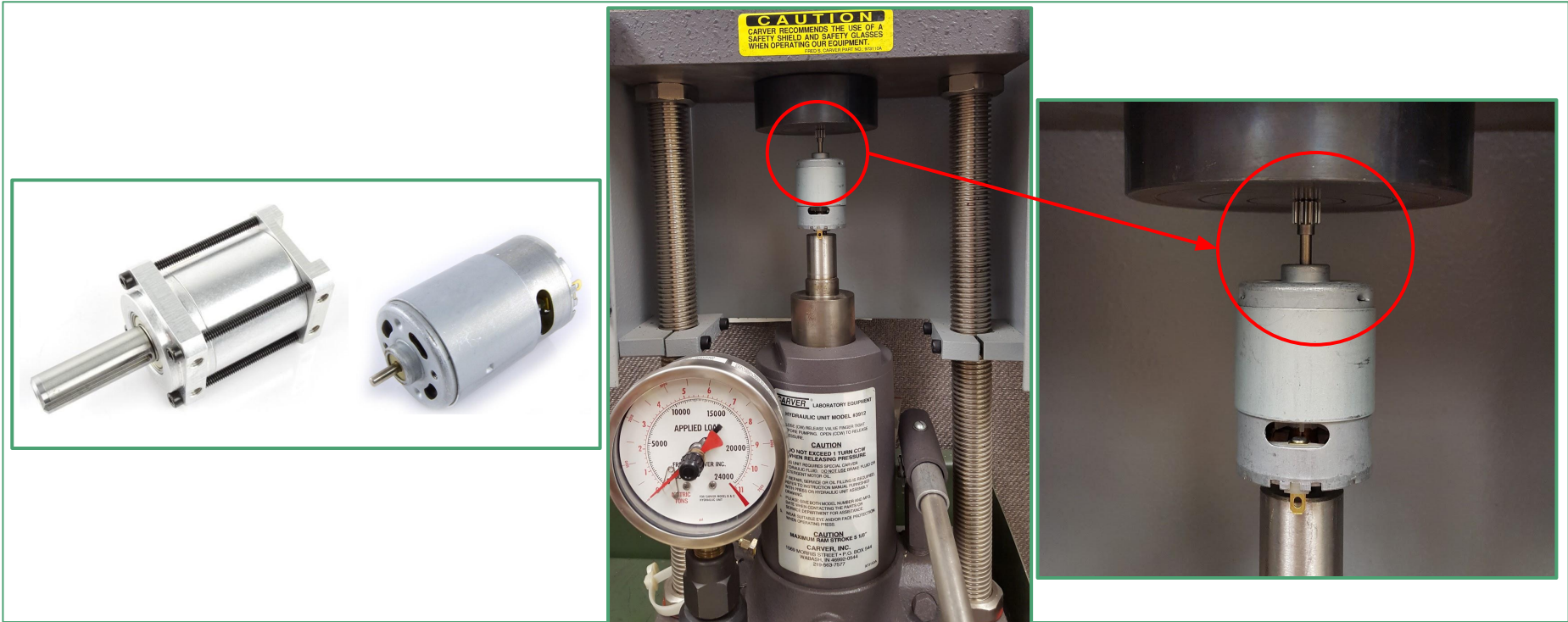


Figure 9: Installation of pinion gear onto the auger motor shaft.

Gear Motor Assembly - Gear Box Installation

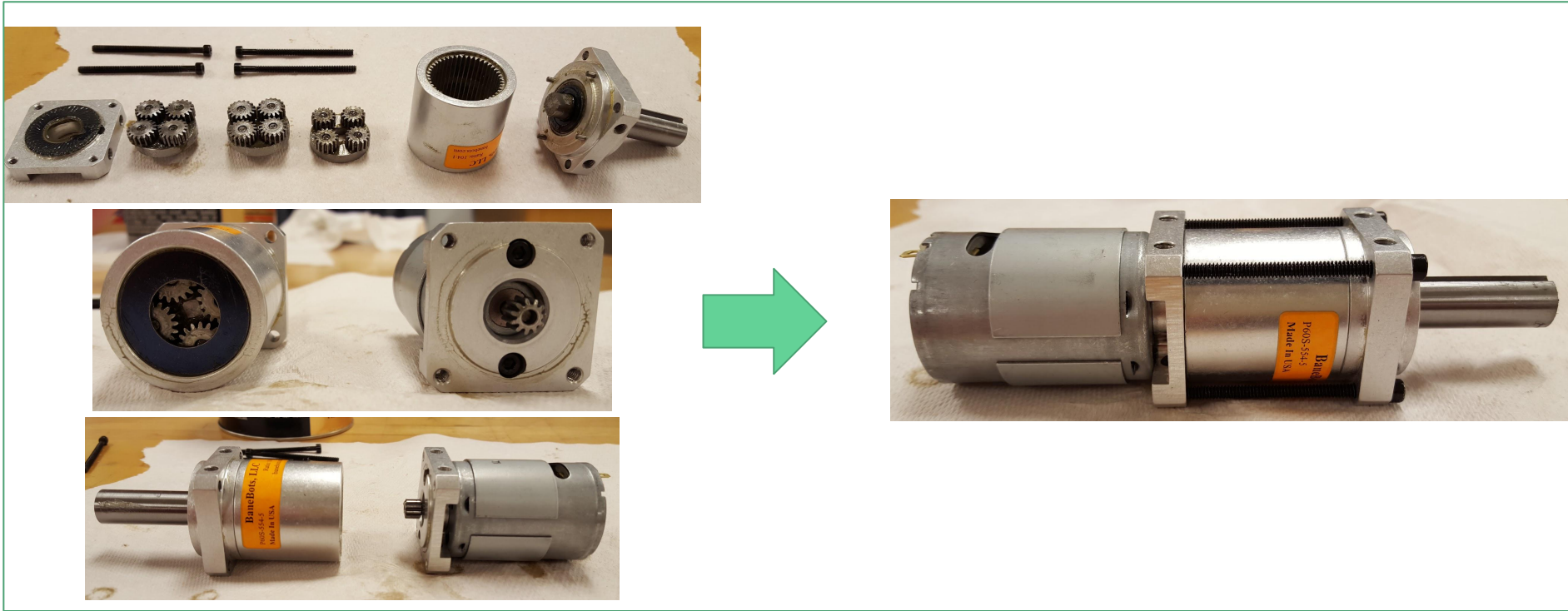


Figure 10: Installation of gear box onto the auger motor.

Encoder Bracket Fabrication

Steering Motor and Encoder



Auger Motor and Encoder

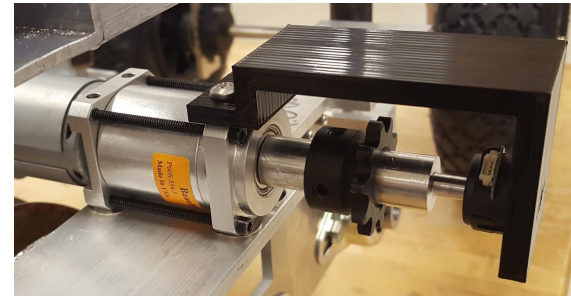
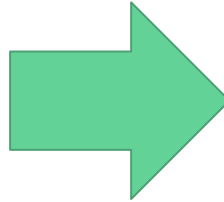


Figure 11: Installation of encoders onto the steering and auger motors.

Assembled Chassis

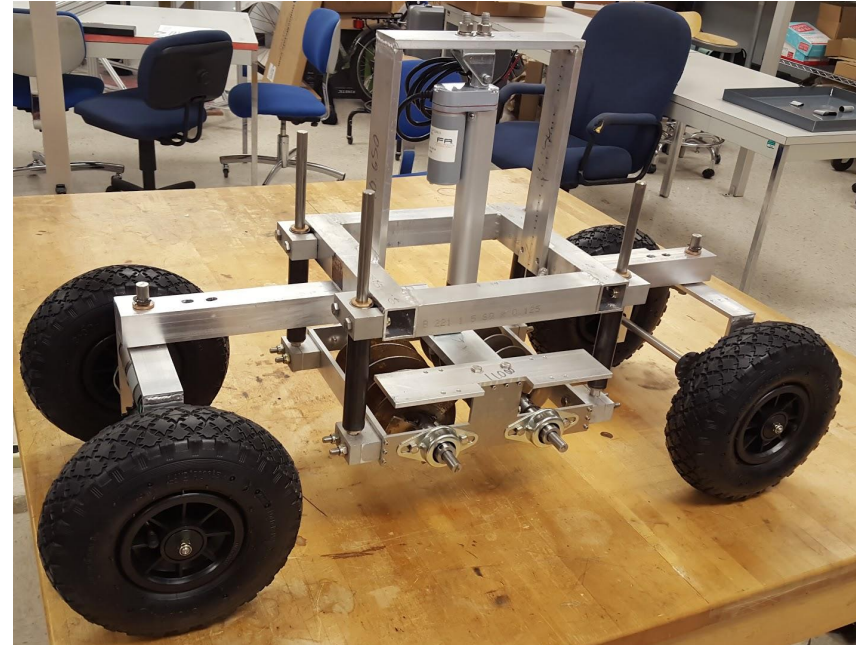
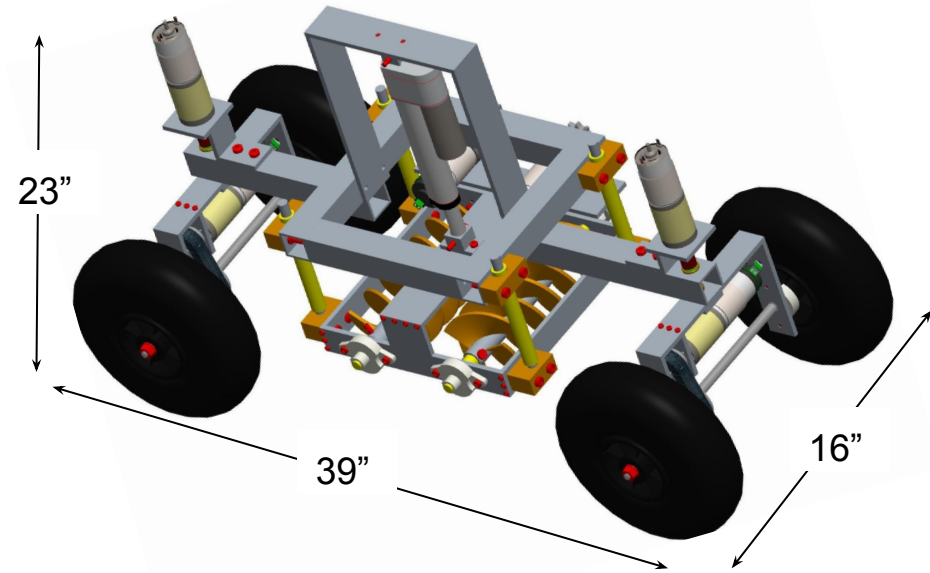


Figure 12: CAD drawing of the Robo-Weeder assembly and actual assembly.

Electrical System Overview

Electrical Objectives

- Controllable Speed
- Controllable Steering
- 6 Wireless Communication Channels
 - Remotely Operated
- 12V Battery Supply



Figure 13: RC Transmitter for control of the Robo-Weeder.

Electrical Components

- Transmitter & Receiver
 - 6 Channels
- Microcontroller
- Motor Controllers
- Encoders
- 12V Battery

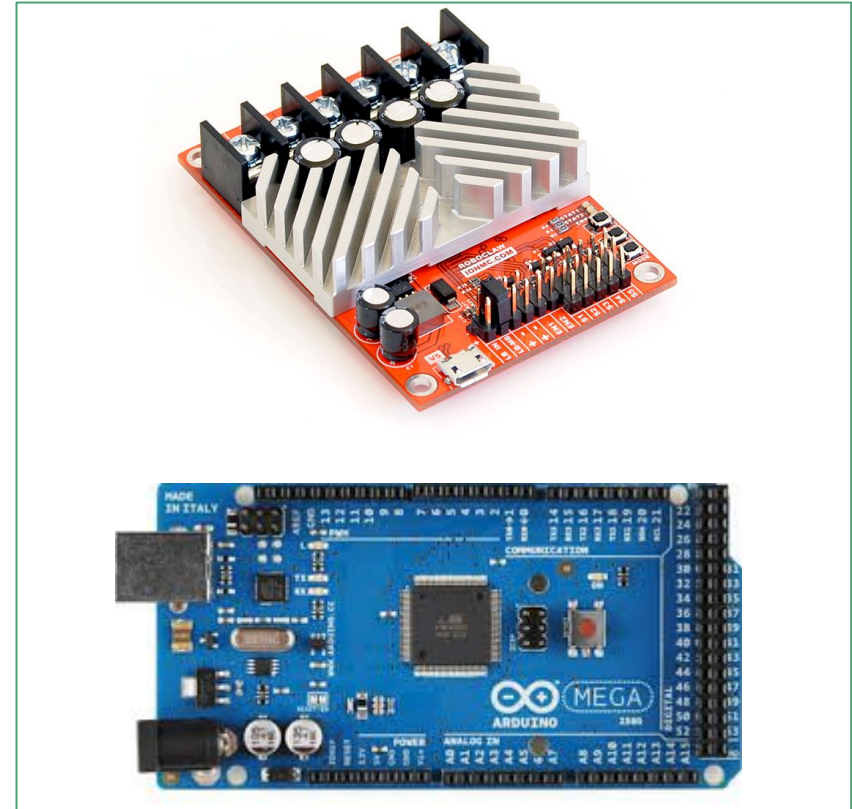
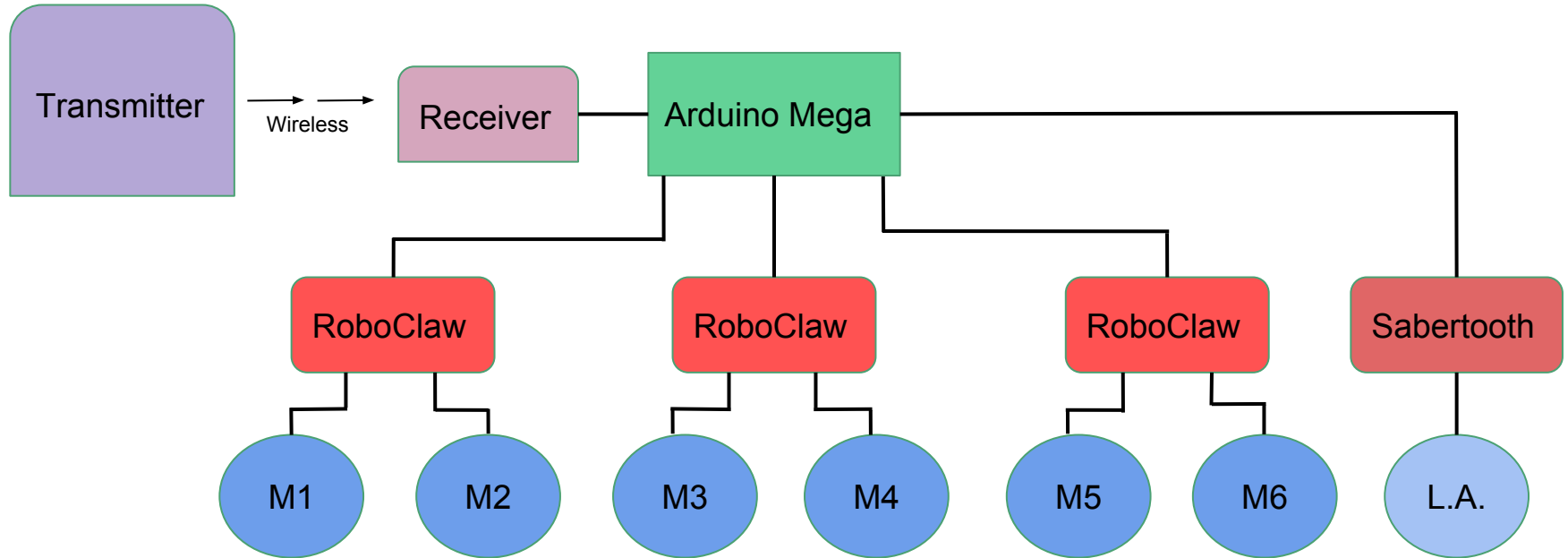


Figure 14: Robo-Claw motor controller and Arduino Mega microcontroller.

Electrical System Overview



Electrical Testing

- Prototyping for Wireless Communication
 - Drive Function
 - Auger Function
 - Steering Function
- 12V DC Power Supply
 - Used for testing with Motors
 - Up to 30A Continuous Output



Figure 15: Power supply for bench testing the Robo-Weeder electrical components.





Encoders, Testing and Progress

Will be used for:

- Absolute Steering Position
- Control of Forward Speed
- Auger Speed Control

Moving Forward:

- Completion of Steering Code
- Testing of Electrical Components on the Robo-Weeder.

Drive Code	Auger Code	Steering Code	Linear Actuator Code
			

Video



Current Status & Future Goals

Future Goals

- Complete assembly of Robo-Weeder
 - Code & Wiring of all electrical components
 - Attachment of all motors
 - Splashproof housing for Electrical components
 - Selection of Battery based on budget and total measured current draw

- Steering Function
 - Capability to turn 30° maximum in either direction

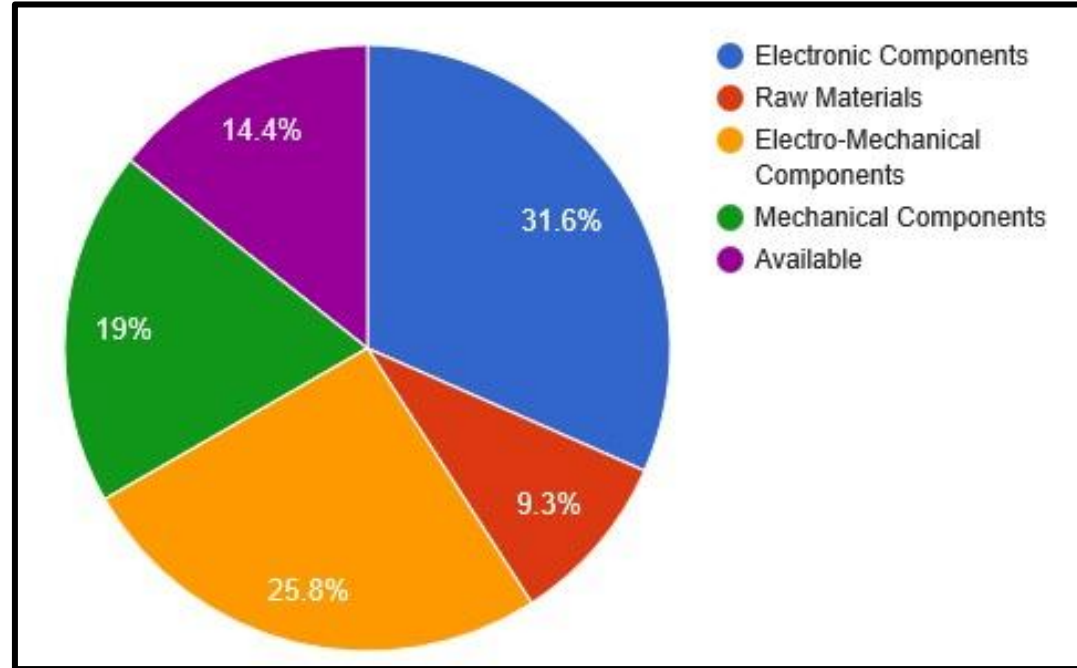
Spending Report

Total Funds: \$3,000.00

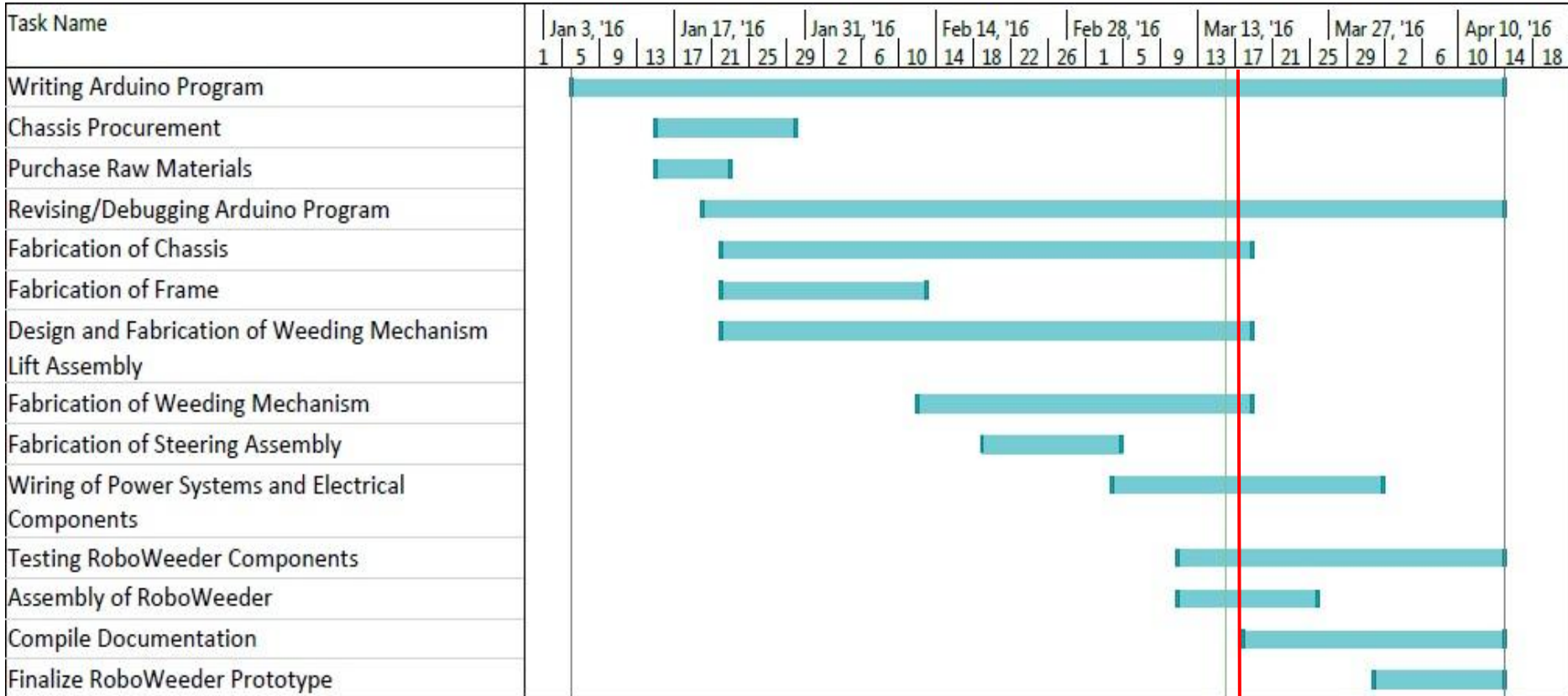
Available Funds: \$430.53

Remaining Purchase:

- Battery System
 - Approximately \$400



Gantt Chart - Current Progress



Questions?
