

IEEE Hardware Competition Ruleset

Verification Prototype

UAH Fall 2024 EE Senior Design Project

Project Overview

This Senior Design Project was formed to assist the verification of the IEEE Southeastcon Hardware competition for 2026. As the semester progressed, significant progress was made with many improvements and lessons learned, with our robot being the ultimate culmination of our hard work.

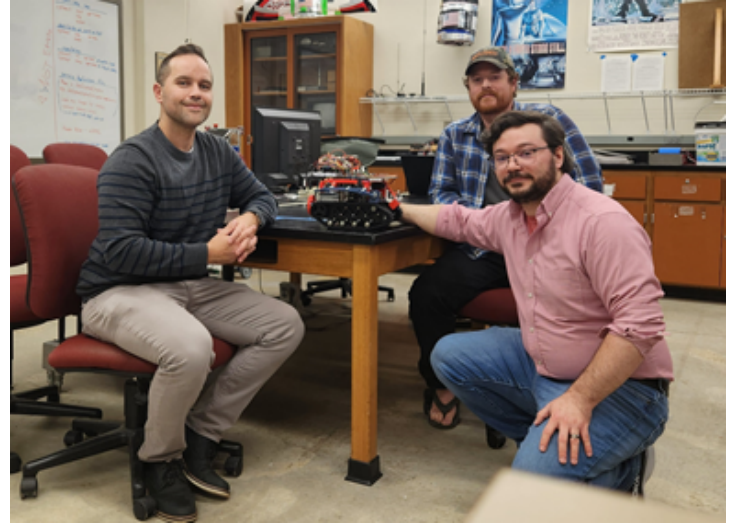
Our project began in the Fall Semester 2024, with construction beginning as parts were received in September. The robot was in its early working stages in the beginning of October, with testing, modification, and improvements being conducted in November. The Robot is able to complete each task individually, and can run the whole course.

Technical Specs

We selected a tank chassis for the base of our robot, for added torque to assist in movements. An Arduino Mega 2560 was chosen as it was previously used on the Spring 2024 prototype, and gave plenty of I/O options for us, which would come in handy.

We opted for all the actuations to be handled by Pololu stepper motors and a single servo. For the claw and pushrod assembly, the motors drive 3D printed gears to turn a threaded rod to enable horizontal movement along the robot to get to the needed position for the pushrod, or extend the scissor claw.

Team ARC (Autonomous Robotic Chargers)



Our team is the Autonomous Robotic Chargers (ARC). Team members include on the left Alexander Brown (Team Lead, Software Lead), in the middle right Brad Farris (Hardware Lead), and lower right Justin Roberts (Assembly and Quality Lead)

The crank wheel was driven by the same stepper motor, but with the 3D printed wheel being attached directly to the motor shaft. When pushed into position, the motor would spin and catch onto the crank and spin.

DC Buck converters were used to ensure the stepper motors would receive the proper required voltage. Motor drivers were used to give control over the three stepper motors, and the single servo.

All actuations would be performed autonomously without any direct human commands and were coded using Arduino.
