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Combat Robot

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Abstract:

Our senior capstone project was to choose a challenge within a national robotics competition. The group decided to compete at the National Robotics Challenge in Marion, Ohio. The combat robot event that was chosen has tasked the group to design and create a single custom-built machine that employs one or more methods of destroying or disabling their robot competitor. This robotic device will be remote-controlled but may include some autonomous operations. There are many requirements that go along with this competition due to the safety factor regarding the somewhat dangerous nature of the contest.

COMBAT ARENA AND RULES

- ◆ Battlefield measures 8' x 8' x 24" interior height on plywood floor and the frame of the enclosure is made from 80/20 with clear Lexan panels for added safety.
- ◆ Three Judges will vote for the winning bot based on equally considered categories of damage, control, and aggression
- ◆ The winner of the match can also be determined if a team would forfeit the match by throwing in the towel, or if the opponent is knocked through the trap door.



QR code for comprehensive rules and points system



SCAN ME

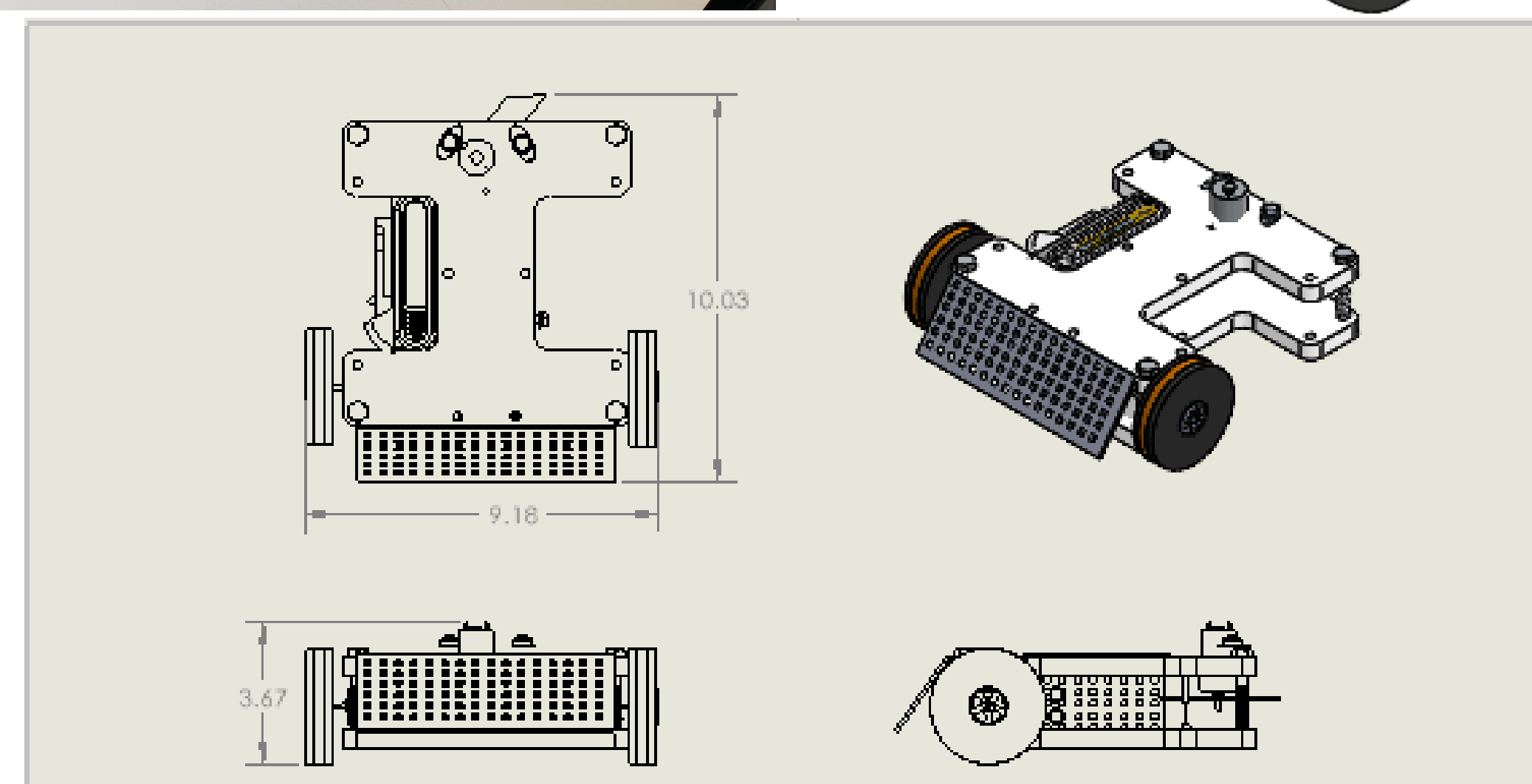
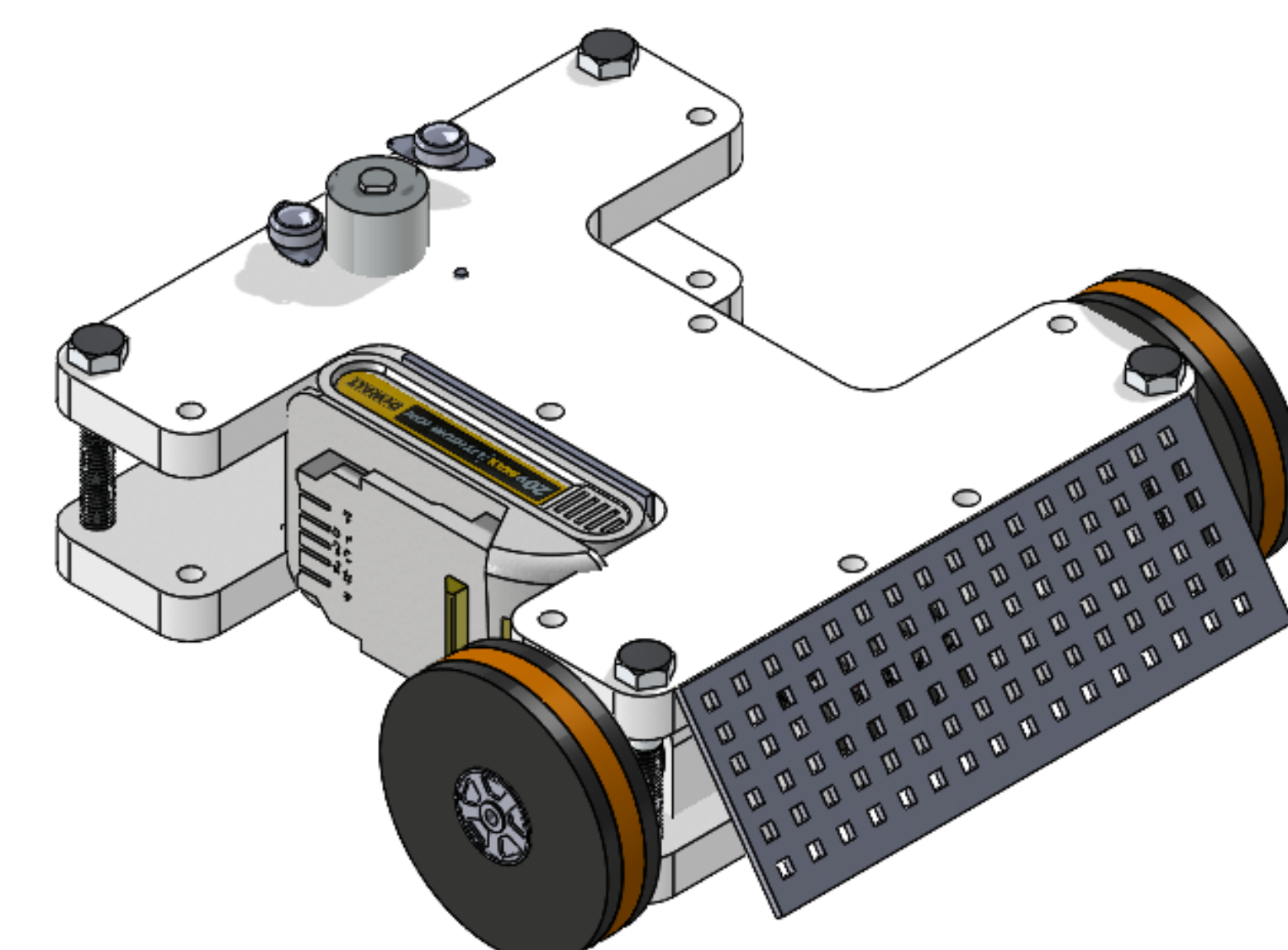
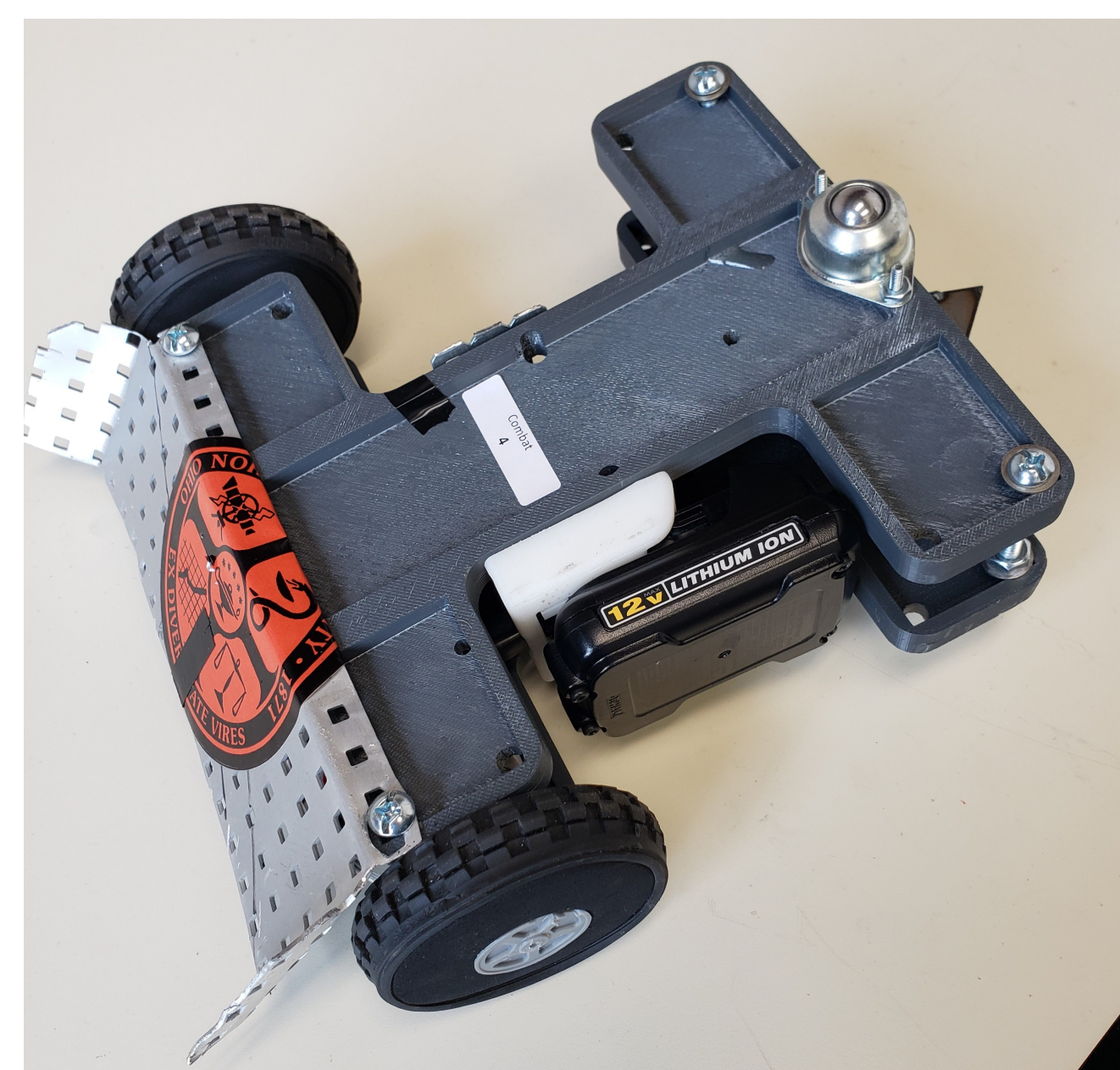
ROBOT REQUIREMENTS

- ◆ Robot must fit within a 14" x 14" x 14" box and weigh less than 3lbs
- ◆ All robots must be able to be FULLY deactivated, which includes power to drive and weaponry, in under 60 seconds by a manual disconnect.
- ◆ All robots not in an arena or official testing area must be blocked up in a manner so that their wheels cannot cause movement if the robot were turned on
- ◆ Moving weapons must have a clearly visible locking device in place at all times when not in the arena
- ◆ All electrical power to weapons and drive systems must have a manual disconnect that can be activated within 15 seconds. Shut down must include a manually operated mechanical method of disconnecting the main battery power.
- ◆ Spinning weapons must come to a full stop within 60 seconds of the power being removed using a self-contained braking system.

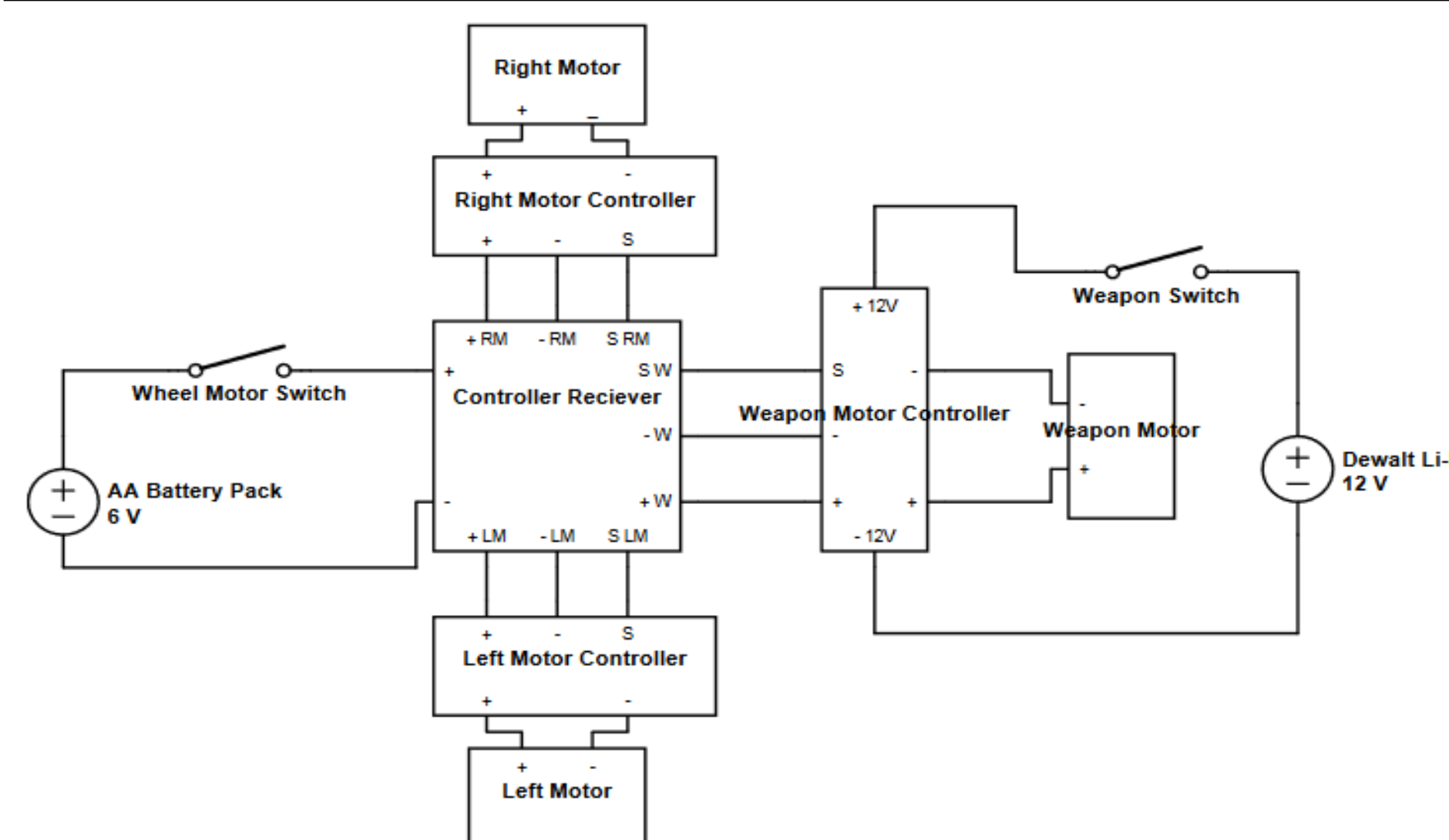
Robot Features and Weapons

- ◆ 3D printed chassis with "H" shape to enhance durability while saving weight
- ◆ Robot is controlled via a Turnigy TGYi6 which uses auto frequency hopping
- ◆ Robot has ability to be driven on top or bottom if flipped
- ◆ 1000 rpm motors used for weapon and driving which allow for greater speeds
- ◆ Spinning weapon at front of robot for maximum damage
- ◆ Ram located on back of robot to help control the match, and contingency if spinning weapon was damaged

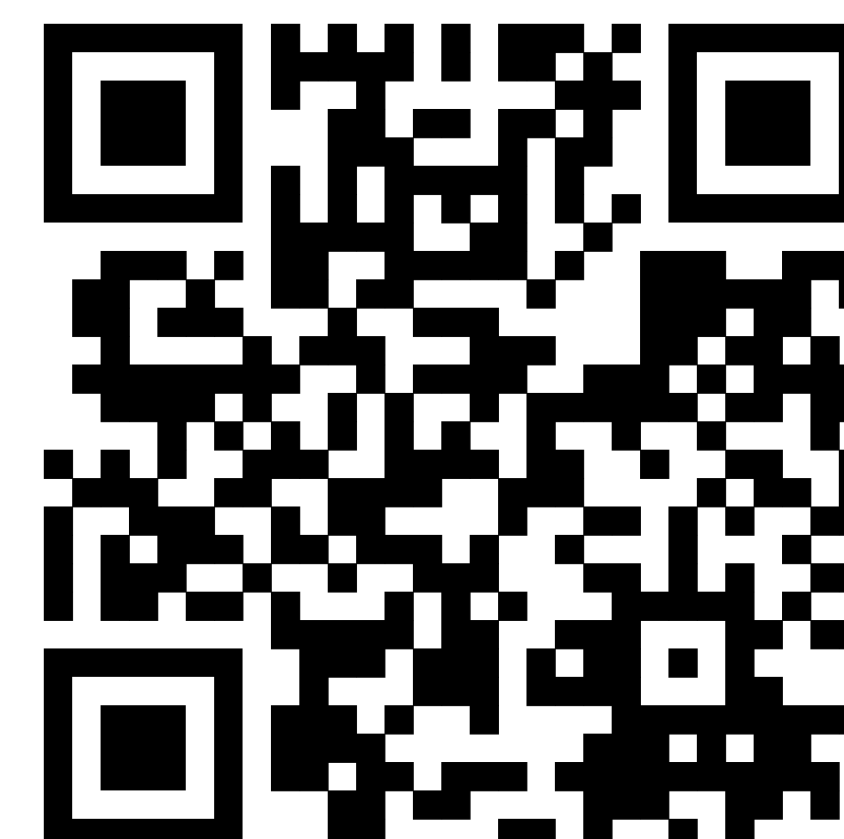
ASSEMBLY DRAWINGS OF THE ROBOT



CIRCUIT DIAGRAM



Robot In Action!!!



Contest Results

The robot placed 4th in the beetleweight post secondary division. The main problem was the lack of protection of our wheels, which was exposed in the first match. We went on to win 2 matches in a row before being defeated. Our main strength was the control we had over our robot. We had much greater control than some of the other bots which allowed us to be more aggressive and dominate the match.