

# Engineering Requirements

**Additional customer requirement 1:** After the robot has pushed its opponent out of the ring, the robot must not exit the ring.

Engineering requirement 1: The robot must be able to detect when the block of wood falls outside the ring and stop itself before it falls outside of the ring as well. To prevent itself from falling, the robot must detect that it has won the match and use motor braking to stop itself within 0.25 seconds.

**Additional customer requirement 2:** The robot should quickly find and rotate towards its target.

Engineering requirement 2: Once the block of wood comes into view, the robot will calculate the precise angle it needs to rotate in order to point towards its target. The robot will rotate by the calculated angle and will be within five degrees of the target. This will be done with two side-by-side distance sensors and two wheel encoders. When the block is being detected by both sensors at once, the robot will move towards the block.

For this project, the group must build a small robot that will push another robot out of a circular rink. This project will include power supply design, analog design, signals and systems, mechanical design, and embedded programming.

- 1. Customer Requirement: The robot should be able to find and push an object.**  
Engineering Requirement: At least 9 out of 10 times, the system can successfully push out an object out of the rink without human intervention. The size of the test object is the maximum size of mini-sumo robot according to this link: (10cm square)  
[Regulation Link](#)
- 2. Customer Requirement: The robot should be debuggable.**  
Engineering Requirement: The development team will be able to read sensor values of each sensor (navigation, wheel encoders, battery sensors, and other sensors) while the robot is competing in a match. This may be done by 7-segment displays on top of the robot, speakers that emit a tone related to a sensor value, or via a computer terminal over a wireless connection. Only one sensor is required to be displayed at a time.
- 3. Customer Requirement: The robot is heavy enough to be competitive at mini-sumo.**  
Engineering Requirement: The robot must weigh at least 95% of the maximum robot weight (500 grams for the mini-sumo robot).
- 4. Customer Requirement: The robot has reasonable battery life.**  
Engineering Requirement: The system will move for at least 15 continuous minutes on a single charge.

5. **Customer Requirement: The robot looks aesthetically pleasing.**

Engineering Requirement: Wiring must be grouped with split loom or other wiring organization material. Wiring will be routed through zip ties secured to the chassis. No cardboard or tape will be visible on the final project.