

13th IEEE UAE STUDENT DAY, 2018

Common Design Project (CDP) Competition

Sumobot Competition

General Information

- Undergraduate engineering students within the UAE are eligible for this competition.
- Each institution can submit a maximum of two projects for judging in this competition.
- Each team shall comprise a maximum of 4 members.
- Total cost for each team must be less than 2000 AED.

Project Definition

Background

The idea of this project is about designing and building of a mechatronic product (robot sumo) with several constraints (dimensions, weight, cost and etc.). Two robots compete on circular arena and try to push each other so that the opponent fall or out from the sumo arena. The winner is the team who successfully push out their opponent robot. Robot has to be fully autonomous.

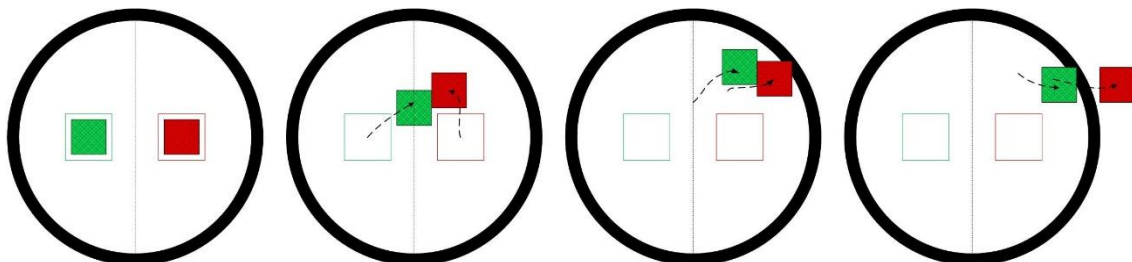


Figure 1. General description of sumo robot competition

Competition Description

A sumo robot must be designed limited to dimension (15x15x30 cm³). The robot has to be powered by dry battery system. The robot could use as many as possible actuators (motors) to perform the SUMO competition. No actuator is dedicated to lift the opponent. You may lift the opponent using geometry of the robot. The robot could use sensors to help it achieve its target. Algorithm and parts of the robot can be prepared and /or changed during the competition. Mechanism of the robot can be simple or complex. **Innovate!**

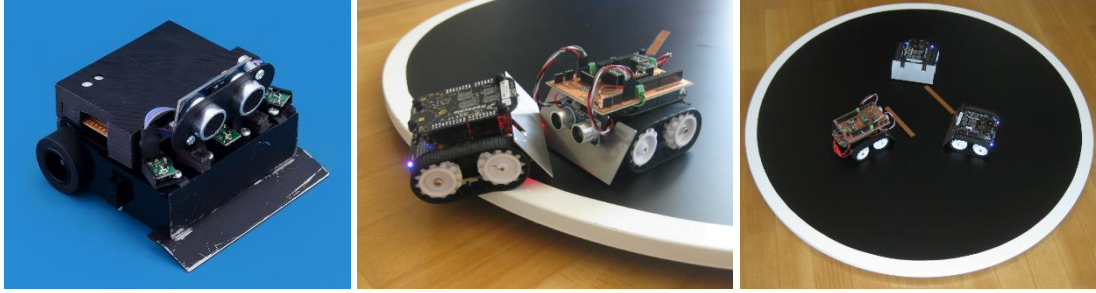
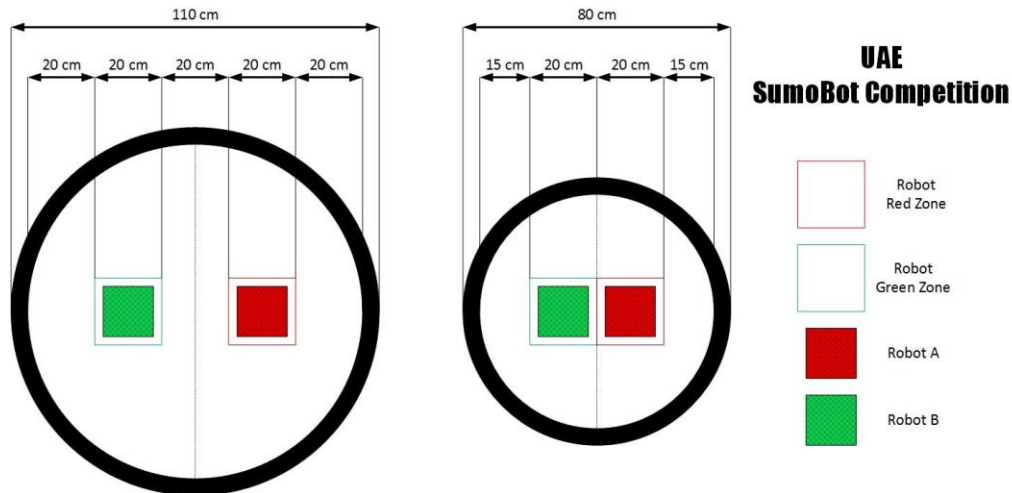


Figure 2. Sumo robot competitions

Constraints and Requirements

- Robot specification:
 - Maximum length x width x height = 15 cm x 15 cm x 30 cm (final dimension)
 - Maximum weight = 2500 gram
 - Maximum battery = 12 volt and 1000 mAh (no super capacitor is allowed).
 - There is limitation of number of actuators.
 - For avoiding destruction of opponent's robot (accidentally or deliberately), attacking actuator is pushing only (no actuator to lift, flip, etc.). However, you can lift by designing the topology of your robot.
 - Any type of hazardous materials and objects must not be used (fuels, explosive materials, etc.).
 - Robot can be activated with a single **green push button** located at the top of the body /chases so that it can easily be operated by the referee.
 - Robot can be deactivated with a single **red push button** located at the top of the body /chases so that it can easily be operated by the referee.
 - Any flaming devices are not allowed.
 - Any electromagnetic interference devices are not allowed.
 - Devices that throw things at your opponent are not allowed.
 - Each robot or team should have a unique name sticker and color for identification.

- There are two types of SUMO Arena:



- **General SUMO Arena:**
 - ✓ The arena is made of wood
 - ✓ Inner circle with diameter of 100 cm and **white color**
 - ✓ Outer circle with diameter of 110 cm and **black color**
 - ✓ There are two starting robot zones: **Red** and **Green** Zones
 - ✓ Each zone has dimension of 20 cm x 20 cm
 - ✓ The two zones are separated with 20 cm distance
- **Deadlock SUMO Arena:**
 - ✓ The arena is made of wood
 - ✓ Inner circle with diameter of 70 cm and **white color**
 - ✓ Outer circle with diameter of 80 cm and **black color**
 - ✓ There are two initial robot zones: **Red** and **Green** Zones
 - ✓ Each zone has dimension of 20 cm x 20 cm
 - ✓ The two zones are not separated
- Start, Stop, Resume and End a Match
 - Robot Placing

Upon the judge's instructions, the two teams approach the arena to place their robots on the robot zone. Robot can be placed in any direction as long as it is inside the zone. After placing, the robots may not be moved anymore.
 - Start

The referee for the match will start the robot at the same time by pushing a **Green Button** on the robot.
 - Stop and Resume

The match stops and resumes when a judge announces so.
 - End a Match

The match ends when the judge announces so. The two teams retrieve the robots from the arena.

- Detail procedure in the competition:
- Each match will have maximum 3 trials with maximum 3 minutes for each trial. After 3 trials and if the match still draws, the match will be moved to the **deadlock Sumo Arena**. If the match still draws after the match in the deadlock arena, the winner will be decided by rock-paper-scissor game between the students (maximum for three times).
- The opponent of each team will be determined by random selection
- Teams for the same university will not meet at the first round.
- Before the match, the teams can replace the parts (including the battery) and re-program the robots. However, The match will not wait for the teams to be ready. The teams whom cannot be ready at the match will be disqualified.
- Teams must provide the list of hardware price.
- Before each match, the specs of the battery (i.e., voltage, and current) must be visible by the referee. Those who violate the constraint in the power of the battery will be disqualified.
- Before the match, the referee will check robot dimension. Those who violate the constraint in the power of the battery will be disqualified.