DIRECTORATE GENERAL OF VOCATIONAL AND TECHNICAL EDUCATION

100 CENTURY OF EDUCATION

TÜBİTAK

TİKA

INTERNATIONAL MEB ROBOT COMPETITION

17th INTERNATIONAL MEB ROBOT COMPETITION

MINI SUMO CATEGORY RULES

2025

Education, Technology, Production from Roots to the Future

CONTENTS

MINI SUMO

1. INTRODUCTION

Sumo robots emerged when those interested in robotics as a hobby were inspired by Japanese sumo wrestling and wanted robots to do the same wrestling.

Sumo robots are robots that are capable of autonomous movement, contain electronic circuits, are designed to compete with each other, and are programmed for the intended movements. They are produced in different standards and categories.

Sumo robots meet each other on a round ring with certain standards and features called Dohyo. During the match, sumo robots try to push each other out of the line around the ring. The robots detect the white line around the dohyo with the help of contrast sensors, and try not to go out of the ring and stay in the ring. Various sensors (IR, ultrasonic, laser, etc.) are added to the robots to detect the environment and the opponent robot in a short time and improved tactical algorithms are also installed. Sumo robots win the match because of their mechanical and electronic design and the program algorithms they are loaded with.

2. ROBOT SPECIFICATION

2.1. Detailed Description of Robot

a) Mini Sumo Robot should be 10cm width and 10cm depth and able to be stored **in a cubic box** for inspection purpose

b) No restriction on the height

c) The weight of mini sumo robot will be maximum 500gr.

2.2. Controlling Robot

a) Robots will be autonomous type. It is not allowed remote control except “remote start-stop function”

b) Starting the movement;

- Mini sumo robots are started by the judge using remote controller at the same time.
- Mini sumo robots have to move in 10 sec.

c) Terminating the movement;

- Judge announced the end of round.
- It is not compulsory to stop the robots by judge's remote controller at the end of round.

2.3. The rules for using blades

1. Paper test will be applied to the robots by the judges. Robots that have very sharp blades won't be accepted.
2. Using the blades should not cause any damages to Dohyo and injury to spectators. Robots which have materials such as craft knifes, razor blade etc. won't be accepted.
3. Judges will decide whether disqualify the robot which damaging to Dohyo or not.

2.4. Movements of Robots

The movements of the robot should be designed to detect the movements of the opponent and respond/attack accordingly. If the movement is suspicious, operation check maybe made by indication of the judges. The check is carried out as the condition that a match terminates without program modification.

2.5. Prohıbıted Items In Desıgn And Manufacturıng Of The Robots

1. Any components that may affect the operating frequency or operation of opponents (such as flasher, laser sensors etc.) are prohibited. Infrared signals emitted from the standard optical sensors on the robots will not be evaluated in this context.
2. Using any components that may scratch or cause any damages on the surface of dohyo are prohibited.
3. Liquid, powder or gas which is used as a weapon or attack mechanism against the opponent are prohibited

4. Inflammable components should not be installed in the robots.
5. It is not allowed that placing batteries caused to damage Dohyo , other robot or itself.
6. The robot must not include any kind of launching device.
7. The robot must not include any parts that stick the robot to dohyo surface and prevents its movement (such as suckers, glue and so on)

3. GAME FORMAT AND EVALUATION

3.1. Game Principles

1. In principle, the competition time based on three matches in 3 minutes of each. Team who get two effective points within the competition time will be the winner.
2. If only one single effective point has been got by the end of the competition time, the team that has get this point will be the winner of the competition.
3. In case of equality such as 1-1 or 0-0, the competition will be extended one more round. In extension time, the team who get 1 effective point will be the winner of the competition.
4. Within the match time, if no team has win any round, 1 effective point is given to lighter robot than other according to robot weight and then the winner is determined.
5. Before the match is over, all maintenance is prohibited.(however, under supervising of judge, competitors can interfere only in 30 seconds without leaving match area and getting any technical support from outside. They also cannot change anything on robot in this moment)

3.2. Effective Point

The winner of round is determined based on the following situations

1. If the opponent robot is forced out of dohyo and the robot touches outside of dohyo.
2. If the opponent robot falls out of Dohyo by itself and touches outside of Dohyo

3. If the robot stays inactive more than 10 seconds (inactive robot loses the round even if the other robot touches out of Dohyo)
4. If some parts described in Article 15 are falling down
5. If “warning ” was given two times to the opponent,

Placement Direction Of Robot On Dohyo

a. Robotların Judges decide how to place the robots on Dohyo. Head to head placement does not allowed. (In extention rounds, judges will decide the placements of robots on Dohyo symetrically)

b. Before the match, Sumo robots should be placed manually at the same time accorring to rules shown below. It is not allowed to change the position of robots once they were placed on Dohyo.

c. Robots will be placed back to back on any place in quadrants as shown in Figure

3.3. Robot Markings

Photos of robots will be taken and the stickers will be pasted on each of them at the first day of competition.

3.4. Startıng Game

Competitors must have safety equipments such as glases,shoes etc.

1. Judges will start the match after checking the dohyo and competitors as well. If there are any scratches/dirt in the dohyo, the judges will decide whether the match can continue on the same dohyo or not.
2. The match will begin when placing robots on Dohyo by the instruction of judges.
3. Placement of robots will be determined by judges as side by side or back to back
4. Robots are not allowed to be moved after they have been placed.
5. The game will start when judge presses the remote control and robots move.

3.5. The Ending Of The Game

1. Game will officially end upon the announcement of judge.
2. Contestants will take their robots from the outside of dohyo by moving only inside restricted competitor area.

3.6. Restart of a Match

In the following situations, the match will be suspended and resumed.

1. In case of both robots are stuck facing each other and further movements are not possible. It will be waited in 10 second, then after round restarted by judges.
2. In case of that both robots fall out into the outside of Dohyo simultaneously (or cannot distinguish which one dropped first).
3. If winner cannot be determined after 3 rounds, the judge places the robots in a specific position symetrically and restart 4th round which is last round.

3.7. Warnings and Penalties

3.7.1. Warning

A contestant who takes any of the following actions will receive a warning. If a contestant receives two warning, one effective point will be granted to his/her opponent.

1. Any violation of Article 7.
2. If the robot is repositioned once it has been placed in Dohyo.
3. All actions that may be deemed unfair / tricky by judges.

3.7.2. Violations

If the following situation happens, the opponent will be granted one effective point.

1. If the components (over than 10gr.) were dropped from the robots
2. If the robot doesn't move within 10sec. after starting signal.
3. If there is a request from contestants to terminate the match

3.7.3. Losing the Game Becaue of Violations

A contestant who takes any of the following actions will lose the game because of violation.

1. A contestant doesn't come to the appointed dohyo in 5 minutes.
2. A contestant sabotages the game. For example, by intentionally breaking,damaging or defacing dohyo.
3. A contestant violates Article 5.
4. If robot cannot move as described in Article 6 "the requirements of autonomous robots"
5. If the robot fires and then then it causes the robot broken.

3.7.4. Disqualification

A contestant who take any of the following actions will be disqualified and forced to leave the game and will not be on the ranking list.

1. A contestant's robot does not meet the requirements which is stated in Article 7 "specification of the robots" .
2. A contestant doesn't respect the fairplay rules. (For example, using offensive language or assaulting opponents or judges).
3. A contestant injures the opponent or judges deliberately.

3.8. Robot Production Report:

There will be a pre-selection for participation in the competition. The points to be considered for pre-qualification are explained below.

1. Competitors must log in to robot.meb.gov.tr with their username and password and complete the Robot Production Report steps.
2. Robot production report steps are explained in detail in the "Robot Production Report Guide".
3. The uploaded reports will be reviewed by technical advisors and corrections may be requested for one time only if necessary.
4. Reports that are not corrected within the correction period will be evaluated as they are.

5. Robots whose robot production report is approved are eligible to participate in the competition.

4. GAME AREA

Dohyo Definition

1. Dohyo consist of the match ring and the outer layer area of the ring. The rest of the space will be assumed as area which is outside of Dohyo and objections for this area won't be accepted.
2. The specification of Dohyo
   - Dohyo of Mini Sumo Robot is a circular MDF board which has 5cm height and 77 cm diameter
   - The dividing line; It is the 2,5cm white area outside of Dohyo of Mini Sumo Robot and it is included to dohyo area.

Dohyo Images

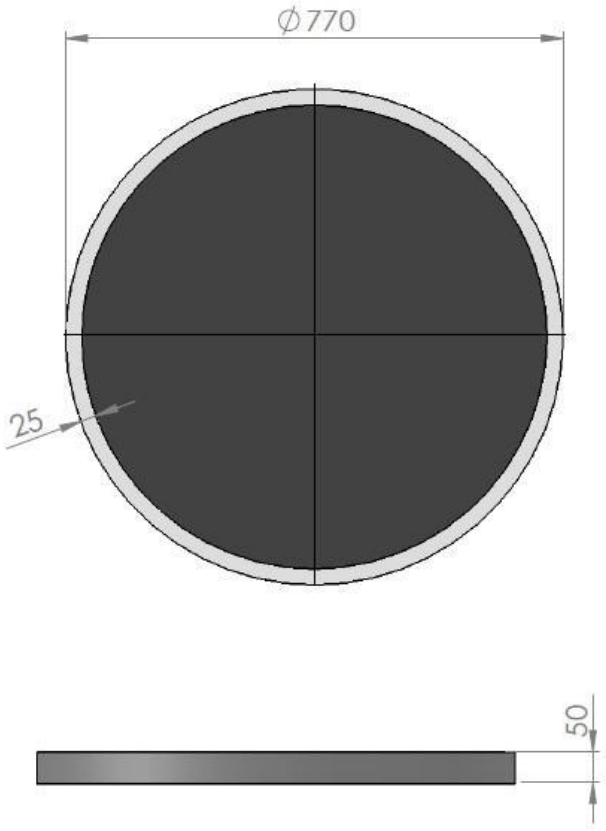

Figure 1: *Mini Sumo Robot Dohyo Dimensions(mm)*

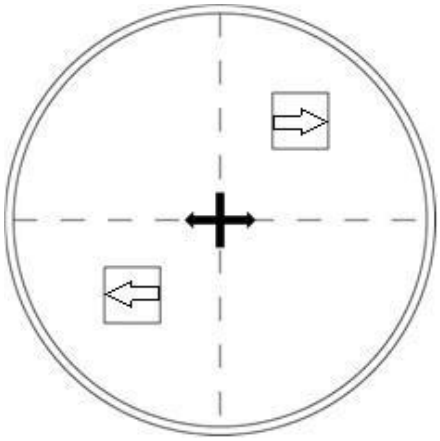

Figure 2: *Robot placement on Dohyo*

5. SAFETY MEASUREMENTS

1. For the safety of the competitors, safety goggles, gloves and sneakers must be worn throughout the competition. This safety equipment (goggles and gloves) is the responsibility of the competitor and competitors with missing safety equipment will not compete
2. Fire prevention measures
   a. A fuse or protection circuit must be used to prevent excessive current draw from the battery. Otherwise, the referees will intervene in damaged or dangerous robots.
   b. The game is stopped at the discretion of the referee in case of fire hazard or flashes during the competition. The referees decide whether to continue the competition or not. If the referees decide to end the competition; the stopped round and the following rounds are given as effective points on behalf of the opponent.

5.1. Accıdents and Injurıes

Request for suspension/postpone

1. When a contestant is injured and the game cannot be continued, a suspension can be requested by the contestant.
2. In the event above, the judges will make necessary arrangements for the game to be resumed immediately.

3. If the arrangements made do not enable match to be resumed, the opponent will be declared as a winner without match.

6. OTHER RULES AND WARNINGS FOR COMPETITORS

For each robot, a single operator and an assistant can be registered. However, only one competitor will operate the robot in match area. Both contestants have to know the competition rules and obey these rules. Robots must be autonomous robots. The winner will be determined by the judges after the match.

Teams will provide Start/stop circuit of mini sumo robots by themselves. No any start/stop module will be given to teams. Competitors must use the IR Launch modules on their robots so that they will not be affected by the Infrared Sourced Optical Sensors on the competing robots, and the IR device must be positioned with the IR receive lens facing upwards. Once positioned on Dohyo, objections made due to the Start Module will not be considered.

Advice: Some robots that are not enclosed around the launch module may cause the module not to work as desired, naturally due to interference signals from the front, rear and sides. Therefore, it may cause the robot not to start. In order to minimise this kind of problem, the perimeter of the module is raised to get only IR signals come from above. Example is given in Figure 3.

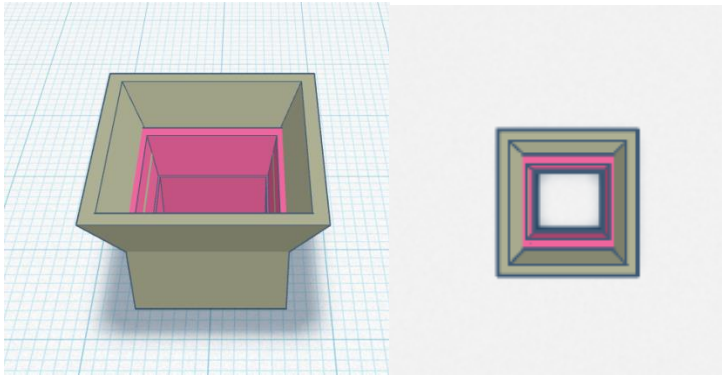

Figure 3

7. START MODULE

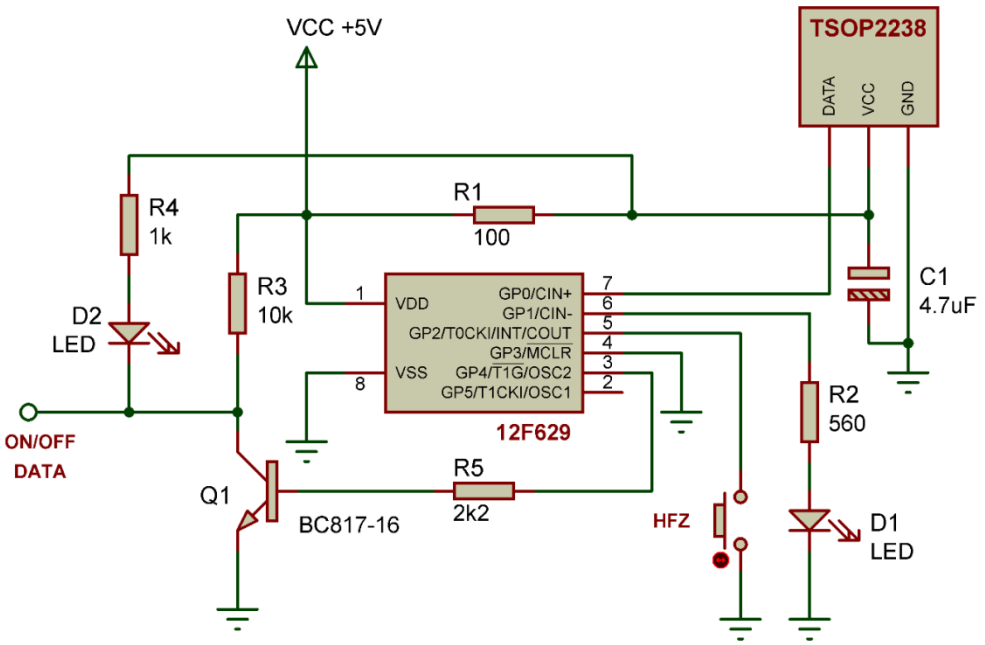

Figure 4: *Start modüle circuit*

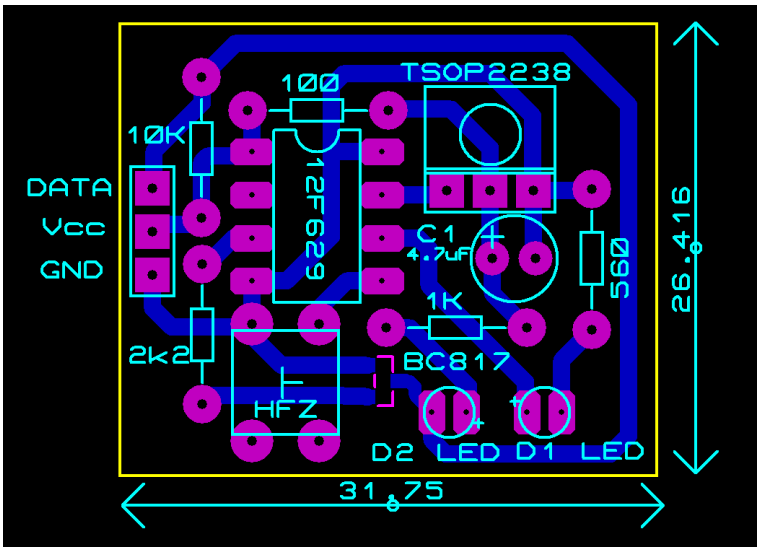

Figure 5: *Start module PCB*

7.1. START MODULE: HOW TO USE

First of all, which button on transmitter will be used for on/off function on receiver side should be determined. You should push memory button on the receiver and then D1 led turns on permanently. At this time, you should press a button which you want to save in

memory on transmitter two times successively then wait. D1 led will turn off. Now module is ready to use.

To set the output ON, push the button (memorized button on transmitter) one times. D1 led will flash but D2 will turn on permanently. The output voltage drops 0V.

To set the output OFF, push the button (memorized button on transmitter) one times. D1 led will flash but D2 will turn off permanently. The output voltage rises to +5V.

You can use any kind remote controller using “RC5” protocol as a transmitter for this circuit. A special area called “test point” will be reserved for competitors to test their remote modules.

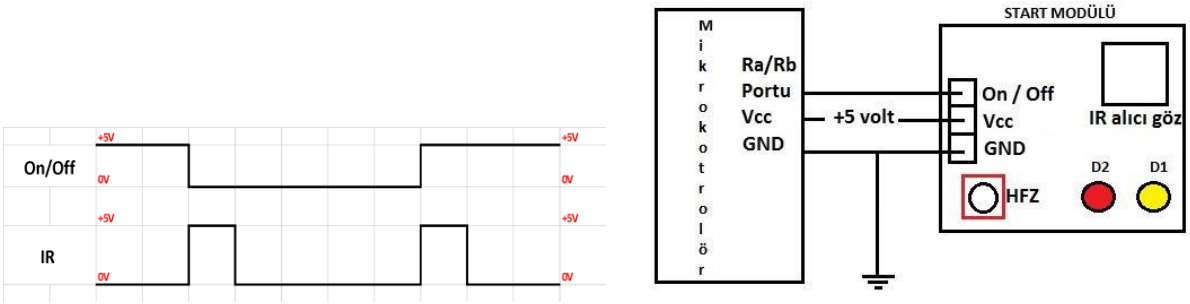

Figure 6 *Wiring diagram between MCU and start module*

8. CONTACT

Any changes in the rules are authorized by the Organization Executive Committee.

The general rules regarding the competition applications and Mini Sumo category are included in the “Application Guide”. The Application Guide must be read before making an application.

You can ask your questions about the category via the contact form under the information menu after logging in at robot.meb.gov.tr. Your questions irrelevant with the category will remain unanswered.