

# RULES OF ROBOTIC TOURNAMENT

## “ XII Robotic Arena ”

### MicroMouse 16 x 16

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#### Section I

##### General

###### § 1

1. This document regulates rules of the tournament in category “MicroMouse 16 x 16”.

#### Section II

##### Robot Specification

###### § 2

1. Robots can't be a pre-built, commercial construction.
2. Robots must fit in a 168x168 mm square extended by precision of a measuring equipment.
3. Height of robots is not limited.
4. Weight of robots is not limited.
5. Communication with robots during matches is forbidden.
6. Starting and disabling robots remotely is an exception from the point above.
7. Robots should be equipped with a loop which would allow for it to be "fished" out of the maze.

###### § 3

1. Robots must be fully autonomous.
2. The micromouse must negotiate the micromouse maze; it must not climb or jump over the walls of the micromouse maze.
3. Robots cannot interfere with the very structure of the maze. Actions such as leaving traces or markers, moving or destroying walls are strictly forbidden.

4. Robots' functionality cannot be dependent on varying environment during tournament, such as lighting (from dusk to bright reflectors), smoke, loud music or laser effects. The show may be lit by regular lightbulbs, halogens, energy saving lightbulbs, fluorescent lamps, LEDs and other lightsources common in households. Organizers have no control over street lighting near windows of the building. During the show it will be forbidden to use camera flashes and other intense light.

### **Section III**

#### **Maze Specification**

##### **§ 4**

1. The maze shall comprise 16 x 16 multiples of an 18cm x 18cm unit square.
2. Outside walls of the maze make up a 288x288 cm square.
3. The outside wall shall enclose the entire micromouse maze.
4. Walls of the maze are 12 mm thick (meaning that the operational field for the robot can be as little as 168x168 mm square) and at least 50mm tall.
5. Walls of the maze are white coated plywood with red top.
6. Floor of the maze is black coated plywood (or similar material).
7. Posts of the maze are white coated aluminum or 3D printed using white filament.

##### **§ 5**

1. Starting point of the maze is located in one of four corners of the maze and is surrounded by three walls.
2. Goal of the maze is located in the opposite corner and is surrounded by three walls.
3. A start sensor may be placed at the boundary between the starting unit square and the next unit square. A destination sensor may be placed at the entrance to the destination square. Time may be measured by these sensors.
4. The maze can contain any types of connections and crossings, including such that render "left/right hand" algorithms never reaches the goal.
5. Multiple paths to the destination square are allowed and are to be expected.

### **Section IV**

#### **Competition**

##### **§ 6**

1. Before the runs begin, contestants will be given access to a smaller maze for tests and preparation.
2. Tournament will consist of one stage.
3. Every robot has a right to one run.
4. Order of robots will be decided and published by judges on the day of the contest, after list of contestants is set and closed.
5. At a time decided by judges, before first run and revealing of the maze, all robots must be taken to a judge's table. After this they may not be modified or reprogrammed.
6. If contestants had access to the maze for testing and calibration purposes before runs, it will be reconfigured.
7. Results will be announced after judges count final scores.

## Section V

### Runs

#### § 7

1. "Run" is an exploration of the maze by a robot.
2. Each micromouse is allowed a maximum of 10 minutes to perform.
3. Run time will be measured with a stopwatch.
4. The maze is considered solved upon reaching finishing line.
5. Solve time is measured from the moment robot crosses the starting line. It may be crossed multiple times, each creating new solve time.
6. Solve time will be measured by light sensors. In case of malfunction of said sensors, it will be measured by the judge, using second stopwatch.
7. During the run robots may attempt to solve the maze multiple times.

#### § 8

1. Starting field will be designated by a judge.
2. At the start of the run robot may be recalibrated - run time will still be counted, but contact with the robot will not result in any time penalties.
3. Robot's algorithm can not be changed during recalibration.
4. Robot leaves the starting point on judge's signal.
5. If the robot leaves starting point before the signal, run is stopped and then redone. It is considered a falstart.
6. Two falstarts disqualify the robot.
7. In case light sensors are in use in stead of a stopwatch, robot does not need to wait for judge's signal. Points 4, 5 and 6 of catch 8 are not in force.
8. During a run contact with the robot is allowed for basic maintenance including small mechanical repairs and/or wheel cleaning. This does not result in time penalties, but time is still counted.
9. Contact described above can't be longer than 30 seconds.
10. Run can be stopped and resumed on demand of contestants.
11. Robot's constructors may wish for unlimited number of breaks.
12. During the break modifying robot's algorithm and recharging/replacing the battery is not allowed.
13. Time of all breaks can not exceed 10 minutes.
14. After resuming the run robot is placed on the starting point and loses half of the remaining run time.
15. Initial calibration and all other contacts with the robot may be monitored by a judge.
16. Run is finished after 10 minutes reduced by penalties.
17. Run can be finished earlier on demand of contestants.
18. After solving the maze, the robot may be returned to the starting point by the contestant or come back on its own. Time is counted during the return.

#### § 9

1. Freeing a stuck robot is considered a "push".
2. A judge decides whether the robot is stuck in the maze.

3. During the push the robot may be rotated or moved, but only within the field he currently is in.
4. A push results in a 5 second time penalty added to final time.
5. A push does not result in shortening the run.

### § 10

1. "Moving" a robot results in moving the robot from any place in the maze to the start.
2. Moving does not result in a penalty added to the final score.

### § 11

1. Champions will be determined by scoreboard.
2. Score of a robot is calculated with following formula:

$$\text{Score} = \text{best\_t} + 5 \cdot \text{push\_n} + \frac{\text{first\_s}}{30}$$

gdzie:

best\_t - best solve time,

push\_n - number of pushes given to the robot,

first\_s - total time spent by the robot up until its first solve.