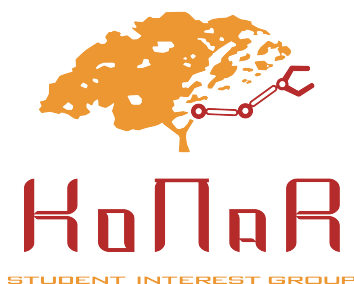


# RULES OF ROBOTIC TOURNAMENT

## “ XV Robotic Arena ”

### Sumo

“KoNaR” Student Interest Group  
Faculty of Electronics, Photonics and Microsystems  
Wrocław University of Science and Technology



#### Section I

##### General

###### § 1

1. This document regulates rules of the tournament in category “Sumo”.
2. In case of 3 or less robots, the category is played as a demonstration and no prizes will be awarded for it.

#### Section II

##### Robot Specification

###### § 2

1. Robots can't be pre-built, commercial construction.
2. Robots must fit in 20x20 cm square extended by precision of a measuring equipment.
3. Height of robots is not limited.
4. Weight of robots must not exceed 3000 grammes extended by precision of measuring equipment.
5. After placing the robot on a sheet of 80gsm paper and then lifting it, the sheet must stay on the ground.
6. All robots must be equipped with a start module which allows to remotely start the robot, either provided by the organizer or self-built.
7. Communication with robots during matches is forbidden.
8. Disabling robots remotely is an exception from the point above.

9. For safety reasons robots must be equipped with an IR kill switch to be operated by the referee. When the referee sends a kill signal the power to the motors shall be cut. The robot builder is responsible for adding such a kill switch on the robot.

### § 3

1. Robots must be fully autonomous.
2. Robots can't contain any devices which intentionally disrupt opponents control system.
3. Robots can't contain any parts (like blades and spikes) above the surface of dohyo, which purpose is to damage opponents sensors and/or PCBs.
4. Any parts that could damage the dohyo are not allowed.
5. Robots can't consist of any parts that stick it to the dohyo, e.g. suckers, sticking elements, magnets, electromagnets.
6. Any flaming devices are not allowed.
7. Any pitching devices are not allowed.
8. Any devices that could emit gas, fluids or powder are not allowed.
9. 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

### Dohyo Specifications

#### § 4

1. Sumo ring is called Dohyo. The ring is circular in shape, in Sumo category it has 149 cm diameter with tolerance of  $\pm 5$  cm.
2. Upper part of the ring is made of black coloured steel.
3. The border line is marked as a white circular ring of 5 cm width with tolerance of  $\pm 3$  cm. The ring area extends to the outside edge of this circular line.
4. Referee decides if a particular ring is damaged enough to be replaced by a new one.
5. Dohyo exterior has at least 140 cm larger diameter than the ring itself.
6. Exterior area might be of any colour.
7. Exterior area might be of any material.
8. Exterior area will be free of any obstacles during the fights.
9. A band securing robots from going outside the exterior area will be not higher than surface of the dohyo and is an exception from the point above.

## **Section IV**

### **Competition**

#### **§ 5**

1. Competition will be conducted in two stages:
  - (a) elimination phase
  - (b) finals
2. In the elimination phase robots will play matches in groups one versus one in all of the combinations.
3. Size and number of groups, as well as number of places in group granted with promotion will be stated by the organisers after closing the registration and will depend on the number of registered robots
4. Robots promoted to finals phase will play matches as a single-elimination tournament.
5. Each phase results announcement will occur after finishing the phase.

#### **§ 6**

1. Matches will be held based on the schedule given by the referee.
2. If a robot does not show up for the match on scheduled time the contestant will be rushed by the referee.
3. If the robot will not show up for the match within 5 minutes after being rushed, it will lose by default.

## Section V

### Winner Selection Rules

#### § 7

1. Two robots take part in a match.
2. The match consists of maximum 3 encounters.

#### § 8

1. Yuko points (effective) are awarded in following situations:
  - (a) A robot pushes its opponent out of dohyo.
  - (b) The opponent leaves dohyo by its own.
  - (c) The opponent is disqualified or receives one penalty or more than one warning.
  - (d) Two Yusei points have been granted.
  - (e) One Yusei point has been granted and opponent received a warning.
2. A robot is considered to have left the dohyo, if any of its parts touches the exterior area.
3. Yusei points (advantage) are granted in a situation that opponent is stuck at the sideline and is not able to move away on its own.

#### § 9

1. Before beginning of the match contestants standing near the dohyo should bow before each other according to referee's instructions
2. Every module installed inside robots taking part in fights at the dohyo must be programmed in the way that it only reacts to the commands sent from the appropriate transmitter
3. After the programming procedure follows test start of the robots. It is necessary only at the beginning of the match or in a situation that a robot fought at a dohyo with a different identifier. The test start may also be conducted after contestant's request.
4. The part of dohyo in which the start of the round will take place is stated by throwing the pointer.
5. Before the start of each round the robots should be placed on the stated part of dohyo according to directions set by the pointer's arrows.
6. Based on a random draw the robots may be positioned facing each other with rear left or rear right corners.
7. Contestants have 120 seconds to place robot in the aforesaid part of dohyo.
8. The robots are started by the referee with IR remote controller. The beginning of the round occurs immediately after receiving:
  - (a) Start signal in case of using external modules
  - (b) Start command in case the start module functionality was implemented internally.
9. Before the start of round robots cannot move or take any action resulting in taking advantage over their opponent (e.g. spreading ploughs, scanning surroundings etc.). During this time contestants are committed to leaving the outer area of the dohyo. The referee decides if this rule was violated.
10. In case of no reaction for the "start" command the round is repeated. If after three consecutive rounds the start will not occur, referee decides of further course of the match.

## § 10

1. The robot that acquires two Yuko points first wins the match.
2. If neither of match participants acquires Yuko points or both have the same number, the winner is announced by the referee. However, if neither of the contestants had clear advantage and the winner can not be declared, additional three-minute round may be decreed.
3. A match ends when:
  - (a) One of participating robots acquires 2 Yuko points.
  - (b) The third round has already ended.
4. A round lasts for up to three minutes but ends when one of the contestants gets Yuko point.
5. After the end of a round, referee sends "Stop" signal to the robots. It is recommended to cut the power supply of motors either with program or hardware.
6. After the end of a match, contestants should remove their robots from dohyo and bow before each other.

## § 11

1. A round should be interrupted and restarted from the beginning if one of the situations occurs:
  - (a) Both robots are clogged in the way that there is no possibility for them to take any action.
  - (b) Both robots touch the outer area of dohyo at the exact same moment.
  - (c) In any circumstance based on which the referee decides that the winner of the round can not be decided.
2. In case of restarting a round, making changes or fixing the robot is forbidden and the contestants must immediately place their robots in the position stated in paragraph 9, point 4. The exception from this situation is acceptance of the suspension request - paragraph 12, point 1.
3. If neither of the competing robots has won the restart, the referee may decree placing robots in the specific position at the dohyo and restart the round in within the time limit.

## § 12

1. If a robot had an accident and is not able to continue the fight, the contestant may ask for round suspension.
2. The referee must take immediate actions to explain the situation and decide on the further course of the match.

## § 13

1. In the elimination phase the victor is awarded with one point.
2. The classification in every group is stated based on (in case of the same number of points, next item is considered):
  - (a) Points in decreasing order.
  - (b) The difference between won and lost matches in decreasing order.
  - (c) Victories in decreasing order.
  - (d) Result of a direct 1 vs 1 match.
  - (e) Coin toss.
3. The referee may decree additional match between interested contestants instead of coin toss.
4. In the finals, match victory grants promotion to the next round.
5. The winner of the grand final becomes the winner of the competition.

## Section VI

### Violations and Penalties

#### § 14

1. The contestant that takes any of following actions gets a warning:
  - (a) Enters the outer or inner area of dohyo before the referee announces the end of a round or a pause.
  - (b) Preparations for the match restart take more than 30 seconds.
  - (c) Takes any other action that is at odds with fair-play rules.
2. If a contestant gets two warnings, his opponent is awarded with one Yuko point.
3. Each of the following actions is considered a violation and in these situations the opponent or both robots get one Yuko point:
  - (a) Any part of a robot that weighs more than 60 grammes is separated from the robot.
  - (b) A robot stops at the dohyo for more than 15 seconds.
  - (c) A robot emits smoke.
  - (d) Both robots move but do not enter the physical contact with each other.

#### § 15

1. The consequence of fulfilling any of these conditions by a contestant is disqualification:
  - (a) The contestant behaves in unsportsmanlike manner or does not comply with fair-play rules (i.e. uses vulgar or offensive language or insults the opponent or the referee).
  - (b) The contestant damages opponents robot on purpose.
  - (c) The contestant indisposes others to play the match by intentionally damaging or defiling the dohyo.
  - (d) The contestant's robot due to malfunction is not able to fight in all the elimination phase matches.
  - (e) The contestant due to late arrival for elimination phase is not able to fight in all the elimination phase matches.
  - (f) The contestant's robot during a match is not compatible with the specification stated in paragraph 2.
2. If there is suspicion of incompatibility with the specification during a match, the referee is committed to interrupting the match and immediately take the measurement of the robot.
3. A new measurement of a robot may also be taken at the request of opponent.
4. The new measurement is taken with tolerance extended by precision of measuring equipment.
5. The result of disqualification in the final phase is match loss.
6. The result of disqualification in the elimination phase is cancellation of the results of all the matches the contestant participated in and awarding all opponents with victory by default.