

Rules of procedure for SICK Robot Day 2016

General

This time the task consists in picking up receiving **cubes made of foamed plastic** and placing them in a checkered area. All field definitions are given by **RFID tags** attached underneath the lane, described by an (electronic) map supplied by SICK. In order to provide the audience with the possibility to follow the contest, visible lines will be added as well. These are, however, not significant for the robots and therefore won't be defined in more detail in the sequel. As well the outer ring fence, which will be present as always, only serves the audience's security and is of minor importance for the game (nevertheless there is a penalty for collisions with the ring fence).

The arena

The exact dimensions of the area enclosed by the ring fence (the "arena") are irrelevant for the game. It will be rectangular this time, somewhat above 7 x 13 m, so that the mapped area fits completely inside, limited by a continuous ring fence about 50 cm high. The latter is unicoloured, but there will be advertisements attached.

The ground of the arena, a level hall floor, will be covered by a carpet, under which RFID tags are located regularly spaced (1m). These divide the arena into squares, whose corners they mark.

Inside the arena there are 3 fields of particular importance: the so called "playing field" consisting of 25 squares (5x5), and on both sides the smaller "storage areas". The storage areas are assigned to the two contestants that compete simultaneously, and contain foamed plastic cubes of one colour each. Besides, they serve as starting positions for the vehicles.

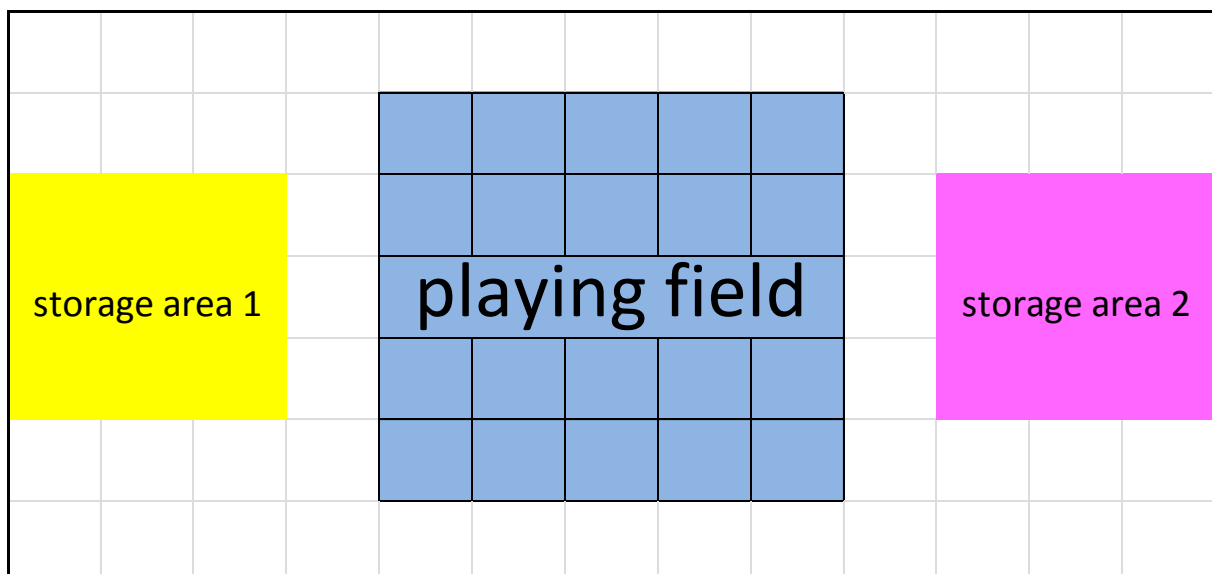


figure 1: segmentation of the arena (colours for orientation only)



Vehicles

Since at any one time two vehicles are in the arena contemporaneously, it is absolutely necessary to comply with the stipulated dimensions: the vehicles' bodies must be at least 25 cm high, so that they can be reliably recognized as obstacles by other vehicles. For the same reason the vehicle's bottom may not be farther than 15 cm from the ground. The maximal height of vehicles is not limited.

The width of a vehicle may be maximally 60 cm.

Moreover every vehicle must possess an easily accessible emergency stop button.

Procedure

Each vehicle takes part in 2 runs, from which the better one is counted. A run takes exactly 10 minutes. The running order is assigned by drawing lots (it is guaranteed that the mix of competitors will be different in the two runs). All this will be announced in the schedule. The colour of the plastic cubes will be drawn as well.

The two vehicles taking part in a run start inside their assigned storage area. After the start signal they have to pick up plastic cubes of the colour assigned to them and put them into as many squares within the playing field as possible. For that the following rules hold:

- At any time only one cube may be transported.
- "What lies, lies". Inside of the own storage area plastic cubes may be pushed around arbitrarily. But outside, in particular within the playing area, cubes once placed may not be moved any more. This means that the position of neither own nor foreign cubes may not be corrected subsequently (this will be valued as collision). Since collisions with cubes lying around causes a penalty, the contestants can think about strategies, in which order it is best to fill the playing field, exploiting the effect of barricades.
- Though it is not forbidden to place more than one cube per square (intentionally or inadvertently), this will not give additional points, because only the number of occupied squares is accounted for (cf. below).
- Putting a cube onto a square that has already been occupied by the opponent does **not** claim this area for the own party. This holds even if one gains ascendancy by adding further cubes. **Only the first cube placed within the square counts.**

Collisions of vehicles are generally forbidden and lead to instant disqualification for the on-going run. If two vehicles run across each other the one coming from right has got the right of way. In direct encounters collision avoidance shall always be performed to the right.

Apart from the start signal and potentially a stop signal no wireless communication with the vehicles is permitted. After the start of a round no persons may linger inside the arena. This also holds for team members.

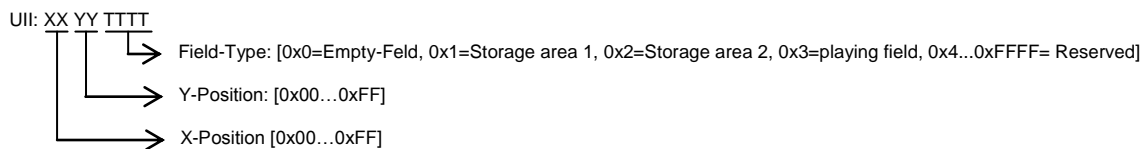


A round is finished after exactly 10 minutes. Assessed is the number of squares occupied by own cubes (minus penalties for collisions with cubes or fence). In case that a participant succeeds in filling all the squares of the playing area, the time needed for that will be used as an additional criterion.

Map and data structures

The exact specification of the RFID tags used is supplied as an attachment (DogBone_G2iL.pdf). The position data is stored within the UII of the respective transponder according to the following scheme:

Structure of UII 32Bit (HEX):.



The map is given as an attachment as well (Map.pdf).

Practice runs and training material

On the day of the competition practice runs may be performed on the course. During these all calibration jobs have to be carried out.

SICK will provide the teams with DogBone-Tags, see document "Demo_Tags_english.pdf" and "DogBone_G2iL.pdf".

The cubes used can be looked at or ordered here – pink and yellow cubes will be used at the event:

http://www.amazon.de/John-50756-Softw%C3%BCrfel-15/dp/B0010DJR5U/ref=sr_1_1?ie=UTF8&qid=1442393319&sr=8-1&keywords=john+50756



FAQ:

Question: May I run after my robot, so that I can react faster in emergency situations?

Answer: No. Stepping into the arena during a race is prohibited. This holds for participants as well. The only exception is a fast sprint in order to activate the emergency stop. But this will result in disqualification anyway.

Question: Does a collision with an opposing vehicle lead to a disqualification, even if the own vehicle tried to give way?

Answer: If a clear culprit for the collision can be identified (according e.g. to the rule concerning right of way) of course only this one will be disqualified.

Question: May data gained from a sensor not located on board of the robot (e.g. a camera on a high tripod, rotary arm or ladder; a camera mounted on a balloon, blimp or helicopter) be used for building a map?

Answer: Definitively no.

Question: May marks that the robot can detect (e.g. RFID tags) be attached by the teams to the storage areas or the playing field?

Answer: In no case.

Question: What happens, if a cube is dropped (deliberately or unintentionally)?

Answer: Lost cubes stay within the arena for the ongoing run and are removed before the next round. Outside of the storage areas these cubes may not be touched and even more not be moved. This will be assessed as collision. The loss of a cube itself is not specifically punished.

Attention: Cubes lying about in the arena constitute obstacles that have to be accounted for.

Question: Are there conditions that make a run end earlier than the stated 10 minutes?

Answer: Only if both vehicles get disqualified or break down.