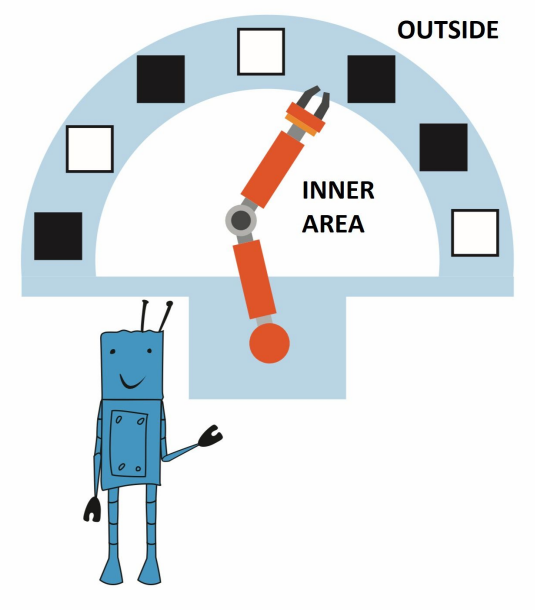
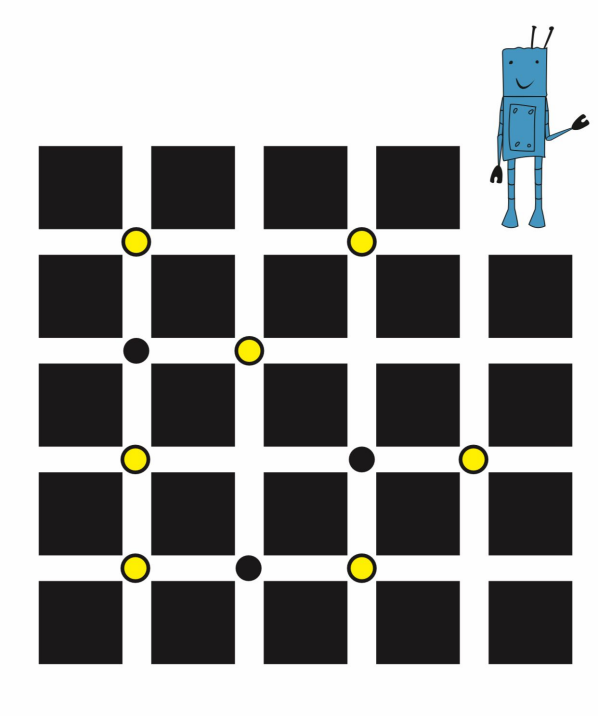
PRACTICAL LEGO OLYMPIAD
ROBOFINIST 2018

Task 1. Manipulator



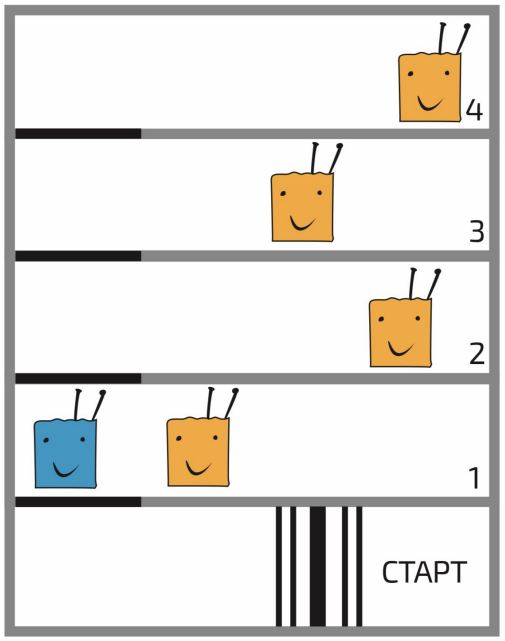
There was a rise of output products on the packaging factory, so the automated sorting process of poor-quality products by color parameter is now needed. You need to construct a working prototype of a manipulator, which has to identify poor-quality production and put it away from conveyor. Conveyor is a static platform, where there is a place to set base of manipulator (18x20 cm size) and also a place to set 7 products (e.g. cubes) with a size from 38x2 mm. Цвета кубиков различаются. The poor-quality cube is the black one. If the black cube touched the surface outside (beyond) the conveyor, robot **gets 7 points**. The second mission for this robot is to collect production with a fine quality in the inner area of the conveyor. The fine-quality cube is the white one. If the white cube touched the surface in the inner area of the conveyor (inside), robot **gets 10 points**. If any cube touched the surface in the wrong area of the conveyor, robot **loses 15 points**. The minimum amount of points robot can get - **0 points**. At the beginning the manipulator should be in the start-position, which is marked on the conveyor. No parts of the robot can touch the surface beyond this start-position. In another case robot **loses 5 points** for each touch, which lasts more than 1 sec. Before each launch the lots are drawn to choose the scheme how to place the cubes on the conveyor. Each attempt lasts **180 sec**. If the robot accomplished the task 100%, the amount of saved seconds is divided by 10 and added to the earned points.

Task 2. Collector



Robot has to deliver **all** white cans to the start zone, which is marked with a yellow square. Field consists of black squares, which create white road network, where you can find cans on the crossroads. Robot starts to move from the «start» square. Can is successfully delivered, if it's steady and all of its parts are on the yellow square. Cans cannot be put away by the judge or participants during robot collecting. The length of the square side is – 250 mm, the distance between two squares – 100 mm. The amount of cans on the field – 10, their position is chosen randomly right after the participant has put the robot in the start position. For each successfully delivered white can robot **gets 8 points**. Note, that there are 3 black cans on the field. If robot delivers one of them, it **loses 10 points**. Each attempt lasts **180 sec**. If the robot accomplished the task 100%, the amount of saved seconds is divided by 10 and added to the earned points.

Task 3. Lemmings



Robot has to prevent judges' robots (lemmings) from reaching the end of the corridor. The field consists of 5 corridors, which have dead ends at one side and at another one are connected to the main corridor. The visual prolongation of these 5 corridors is shown with a black lines in the floor of the main corridor. The participant's robot starts in the dead end of first corridor. There are judges' robots (lemmings) in the dead ends of the rest four corridors. These robots look like a four wheeled cart with two bumpers, which can drive only back and forth. When the front bumper is pressed, lemming drives back. When the back one is pressed, robot stops for 20 sec («paralyzed»), for each «paralyzation» robot **gets 3 points**. There is a barcode in the center of the first corridor. It consists of 4 black stripes 2 cm width and 1 black stripe with 4 cm width, which are separated with white stripes with different width. The width of a white stripe is responsible for the start time of each lemming (the most narrow white stripe – this lemming starts first). Lemmings start with the difference in 10 sec. First lemming starts in 10 sec after the attempt has started, it has a speed of 8-12 cm/sec. Lemming, which corresponds to 4 cm stripe, drives twice faster, so for his «paralyzation» robot **gets 6 points**. Each attempt lasts **180 sec**. If any lemming reaches the end of its corridor and touches the opposite wall, or blocks the way robot-participant, the attempt is immediately aborted. If all lemmings are «paralyzed» at the same time, the attempt is immediately aborted and the amount of saved seconds is divided by 10 and added to the earned

points. The size of the field (outside side of the wall) – 150x150 cm, the width of the main corridor – 28 ± 2 cm, the length of the lemmings' corridors – 116 ± 2 cm.