World Robotics League®

Craftsman RoboNINJA Bronze Challenge

CHALLENGE 1: ORGANIZER BOT

INSTRUCTIONS BOOKLET

Revision 1.0

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http://worldroboticsleague.com/

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1   IMPORTANT NOTES

For World Robotics League®, the constitution and Manifesto which describes the acceptable behavior of help from Parents, Coaches and Mentors is present [here](#).

In addition to the drawings and figures, the challenge field computer model is provided in eASM format. You can look at multiple views, rotate, look at details and measure using eASM files. We strongly recommend you to install free eDrawing and eAsm viewer provided by Dassult/solidworks, from following site: http://www.solidworks.com/sw/support/edrawings/e2_downloadcheck.htm
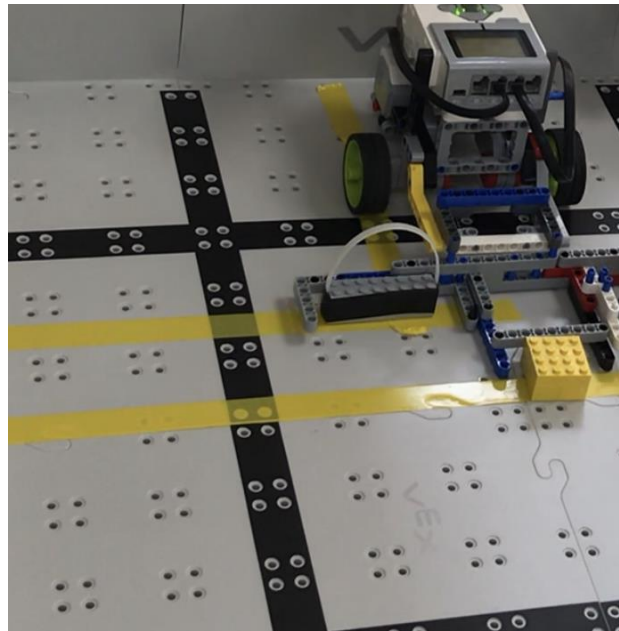

Figure 1 : An example of how tape is used to mark regions.

AS described in Figure 1 different regions of the field can be marked using masking tape or electrical tape. Avoid using thick fabric-based tape or tapes that may spill glue since this may alter behavior of the robot.
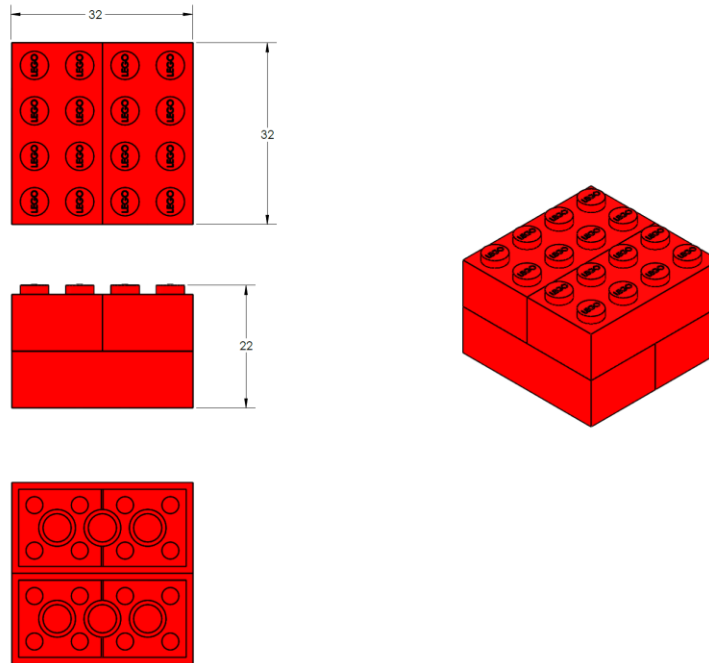
Figure 2 : Example to show how different sizes of bricks can be stacked to build similar block size

The Blocks are built using Qty 4 of 2X4 Lego bricks. As shown in Figure 2, you may arrange other smaller Lego bricks to build the block. Alternatively, you, may use cardboard box or wooden box to the specified block size. Note that the competition field will use Block built using Lego bricks. The friction and total weight of cardboard and wooden box may differ from Lego brick-based block.

This challenge is suited for RoboNINJA™ Craftsman Bronze skill level ONLY. For explanation of the levels, see the **Levels and Progression** page on the World Robotics League website.

2   THE CHALLENGE

As you all know that a Robot is multifunctional Machine. Quite often Robots are used for repetitive tasks. One such task is warehouse and factory organization. This challenge is geared towards using a Robot for organizing items in a factory like setting. In a typical factory, tools, materials and equipment are stored and organized in various sections. During the work hours, also referred to as shift, workers and robots move the items around to complete various tasks. At the completion of the shift all the tools, material and equipment need to return to respective areas for two purposes (1) To ensure that items are available for next shift (2) Take an inventory in case items are misplaced or missing. The organization of the items can be laborious task, therefor many a factory may employ robots to organize the items.
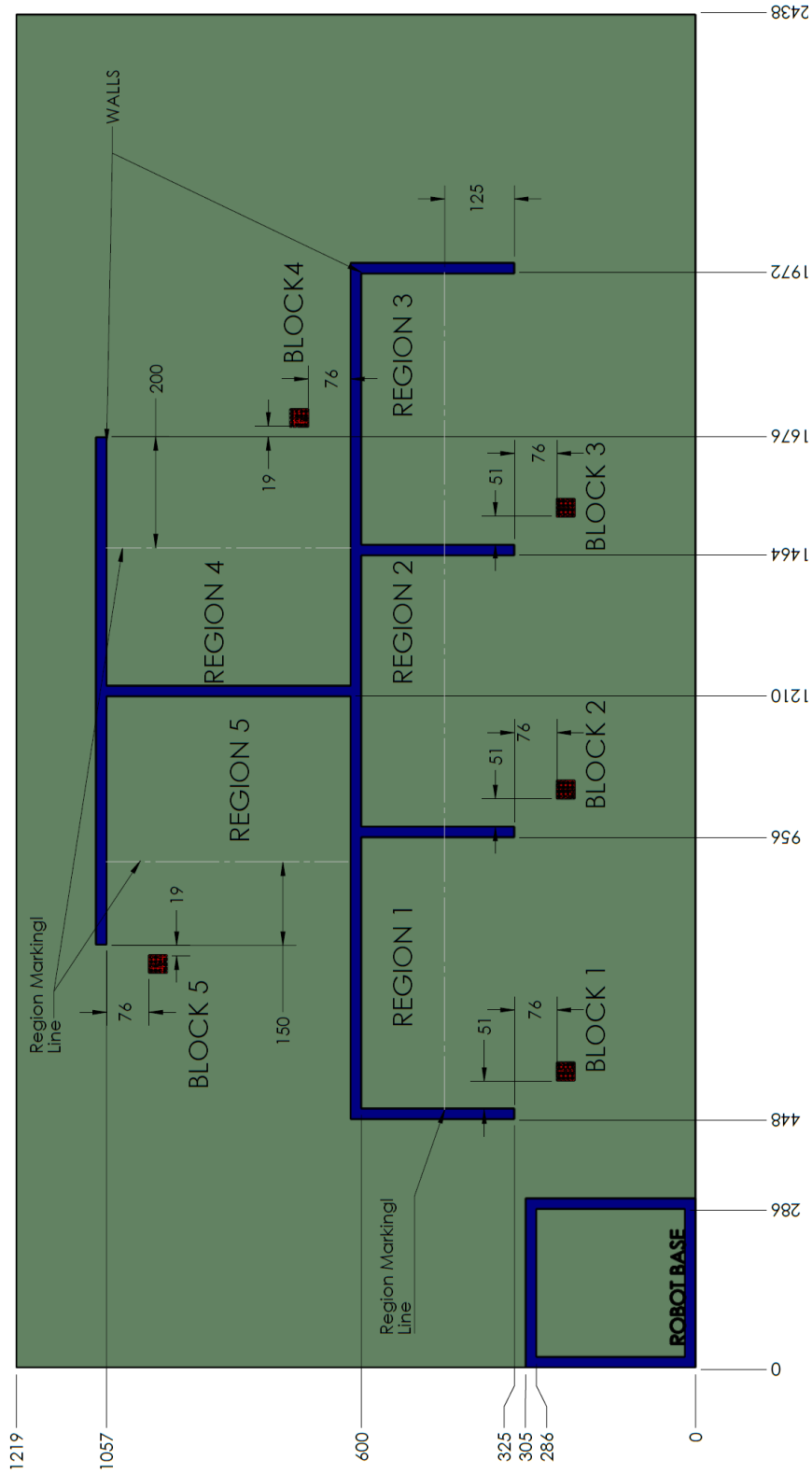
Figure 3 Challenge field details

As described in the Figure 3, Region1 – Region 5 represent different parts of the factory. Blocks 1 - Block 5 represent materials, tools and equipment. At the start of the challenge, the scenario on the table shows end of a shift. The blocks representing material, tools and equipment are placed away from their storage area.

Once the Challenge starts, the Robot needs to move each item to its respective storage area behind region marking line. The items may be moved by pushing, pulling or picking and placing. All three modes of item moving are acceptable.

The Robot may move the items to respective regions in any order. Total time for the Robot to complete the task is 20 minutes.

3   CHALLENGE CONDITIONS AND RULES

- All units are specified in millimeters.
- Total time to complete the Challenge is 2 minutes.
- Each participant will be given two opportunities. Maximum of the two runs will be considered as the actual team score.
- Robot can only be touched when fully inside robot base. Should the participant wish to modify design, attach additional items or change the program on the Robot, they can do so only while Robot is fully inside the Robot Base. The robot may return to the base for modification or changes; however, the 2-minute clock will not stop.
- For this challenge, if your robot misbehaves, you may pick up the robot and restart the robot. There is a 5-point penalty for picking up the robot.
- If Robot touches or crosses over wall, it will be considering damaging factory asset and a penalty of 10 points will be applied.
- You may use up to 4 motors total on the mechanism of any kind.
- You may use up to 4 sensors of any kind in this challenge.

4   SCORING

Points are scored when Robot touches a block and moves the block. The points are assigned per follows:

Table 1 Score details

Region/Block	Touch Score	Move Score
1	5	10
2	10	20
3	15	25
4	25	45
5	20	15

For the move score, the block must be fully moved in respective region. Moving each block in incorrect region will incur 2 point penalty.

5   TEAM REGULATIONS

1. Teams must be at least 1 person and at most 2 people.
2. At most two of the team members may be at the table before starting the run; they will be designated as "Robot Drivers".
3. Everyone else must stand back at least 12 inches from the table.
4. During the three runs, every team member must be the robot Driver in at least one round to ensure everyone is fully engaged and they have participated in the process of design, development and programming.
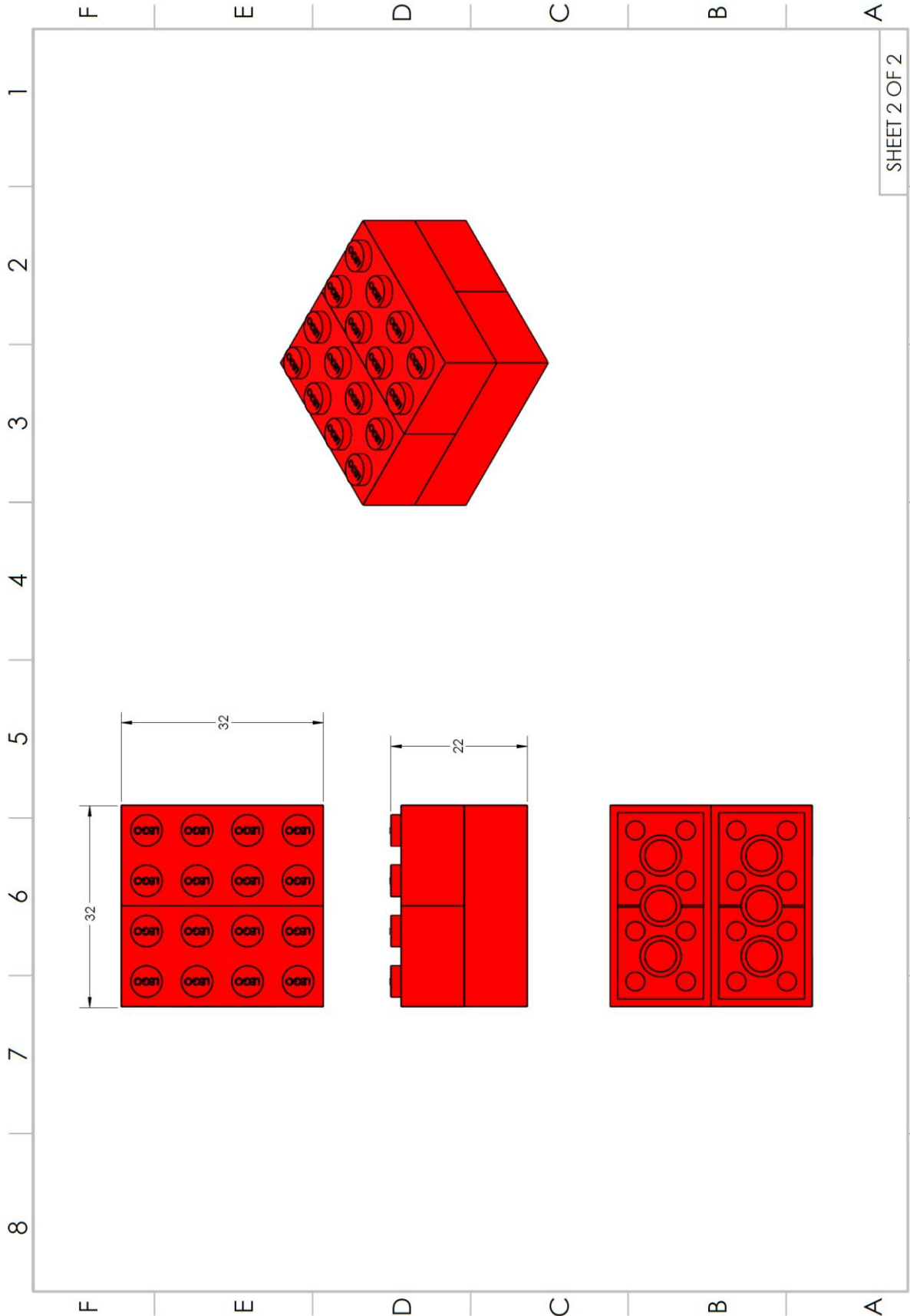
6   AWARDS

- Highest score Award: 3 awards for the top three scores.
- Repeatability: The robot with most repeatable runs. We want to ensure that the skill of the kids is the largest part of the robot run. The robot that produces the highest scores in a consistent manner will get this award.
- Referees choice (flexible criteria): Referees will on the spot decide if some robot/program did something amazing/exceptional and hand these out.
- One team may win multiple awards.

7   ROBOT RUN RULES

1. One team can use ONLY one robot during the entire challenge. They must finish with the exact same robot that they started with.
2. Once the robot is running, it is in autonomous mode, and it MUST continue running without any human intervention barring any exceptions already listed out in previous sections.
3. If a robot misbehaves and needs human intervention, a Robot Driver may intervene. Touching the robot disqualifies the run i.e. score from any previous runs will be discarded unless the game specific rules say otherwise.
4. If a robot or mechanism created by the participating team starts destroying any fragile mechanisms, the referees will stop your mechanism. You may reattempt the challenge if the rules allow and if you are still within the allotted time.
5. The robot runs can be attempted indefinite number of times within the allotted time frame. The referee will stop the run if the robot is not finished by the end of the allotted time.
6. There will be two referees on either side of the table, and their combined decision will be final.
7. There will be 3 rounds for each team. Each team will get 1 run in each round. There will be a 5-minute break between rounds for kids to tweak their programs or robots.

8. No adults may help the kids at the competition site. At the competition site, the kids must finish the work on their own. We want kids to do the work themselves demonstrably.

9. Referees and Judges may ask the participants to explain their programs and design before the run to ensure that they have done original work by themselves. Each member of the team must be able to answer questions about the program and design. If a team member cannot answer questions satisfactorily, that team will not be eligible for any awards no matter their score.

WALLS

BLOCK4

REGION 3

BLOCK 3

REGION 4

REGION 2

REGION 5

BLOCK 2

Region Markingl Line

BLOCK 5

REGION 1

BLOCK 1

Region Markingl Line

ROBOT BASE

2438

1972

1676

1464

1210

956

448

286

0

1219

1057

600

325

305

286

0

125

200

19

76

19

150

51

76

51

76

51

76

76

NOTE:
1. The marking can be done with masking tape or electrical tape of any color.
2. Each block needs to be pushed to respective regions. Block 1 nees to be ushed to Region 1 and so on.
3. At the start of the game, the Robot must be inside the Robot base. Robot base is considered the outer side of the tape as shown.
4. Blocks are built be stacking 2x4 LEGO blocks as shown on the sheet 2. Alternatively one can cut a wooden block or use a paper box of equivalent size. Note that during the challenge LEGO blocks will be used. The weight and friction of the block will be different for different materials.
5. Participant will get scoree for making cotact with block and for pushing the block in resepctive regions:

Region/ Block	Touch Score	Push Score
1	5	10
2	10	20
3	15	25
4	25	45
5	20	15