FAQ

1. **Do we have to build 4 physical robots for the first round?**

Yes, you have to build 4 physical robots for the first round.

2. **What is the weight of the package?**

It is expected that you make those packages. Hence weight will be based on the material you use. The package is expected to be a cuboid of approximately 20x20x20 cm. You can have a tolerance of + 5-10mm

3. **Is there any upper limit specified for the voltage of battery, or RPM of motors?**

The problem statement was designed in a way so that you can make simple robots and focus on the wireless communication, vision & navigation algorithms of these multiple robots. It is unlikely that having JUST a faster robot will help you win the competition. We will not be using Round 1 rankings to determine the output of Round 2 - in which the distances quite small in which case speed will not help you at all.

4. **In this challenge can the robots can be controlled by remote or should it be automatic?**

Automatic. No manual intervention to software implies no remote control. It is expected that there is some central software which is coordinating the navigation of the robots. There should be no human intervention to the software once the round starts.

5. **No sensors for navigation/object detection to be mounted on the robot? Should we not even have a camera for robot navigation?**

No camera can be **mounted on the robots**. It is expected that you use a camera or an array of cameras, mounted on top of the arena to understand the position of the robots and then help them with navigation. The robots can talk to you and listen to you, but they can't see…

6. **Can we use lidar sensor?**

You can. But these sensors should not be mounted on the robot. You can use Lidar to create a map of the arena from a central vantage point.

7. **Is the bot allowed to travel diagonally across the grid or is it constrainted to forward backward right and left motion in the grid?**

You can travel diagonally

8. **Is the 6X6 inch size in which we have to fit the robot has to be met by the chassis of the robot or the entire robot with the wheels.**

Entire robot with wheels

9. **Can you please explain -- Uninterrupted Video of Live Image Processing - with Timer overlayed to show how robots are being tracked in real-time.**

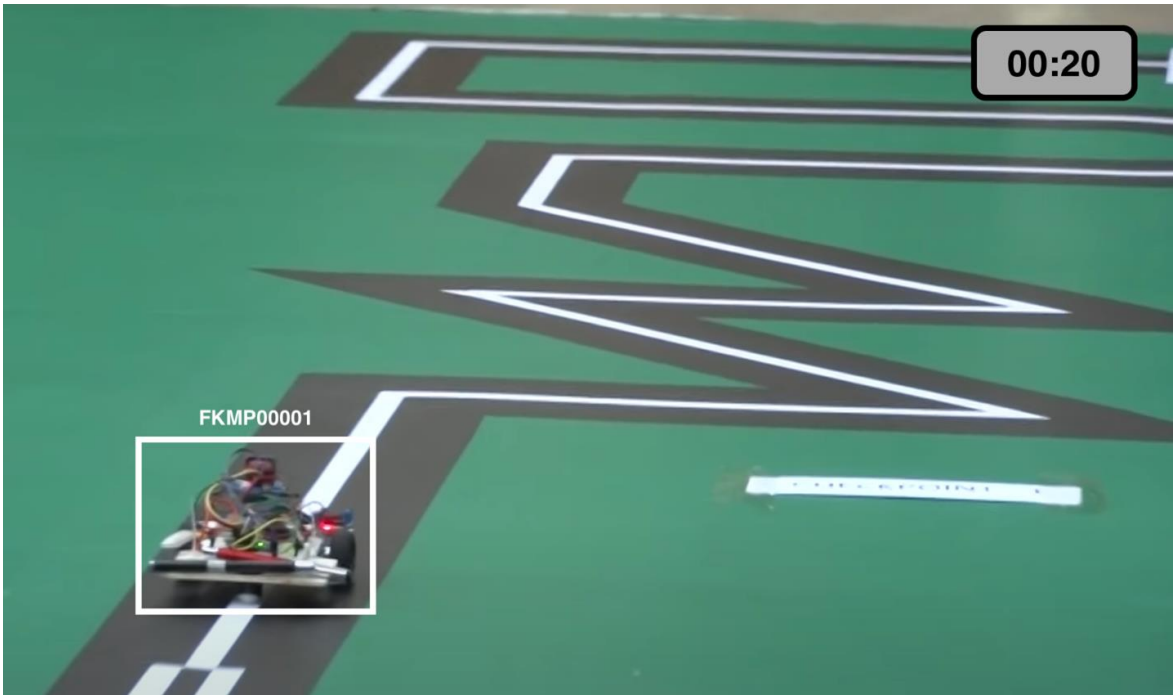

*Image for reference purpose only.

10. **Do we have to show all 4 robot image processing?**

Live video of all cameras that are used for detecting the position of the robots needs to be submitted - Refer to Q6.

11. **Do we need to track all bots at all times (which will be shown in the Live Image processing video)?**

We recommend you track - however this is not a binding condition. **Whenever you are tracking we want to know.**

12. **Is it necessary that we should use the same bots in the second round? Can we make modifications to the bot?**

You can make any modifications you like as long as they fit the guidelines in the problem statement.

13. **Can we use some sort of Visual markers (QR or ArUco markers) on the robots?**

Yes. You can mark the robots with these markings.

14. Can we use some sort of Visual markers (QR or ArUco markers) on the Arena?

You may post QR codes anywhere you like, however, the sensing of those should not be done by the robots individually. It is expected that spatial awareness of the arena is generated by the central camera/ array of cameras. No line follower implementations are allowed.

15. Are we allowed to color the tracks? Does the colour scheme for all lines,the wall and the grid (including S1, S2, S3, S4, D1, D2, D3, D4) have to be the same as given in the figure of the arena or can we alter the colours?

Arena should be monochrome in nature - Black gridlines on white floor or White gridlines on black floor

Exceptions to this include.

- Start and end points in Round 1
- Induct point and destination chutes in Round 2

You can change these colors as per your convinience

16. Can we place sensors outside the arena?

You can use sensors at the pick up and drop off points to detect items have been picked and dropped. Navigation understanding should be generated using central monitoring system only.

17. Will handling the bots through bluetooth and wifi comes under of implanting sensors? Or can we use these methodologies to connect with the bots?

You can communicate with the bots however you like, but you should not be using these techniques for navigation

18. Is it compulsory to use camera or arrays of camera mounted on the track or the top of track to navigate the robot or we can find some other solution within the given guidelines

Any solution has to adhere to the spirit of the problem statement

19. Should the bot be able to identify the color code of the pickup packet by itself by running image processing algorithm.

No, we expect the packages will be loaded manually onto the robots

20. Is there any limit on the number of cameras that can be used. Is there any penalty for using more cameras? Can they be positioned anywhere or are there any restrictions?

There is no penalty. No restrictions on positioning either.

21. Is flipping of parcels a necessity or can we use some other mechanisms such as belt transmission? Can a slanted tray be used for the cargo deposit?

Package should not fall off in transit. There needs to be some mechanism which drops the package from the robot into the destination.

22. Will the external boundaries shown in the layout have any barrier (as the brown lines are mentioned to have some height) so that the bot doesn't move out of the arena? How tall is the wall at the finish line for Round 1?

All boundaries / walls should be 1inch in height.

23. Can the bots communicate with themselves?

Yes they can.

24. For navigation of bots we are not supposed to use any sensors then can we use a physical object to change their direction or to stop them at destination

All motion of the bot to be controlled via central monitoring system.

25. Can we use an accelerometer, gyroscope or wheel encoder in the robot?

Yes, you may use them, however you still need to submit a live tracking video of the robot using the central monitoring system.

26. Can we use OpenSource packages to achieve the task?

Yes. Please declare the same in the introductory video.

27. Do the robots have to move bidirectional or multidirectional??

You may move however you want.

28. Is there any restrictions in deciding the microcontroller which we can use?

You may use any microcontroller you like.

29. Are we also going to be judged on the design and mechanism of dropping the parcel?

No

30. Is there any restriction on the height of the robot?

There is no restriction on height of the robot.

31. Should all 4 robots be identical in size, shape and colour?

Yes.

32. Do we have to strictly follow the objective of a central monitoring system for Round 1?

Yes

33. Can we use a cloud to process the algorithm or should it be local?

You can use the cloud.