Task:

1. Teams have to build a bot that works on the principle of image processing.

2. The bot has to identify the path to reach the end zone by processing the images of various shapes and colors finally reach the end zone in minimum possible time.

Arena:

1. The arena consists of the following parts:
   a) The START zone
   b) The END zone
   c) Marks like triangle, arrow, rectangular stripe, circles.
   d) Blocks and Balls.

2. Figure 1 and Figure 2 show the Top view and the Isometric view of the arena. The positions of the marks are not specified. It will be disclosed during the time of the competition.

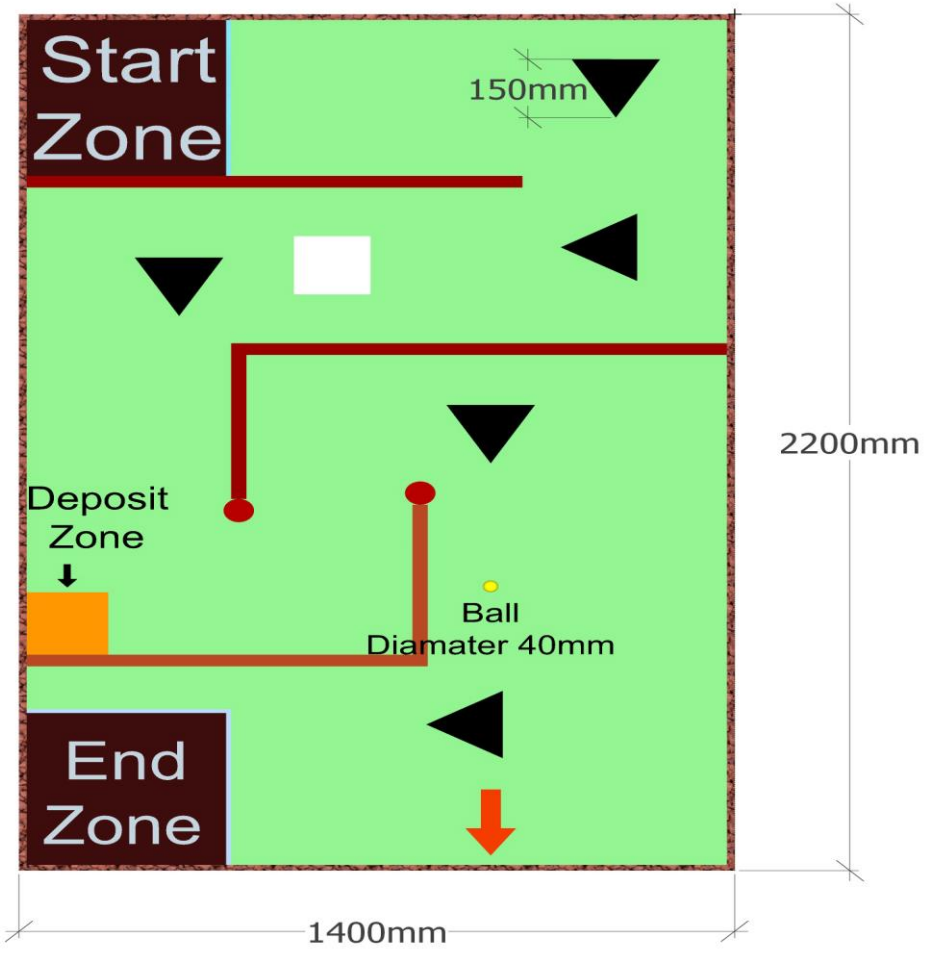

Figure 1 : Top View

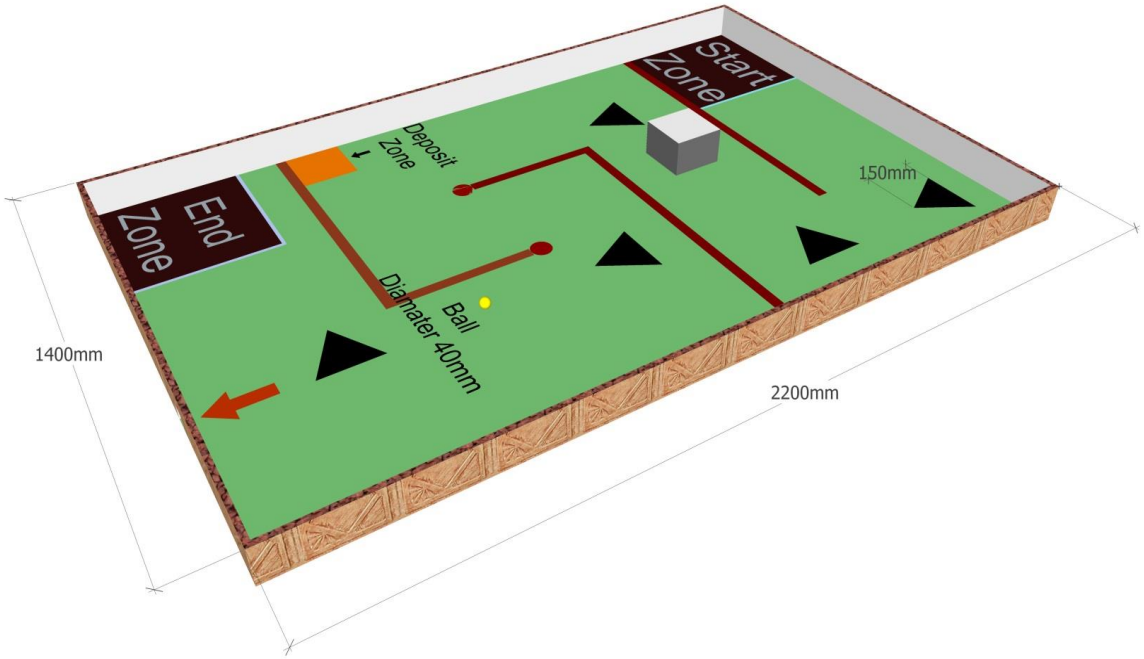

Figure 2 : Isometric View

3. The surface of the arena will be level, flat, hard and green coloured. The RGB values of the colour of arena will be provided in **last week of November.**

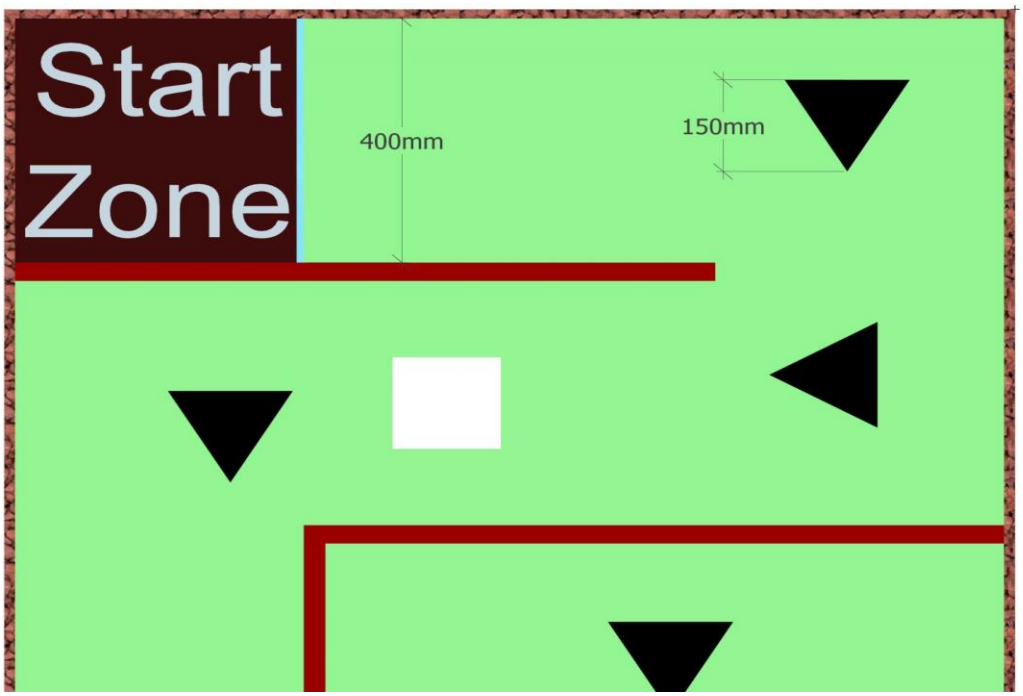

Figure 3 : Start Zone

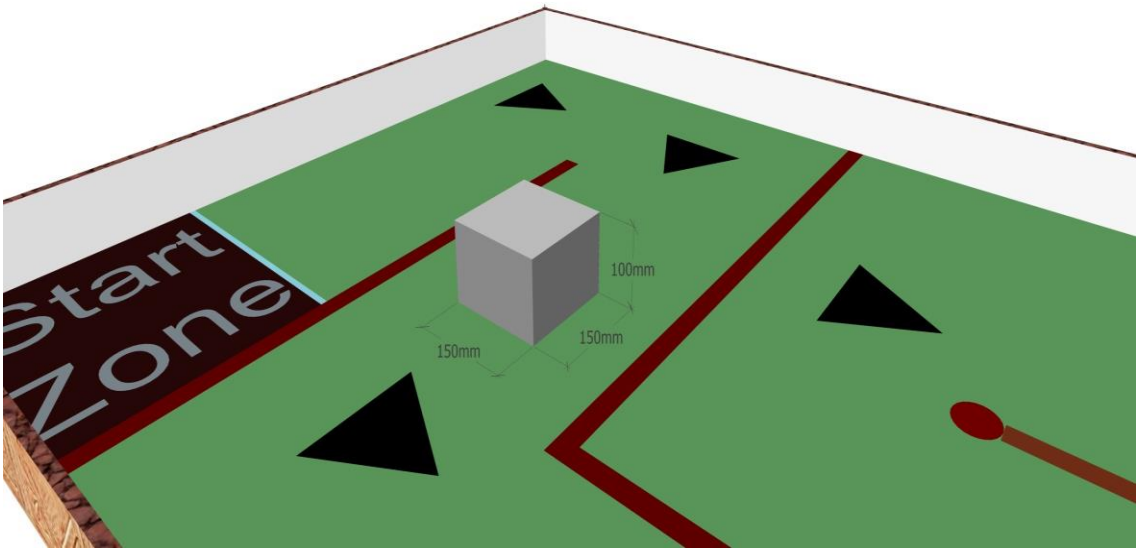

Figure 4 : Block

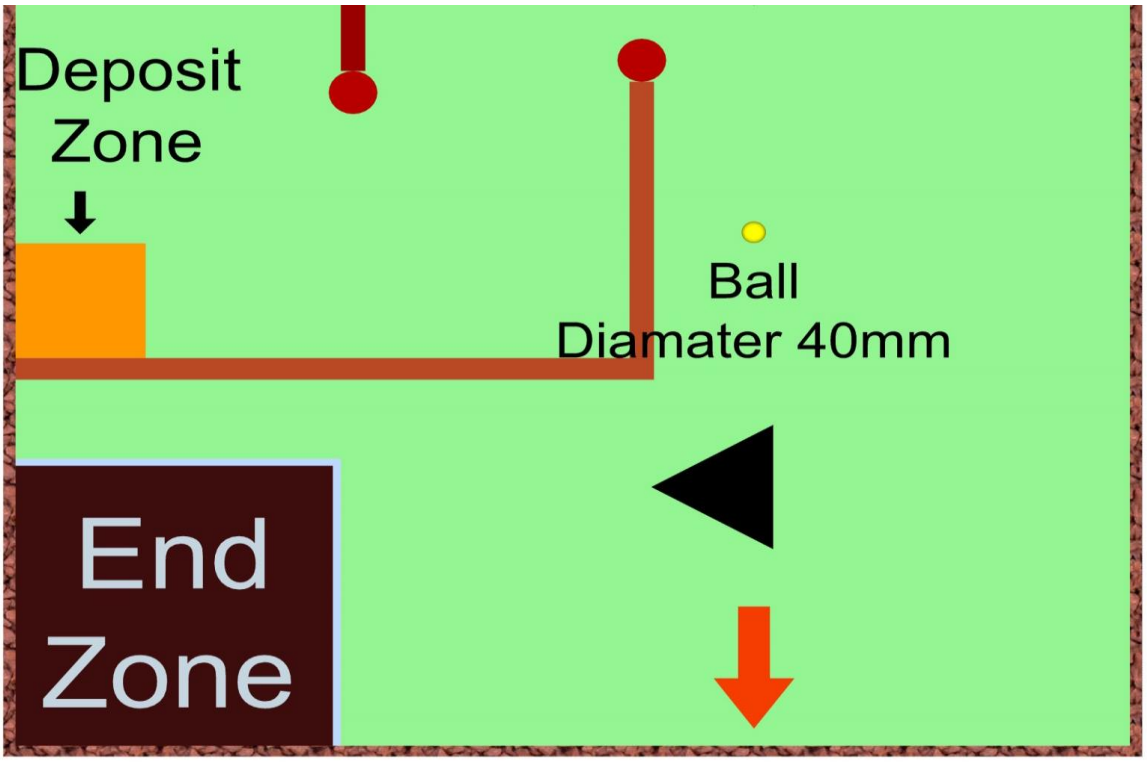

Figure 5 : End zone and Ball and deposit Zone

Specifications:

Shapes:

1. The width of the red rectangular stripes is 30mm. This indicates that the bot should not enter or touch the stripe. Otherwise a penalty of 30 points will be given.
2. The dimensions of the block is 150mm X 150mm X 100mm (l X b X h). It indicates that the bot has to pick up the block and deposit it in the deposit zone.
3. The dimension of the orange deposit zone 200mm X 200mm. It indicates that the bot has to deposit the block in that zone.
4. The black triangles are equilateral in nature with the perpendicular height equal to 150mm. The bot should turn in the direction in which the triangle points.
5. The red circle is of diameter 80mm. This indicates that the bot should not enter or touch the circle. Otherwise a penalty of 30 points will be given.
6. The dimension of the yellow ball is 40 mm. It indicates that the bot has to push the ball in such a way that the ball goes through the orange arrow.
7. The dimensions of the 'arrow' sign are as shown in figure 5. It indicates that the ball should go through that arrow.

NOTE

1. **The mark will be said to be correctly identified only if the bot takes a move as indicated by the mark.**
2. **The colour of the arena and of the shapes are subject to change. However any changes made would be specified in bold on the site and also mailed to the registered participants. So you are advised to visit the site regularly for such changes.**
3. **Teams are advised to come prepared for the competition to calibrate their bot according to the lightning condition at the venue. Every effort will be made by the organizers in a way that the effect of external infrared light is as low as possible.)**

Camera Specifications:

1. The camera to be used would be C270h model of Logitech
2. You can find the specifications of the camera here: http://www.logitech.com/en-in/product/hd-webcam-c270h

Overall System:

1. There would be one overhead camera placed perpendicular to the center of the arena that will be provided by the organizers. Teams are not allowed to use any onboard camera.
2. Participants should bring their own laptops or computers for the competition.

Bot Specifications:

1. Each team is allowed to have only one bot.
2. The bot must fit into a cube of 240mm x 240mm x 240mm (lxbxh) at all times.
3. The maximum potential difference between any two points on the bot should not exceed 24 volts. The power supply may or may not be on-board.

4. The bot must be fully independent, with self-contained powering and motoring mechanisms. However, it can communicate only with the computer using wired/wireless data transfer.
5. The robotic equipment is to be fully autonomous. Participants are not permitted to enter any information into the equipment during a run. The human operator should not directly control the motion of their bot with a joystick or by keyboard commands under any circumstances.
6. It will be the participant's responsibility if there is any data misinterpretation of image of the arena taken by the overhead camera due to obstruction by the body of the bot.
7. The bot cannot be constructed using readymade Lego kits or any readymade mechanism. But you can make use of readymade gear assemblies and readymade wireless modules if required. Violating this clause will lead to the disqualification of the machine.
8. All the bots have to work on the principle of image processing. Any sort of ambiguity will lead to immediate disqualification. In case of doubt please confirm with the organizers about the validity of your procedure beforehand, via email. The bot can touch the boundary of the arena freely for any kind of feedback.

(Note - Teams should avoid using any kind of shiny material for the surfaces of the bot. The organisers may exclude robots that do not conform to this clause.)

Gameplay:

Pre-Game Setup:

1. The participants will get 20 minutes of setup time for calibration and testing prior to the competition and according to a schedule that will be made available at the start of the event.
2. In the setup time, participants can boot their computer and have the program ready for execution.
3. Only one member will be allowed near the arena and another near the laptop.

Game Procedure:

1. The bot has to start from the START zone.
2. The image of the entire arena will be taken by the overhead camera.
3. This image has to be processed by the code to identify the correct path that exactly leads it to the END zone and the bot must exactly traverse along the same path.
4. While travelling through this track the bot must correctly perform all the actions and do the tasks that each of the marks indicates. The bot will be allotted points according to the marks that it correctly identifies.
5. The maximum time allotted for each run will be 6 minutes.

Game Rules:

1. While starting, the bot will be placed in the starting zone marked in figure 1.
2. The game will start, as soon as the organizer calls for it.
3. Every mark is a checkpoint. Every time the bot takes a move that does not match with the indication of the mark it crosses, the bot can either start from the previously crossed checkpoint or take a reset.
4. It has to carry the block to the deposit zone and push the ball through the orange arrow.
5. Avoiding the rectangular stripes and moving with the indications of the marks the bot has to finally reach the end zone.
6. There is no limitation on the number of resets and will be given whenever the participant calls for it. During the reset, the bot will be placed back in the START zone. However, during a reset, the timer will not be stopped.
7. The bot can take feedback from the overhead camera at any point of time during the game.

***Note**:*

1. **The actual colours on the arena may be slightly different from the ones specified, due to ambient light and texture of materials. If possible, time slots prior to the day of competition, may be given to the participants to calibrate their machines to the available light conditions in the arena subject to availability of the venue.**
2. **Whenever the participant takes a reset, it looses all the points it has scored during its previous run and has to start afresh.**

General Rules:

1. If a bot damages the arena in any way the team will be disqualified from the competition.
2. Organizers will not be responsible for any minor scratches left by the previous machines on the arena.
3. Any team that is not ready at the specified time will be disqualified from the competition.
4. The machines would be checked for their safety before the run and would be discarded if found unsafe for other participants and spectators.
5. Participants should not dismantle their robots before the completion of the whole competition as the machines might need to be verified by the organizers at a later stage to ensure that the participants have not violated any of the rules.
6. Organizers' decision shall be treated as final and binding on all.
7. The organizers reserve the right to change any or all of the above rules as they deem fit. Change in rules, if any, will be highlighted on the website and notified to the registered participants.

Scoring:

1. 20 points will be awarded each time the bot correctly identifies the triangles.
2. 50 points will be awarded for depositing the block in the deposit zone.
3. 40 points will be awarded if the ball correctly goes through the arrow.
4. Let 'T' be the total time in seconds that the bot takes to complete the run. This point will be considered only if the bot completes the run within 360 seconds. Benefit of time will not be given to the teams that quit the game before the end of maximum time. Total score due to time = (360-T)

Tie:

In case of tie the participants will be given a second run with slight modification in the arena at the end of the competition. The entire method of scoring will be the same for the second run also.

Team Specification:

A team may consist of a maximum of 4 members. Students from different educational institute can form a team.

Eligibility:

All students with a valid identity card of their respective educational institutes are eligible to participate.

Certificate Policy:

1. Certificate of excellence will be awarded to the top 3 winners.
2. Certificate of participation will be awarded to the teams that earn at least 60 points.
3. Disqualified teams will not be considered for any certificates.