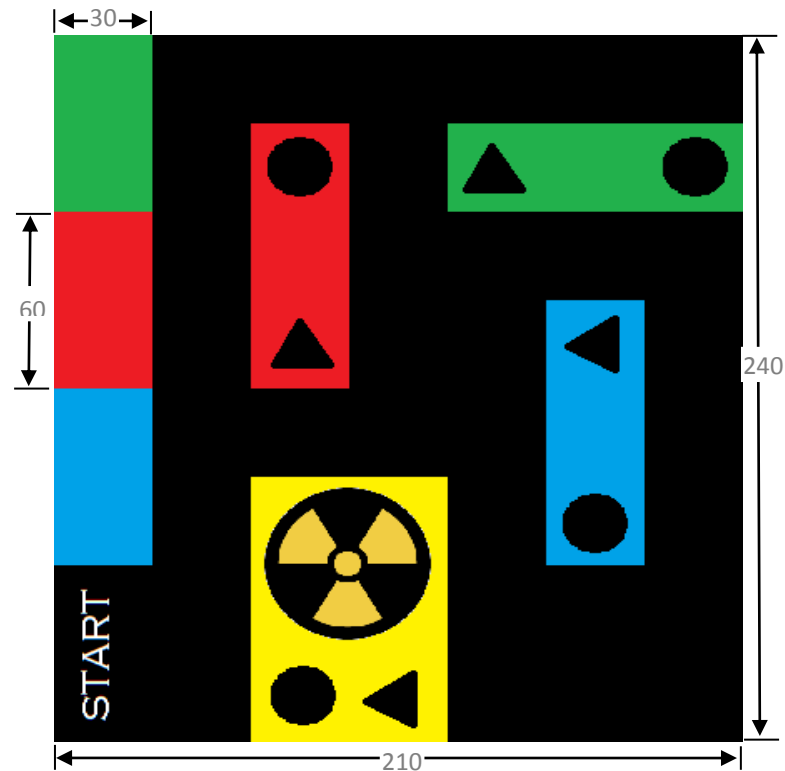


PIXELATE

Task: Construct an autonomous robot that uses feed from an overhead camera and apply image processing techniques to accomplish various tasks on a factory floor.

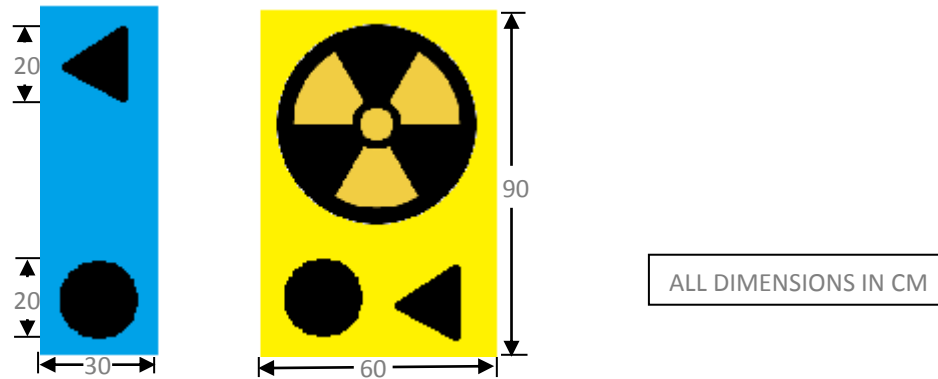
The bot has to traverse to various devices to power them on and off and monitor a device state by tracking the rotating disc placed on the device.

Arena:

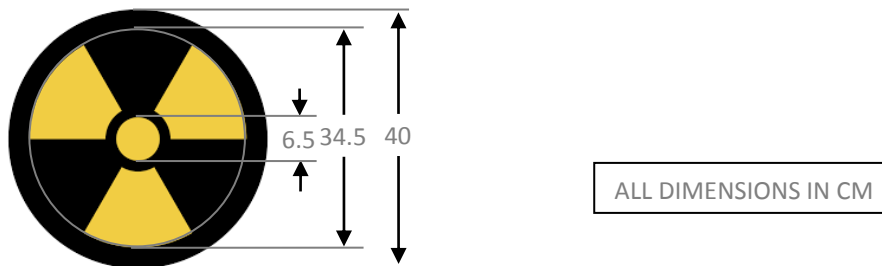


ALL DIMENSIONS IN CM

- The arena represents a facility in which there are nuclear devices of two type –



- The dimension of the arena will be 240x210 cm.
- The equilateral triangle and circle inside the device indicates the ON and OFF switch of the device respectively.
- The yellow device consists of a disc which starts rotating when the device is switched ON and stops when the device goes critical.



- The three different solid colour strips at left side of arena indicates the order in which robot has to switch on the devices and then switch them off.

Gameplay:

Qualifying round:

- The bot has to traverse from the 'start' point to any one of the device switching it on and then off along any path using the feed from an overhead camera.

Final round:

- The bot is required to correctly identify all the devices and their start and stop switches and carry out the tasks as given in game play.
- The rotating disc placed on yellow device has to be monitored and the device has to be started again whenever it stops.

Game procedure:

- The robot has to start from the START position (common to all participants) and has to first switch on the yellow device.
- As soon as the yellow device is switched on, the disc in the device will start rotating.
- To switch on and off any device robot has to go on top of the ON switch and OFF switch of that device respectively.

- The robot has to go to the ON switch from the base of the triangle closet to the edge of the device.
- The robot can go to the OFF switch from any direction.
- Then the robot has to detect the order in which the devices have to be started from the 3 solid strips on the edge of the arena. The colour of the topmost strip indicates the colour of the device to be switched on first followed by second and third in the column.
- Now the robot has to go and switch on all the devices in the order identified and then turn them off in the same order.
- During the game play, yellow device may go critical and the disc will stop rotating.
- The robot has to identify the failure and then immediately has to start the device again and then continue the task from where it was left.
- After switching off all the devices the reactor must be turned OFF.
- The robot must have on it three LEDs of three different colours (red, green and yellow).
- The robot has to glow the green LED for 3 sec after turning on any device and red LED for 3 sec after turning off any device.
- The robot has to glow the yellow LED for 5 sec on detecting the failure of the reactor.
- The robot has to travel along the black path only.

Rules:

Eligibility:

All undergraduate students with a valid identity card of their respective educational institutions are eligible to participate in the event.

Team specification:

A team may consist of maximum of 5 members. Members of one team can be from different educational institutions.

Robot specifications and fabrication:

- The robot should fit within a box of 20cm x20cmx20cm.
- The weight of the robot should be less than 2.5 kg.
- The Potential difference between any two points on the robot must not exceed 24 V DC.
- Teams are allowed to use readymade microcontroller circuits and gear assemblies. Use of Lego Kits is prohibited.

Camera Specifications:

- The camera will be C270h model of Logitech. You can find the specifications of the camera here:
<http://www.logitech.com/en-in/product/hd-webcam-c270h>

Rules for the event:

- The bot should work purely on image processing based principles.
- Appropriate time would be given to the participants for calibration.
- Each team will be given 15 minutes for calibration and 10 minutes for the final run (this does not include the time for qualifying round).
- Only two participants are allowed near the arena at all times.
- The participants must bring their own laptops, adapters and batteries.
- The participants are not allowed to control the bot manually.
- The computer program should detect the positions of various devices and state of rotating disc on its own. The participants are not allowed to hard code their positions.
- The bot should be started by a single click or single command issued by the participant.
- A maximum of 5 restarts are allowed. During a restart the participants are not allowed to make any changes to the code however they can change the calibration. During a restart the timer will not be stopped. Restart shall be done from the same point.
- The final codes must be submitted to the event coordinator.
- The arena would be setup in ambient lighting conditions. A sample pic of the arena would be made available prior to the event.

- 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.

Note: The actual colours on the arena may be slightly different from the ones specified, due to ambient light and texture of materials.

General rules:

- Each team can have a maximum of 5 participants.
- Each member should carry a valid Student ID Card.
- Team should report at the arena 30min before the start of the event.
- The robot should, in no way, cause any damage to the arena. Any kind of damage will lead to immediate disqualification.
- Participants should not dismantle their robots before the completion of the whole competition as the devices might need to be verified by the organizers at a later stage to ensure that the participants have not violated any of the rules.
- The organizers reserve the right to change the rules as they deem fit. Change in rules, if any, will be highlighted on the website and notified to the registered participants.
- The decision of the organizers shall be final and binding.

Scoring:

- If the correct ON / OFF switch is pressed, team will be given +20 points.
- If the ON switch was not pressed from base of the triangle, team will be given -5 points.
- -10 points for breaking the correct order of pressing the switches each time. But after pressing a wrong switch (ON/OFF), the bot can continue on the correct sequence.
- +5 points will be given for glowing Red and Green LED at correct positions.
- +20 points for glowing Yellow LED at correct time i.e. when the disc stops rotating.
- +30 points for restarting the nuclear reactor again after it goes critical.
- -10 points if the bot goes over any non-black region.
- In case of a score tie, the team which completed the task in the least amount of time will be declared the winner.
- Organisers reserve the right to change the scoring system prior to the start of the competition.

Certification policy:

- The top 3 teams will be awarded a Certificate of Excellence.
- All teams qualifying the 1st round will be awarded a Certificate of Participation.
- Disqualified teams will not be considered for any certificates.