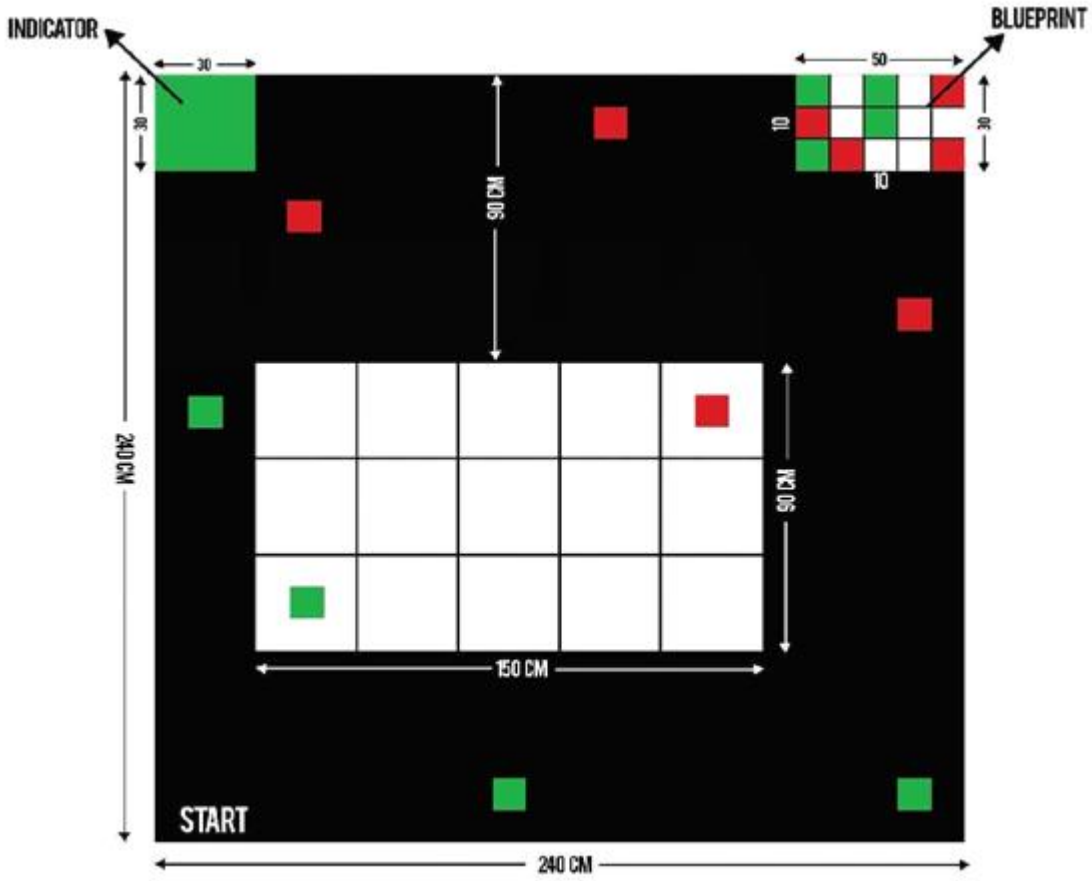
PIXELATE

Task:

Construct an autonomous robot that uses feed from an overhead camera and apply image processing techniques to accomplish various tasks at a construction site.

The bot has to process the pattern from the given blueprint and place the bricks accordingly at the construction site. The color of the brick which is to be placed would be specified by an indicator at a corner.

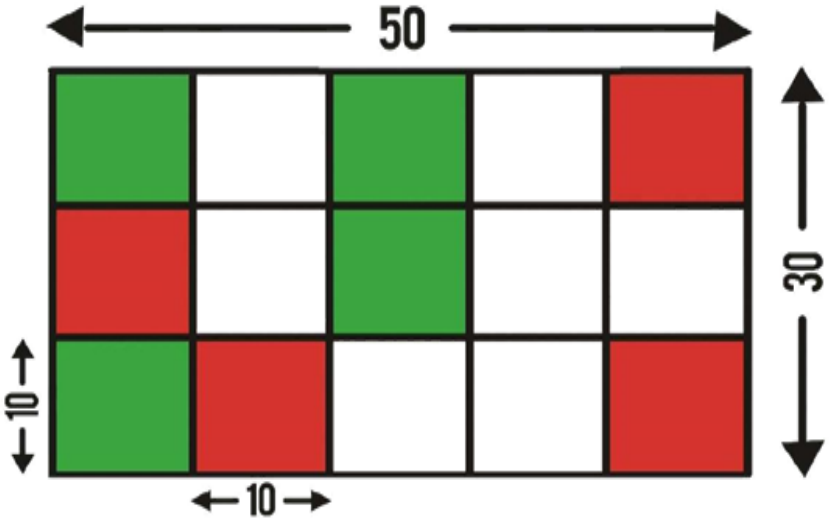
Arena:



All the following dimensions are in cms.

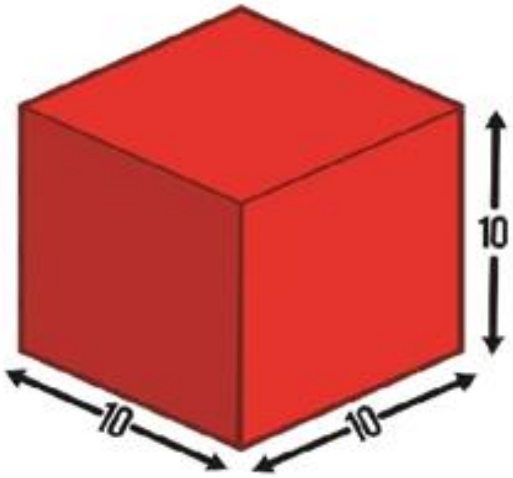
The dimension of the arena will be 240 x 240 .

The arena consist of a 3x5 grid Blueprint and 3x5 grid Construction site (Center Grid).



BLUEPRINT

The arena has two types of bricks i.e. red and green ones.



Gameplay:

Qualifying round:

The bot has to glow the LED corresponding to the color of the indicator (RED or GREEN) and grab the corresponding brick using the feed from an overhead camera.

Final round:

The bot is required to correctly identify all the bricks and their initial position (as on Arena) and final specified positions (shown in blueprint) and carry out the tasks as given in the game procedure.

Game procedure:

- The robot should proceed from the START position (common to all participants) and has to first identify the color on the indicator and position of bricks as shown in blueprint.
- As soon as a particular color is shown in the indicator the bot has to place the bricks of that particular color at the specified position on the construction site(as shown in blueprint).
- As soon as indicator changes its color, the bot has to stop the current task and has to glow a corresponding color LED (RED or GREEN) for 3 seconds and start placing new indicated bricks in the grid according to the Blueprint.
- In case the bot has placed all the bricks of a particular color to its specified position and still the color of the indicator has not changed, then the bot has to stop and glow the BLUE LED, till the color of the indicator changes.

• Traversal of the bot on the Blueprint and the Indicator region is strictly prohibited.

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 a team can be from different educational institutions

Robot specifications and fabrication:

• The robot should fit within a box of 25 cm X 25 cm x 25 cm.
The weight of the robot should be less than 2.5 kg. The robot should be capable of moving a 10 cm^3 cubic brick (made of Thermocol).

• 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 a 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.
- Each team will be given 15 minutes for calibration and 15 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 computer program should detect the positions of various bricks and place them in the construction area in the same manner as given in the blueprint.
- The bot should be started by a single click or single command issued by 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 colors 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 30 minute before the beginning of the event
- The robot should, in no way, cause any damage to the arena. Any kind of damage will lead to immediate disqualification.
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- 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 wherever it seems necessary. Change in rules, if any, will be highlighted on the website and notified to the registered participants.

The decision of the organizers will be final and binding.

Scoring:

- If the bot glows the correct LED (red or green), 5 points will be awarded to the team.
- If the bot grabs the brick of the same color as shown by the indicator, *5 points* will be awarded to the team. If the bot places the brick at a position shown by the blueprint, *10 points* will be awarded to the team

- If the bot grabs the wrong brick, *5 points* will be deducted from the score.
- If the bot places the brick at wrong position, *5 points* will be deducted from the score.
- If the bot completes placing of all the bricks of a particular color into the construction site and third (blue) LED on the bot glow till the indicator indicates a different color, *+15 points* will be awarded to the team
- In case of a score tie, the team which completed the task in the least amount of time will be declared Winner. Organizers reserve the right to change the scoring system prior to the start of the competition.

Certification policy:

- The top three teams will be awarded a certificate of excellence.
- All teams qualifying the first round will be awarded a certificate of participation.
- Disqualified teams will not be considered for any certificates.