

Robo-Royale

Theme - Reaching the heights

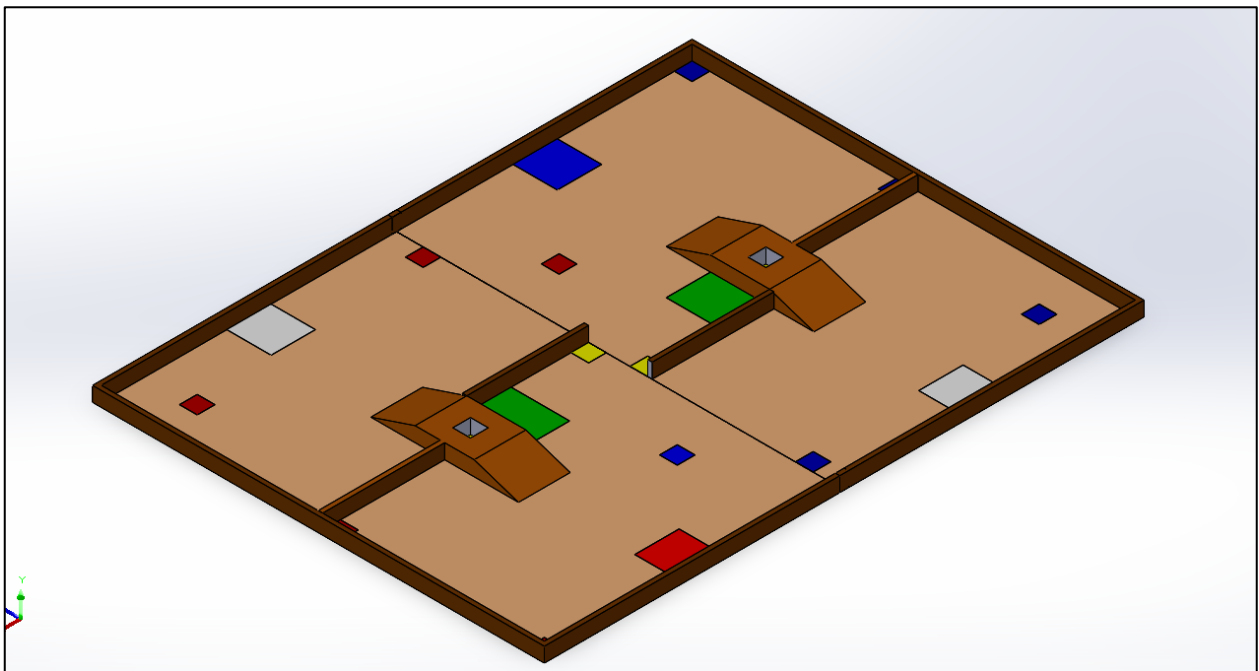
Abstract-

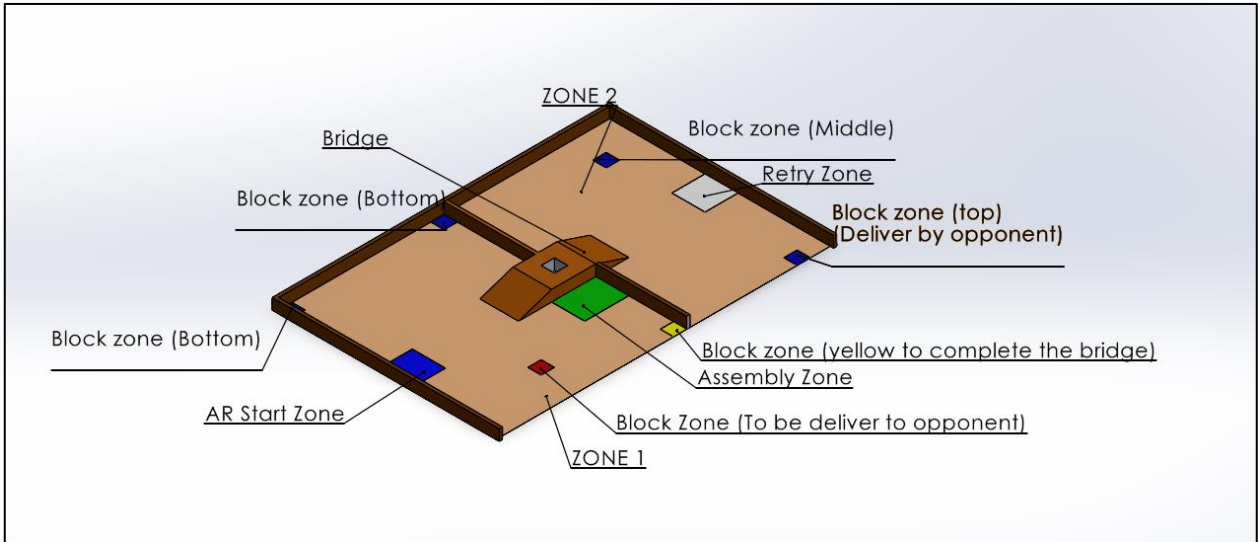
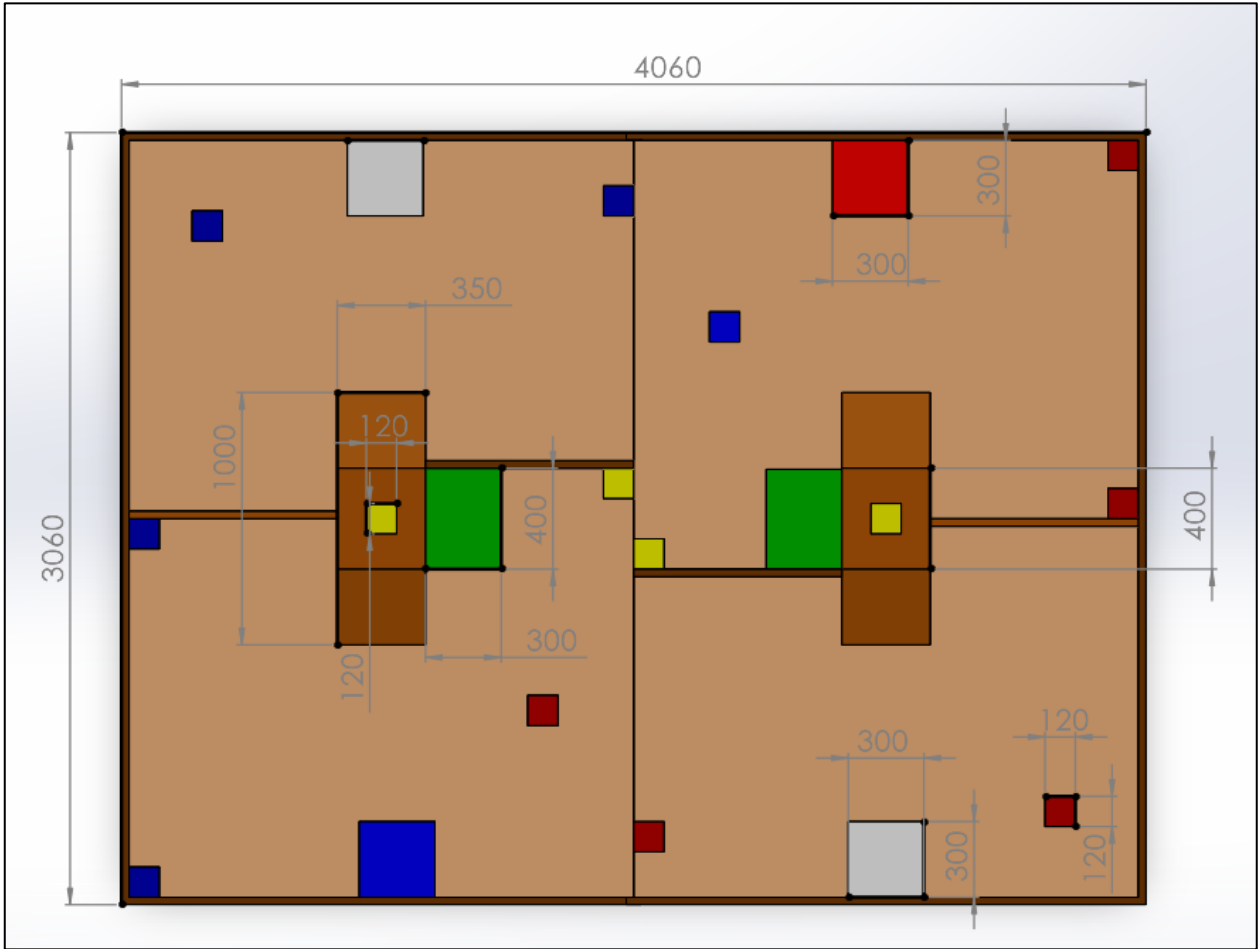
In the determination of reaching new heights, many countries are trying to develop their own Rocket technology. Our former-president and world-renowned scientist, late Dr. A.P.J. Kalam, has made a huge contribution to rocket science.

Dr. Kalam was the project director of India's first ever rocket, named "Satellite Launch Vehicle-III", which was successful in its very first attempt.

By exchanging information and expertise among themselves and learning from one another, scientists from other nations contribute to the advancement of technology.

So, in honor of Dr. A.P.J. Kalam Sir and in gratitude to the scientific community, we are going to build our own rocket and launch it into space.





TERMS AND CONDITIONS:

Assembly bot (AR): A Manual Robot can be controlled by a wired or wireless remote control.

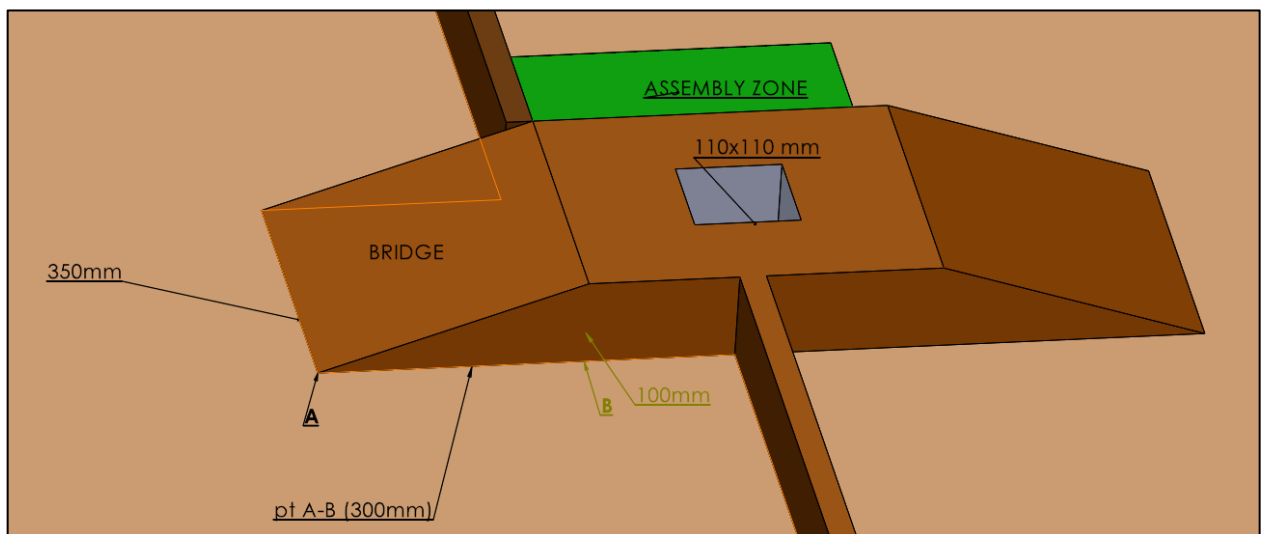
Start Zone: Square of side 300*300mm in Zone 1.

Retry Zone: Square of side 300*300 mm in Zone 2. (White color area)

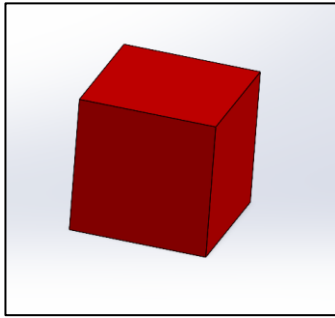
Block Zone- The zone of the respective color is where blocks are kept. The dimension of the block is 120*120 mm.

Assembly Zone- The zone where the rocket is to be assembled is the assembly zone, and its dimensions are 400 x 300 mm. (The green zone in the above images is the assembly zone).

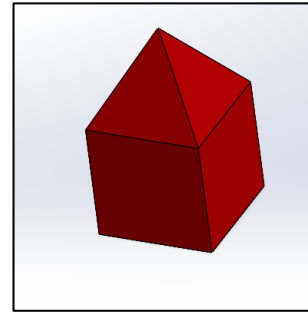
Broken bridge: It is the part of the arena at a height of 100mm and has ramps for going up and down. The bridge has a 100 mm hole, which is to be filled with a block provided of dimensions 100*100* 100 mm.



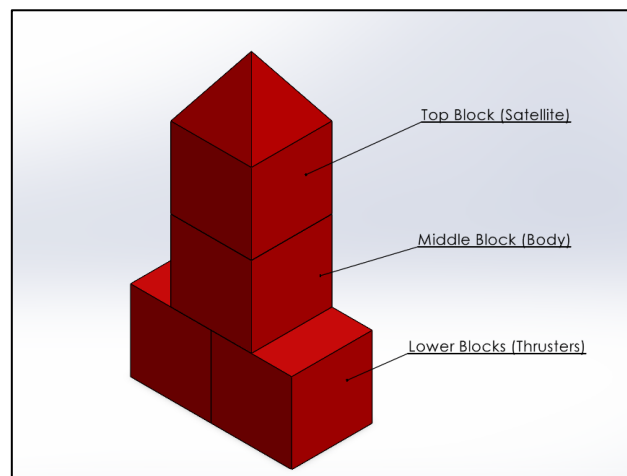
The blocks: The cube which is supposed to be used for filling the hole on the broken bridge and the blocks which are used for the assembly of Rocket are of the size of 100*100*100mm.



Bottom and Middle blocks



Top block



Proper orientation of the arranged blocks

Delivering and sharing knowledge-

The block which is supposed to be kept in the opponent's arena is the "knowledge block," and the opponent for the respective team will deliver that block to them. So, this completes the "Delivering and sharing of Knowledge."

“LIFT-OFF”: When all the red/blue blocks are arranged in the specific order and orientation (shape of rocket), it's a victory and is being called "lift-off."

Assembly zone- The zone where the blocks are to be assembled in proper order and orientation.

Tasks-

The assembly bot (AR) must start from SZ.

AR bot should proceed to pick the block (**one at a time**).

Task 1 (Sharing knowledge)

One team will pick up and deliver an opponent team's colored block to opponent team, which the opponent will use to complete the assembly of their rocket. This task has a time restriction.

Task 2 (Completing the information bridge)

The team has to take the yellow block and fill it on the bridge to complete the task.

Task 3 (Building a rocket)

The respective team bot has to pick the blocks assigned to them and assemble them in the proper order in a rocket to win the LIFT OFF.

Flow of Game-

The AR bot first moves to pick the opposite team's colored block and places it in the opponent's arena in a defined colored zone. (Delivery and sharing of knowledge)

For instance, the Red team AR bot should move from the start zone and pick the Blue block and place it in the opponent's area in the blue zone and vice versa.

The time limit to keep the block successfully is 1 minute. If a team fails to deliver the block to the other team in 1 minute, the task for that team is failed and no points will be awarded. So, the team has to skip task 1 and start with task 2, and the referee will provide that block to the other team.

Once the opponent block is delivered, the AR bot can move to pick up the blocks (other than yellow) in Zone 1 and pick them up and travel to the assembly zone to place and pile them.

Once the 2 blocks (other than yellow) from zone 1 are placed, Then the AR bot can pick up the yellow block and put it in the gap in the broken bridge. So as soon as

the bridge gets completed, the AR bot is allowed to go to zone 2. The points for the deposition of the block will only be awarded when the robot goes "over" the block while crossing the hole and not for jumping the gap after deposition.

In Zone 2, the AR can pick the middle block part and move over the bridge to Zone 1 and pile the middle block (above the lower 2 blocks).

Then AR has to go back again to zone 2 where it picks the last top block (which is to be given by the opponent) and piles it in the proper orientation on the rocket.

Once the blocks are arranged in the proper orientation as a rocket, As a rocket is assembled and ready to launch, It's a "**Lift-Off.**"

SCORING:

AR:

TASK	POINTS
Delivery and sharing of Knowledge	20
Lower Block (Thrusters)	30
Middle Block (Body)	40
Top block (satellite)	50

Score: $20 + (30 \times 2) + (40) + (50) = 170$

MISCELLANEOUS:

- Points will be awarded only if the block is placed correctly, i.e., it has proper orientation and is not in contact with any part of the robot.
- If the blocks are not arranged in the proper orientation, no points will be provided for the blocks that are placed improperly.
- Blocks piled/placed after the allotted time limit will not be given any
- Points will be awarded with a clear indication from judges.

Match Result:

- The team completing all the above tasks first will be declared the winner of the
- If both teams fail to complete the above tasks in 5 minutes, then the match result will be decided on the basis of points scored by the
- In such cases, the team with the most points will be declared the match winner.
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In the event of a tie,

The team that completes lift-off first

The team that delivers and shares knowledge

team that completes the bridge.

Violations:

- At any time, if the wire is seen to be pulling the robot, it will be considered as
- Any part of the robot extending out of the arena will lead to a violation.
- Hand touch without prior permission by the referee will cause a violation.
- AR running in the opponent's area will be considered a violation.

Every violation will cost the team -5 points. Five points will be deducted for every violation.

Retry Rules:

- For both robots, an unlimited number of retries will be allowed.
- The operators will first have to ask the judges for a hand-touch/retry and will take the hand-touch/retry only when allowed. The AR can restart from the start zone in Zone 1 and retry zone in Zone 2 after the hand touch.
- The orientation of the robot after the hand-touch will be decided by the judges.
- The timer will continue to run in this period and the other team will continue.

General Rules:

- If the machine is stuck or rendered immobile and cannot proceed further on its own, then hand touch will be allowed only when both the manual operators want to use hand touch.
- The order of block picking and placing must be followed.
- At each hand touch, all the blocks in touch with the robot of that team (except for the ones already deposited) will be returned to their original positions.
- Blocks will be placed in their original position after retrying if they were wrongly placed.

- A maximum of five violations are allowed; any violations after that would lead to disqualification.
- Any team that is not ready at the specified time will be disqualified from the competition.
- The robot will be checked for its safety before the match and will be discarded if found unsafe for other participants, spectators, or the arena.
- The name of your robot must be prominently displayed on the robot.
- Operators can't step onto the arena unless permitted by the judges.
- The AR operator has to operate from outside the arena.
- The judge's decision shall be treated as final and binding to all.
- The organisers reserve the right to change any or all of the above rules as they deem fit.
- Ready-made Robots are not allowed, but ready-made sensor kits are allowed.

Safety Rules:

- It is not permitted to use fire, water, or spray chemicals. This would lead to immediate disqualification of the team.
- Jamming of RF control signals is NOT allowed. Teams MUST inform the judges about the RF signals involved in their robot during the robot's registration and before the start of the competition.
- No deliberate damage must be done to the arena. The mechanism to carry objects should NOT damage them or any part of the arena. Any damage caused after prior warning has been given will lead to disqualification.
- The decision of the Mind Spark team will be considered final in the case of any dispute.

Miscellaneous:

- The total game field is 4060x3100 mm.
- The game field is surrounded by walls that are 30 mm thick and 100 mm thick.
- The arena is symmetrically divided into two ideal parts for both the red and blue teams. In each part, AR Zone 1, Zone 2, start zone, retry zone, block zones, ramp.
- All objects and arena parts will be coated with vinyl sheets in their respective colors.
- The thickness of all the walls is subject to change without any prior notice.
- The color shades of the arena and the objects are subject to variation within acceptable limits.

- The dimensions of static objects in the arena may change subject to manufacturing difficulties.
- 5% bidirectional tolerance is applicable to all the static objects in the arena.
- Any changes in the arena will be communicated to participants and highlighted on the website.

Machine Specifications:

Only one AR bot is allowed. The Robot can't separate into two connected by just a wire.

- The combined weight of the AR (including batteries and pneumatic reservoirs) should NOT exceed 8 kg.
- The AR should fit in a box measuring 300x300x400 mm. It should fit in the AR Start zone at the beginning of the
- The dimensions of the robot may change during the course of the game.
- The AR can use an on-board power supply.
- The cost of any damage done will have to be borne by the participants. The voltage at any point on any of the robots should not exceed 24V DC. Participants can also bring their own power supply. In this case, the maximum current and voltage limits are 5 amperes and 24 volts. The voltage and current should not exceed this limit.
- The pressure of the pressurised non-inflammable gases in the pneumatic reservoir should not exceed 5 bars at any stage of the
- The storage tank and pressure regulators used by teams need to be certified, and teams using pneumatics are required to produce the safety and security letters at the Registration Desk at the venue. Failing to do so will lead to direct
- Participants must be able to indicate the used pressure with an integrated or temporarily fitted pressure gauge. Also, there should be provision to check the cylinder pressure on the
- You must have a safe way of refilling the system and determining the on-board
- All pneumatic components on board a robot must be securely mounted. Care must be taken when mounting the pressure vessel and armour to ensure that it does not escape if ruptured.
- The control for the machines can be wired or wireless. In a particular match, there can be only one manual operator for the MR and one autonomous operator for the AR. In the case of wireless controls, the participants are requested to use dual channel remotes so that there are no issues of interference during the control. The remote control and wires will not be included in the machine size.

- The minimum length of wire extending from the robot up to the remote should be 4 The wire should always be in slashed condition.

Competition Structure:

Elimination Round:

- Each team will be given a total time of 5 minutes. They have to complete the task and score the maximum points during this round.
- Teams will be ranked according to the following preferences:
 1. Task
 2. cores in the extraction
- The top 8 teams will qualify for the next round.
- The score of the team from the elimination round will not be considered in the next round.

Knock-Out Round:

The knock-out round will start with the top 8 teams. Each match will last a maximum of 5 minutes.

- A team, once registered, cannot register again, even with a different
- A team may consist of a maximum of 5 members.
- All students with a valid identity card from their respective educational institutes are eligible to participate.
- Teams will be required to show the I-Cards of all of their team members during the matches.
- A team may consist of members from different educational institutes.

TEAM AND FEE STRUCTURE:

Team size : Max 5 participants per team.
Registration Fee :