



Be An Avenger

"A true champion is not born; he is forged in the fires of intense competition."

Problem Statement:

Design a manual robot having a strong gripping hand mechanism to compete in an epic one-on-one battle with your opponent team. This is a true test of your robot-making as well as motor skills to be crowned the champion of the arena!

Game Play:

Thanos may have wiped out half of the universe with his 'Decimation' snap but this Aarohan, Robocell CCA gives you a chance to complete your own Infinity Gauntlet. Overcome hurdles and collect the precious Infinity Stones before your opponent team to win this exciting contest and 'Be An Avenger'.

- Two teams A and B have to start **simultaneously** at the point marked "START" on the arena.
- The teams must collect Infinity Stones in the following order while completing the respective hurdles: Power Stone (Purple), Time Stone (Green), Space Stone (Blue), Reality Stone (Red), Mind Stone (Yellow) and finally the Soul Stone (Orange).
- The teams will receive the Stones after completing each corresponding hurdle. After completion of obstacle, they must use the hand mechanism of their bot to pick up the Stone and place it in the Gauntlet that is placed in the center of the arena. Only after placing a particular Stone can the team proceed to collect the next.





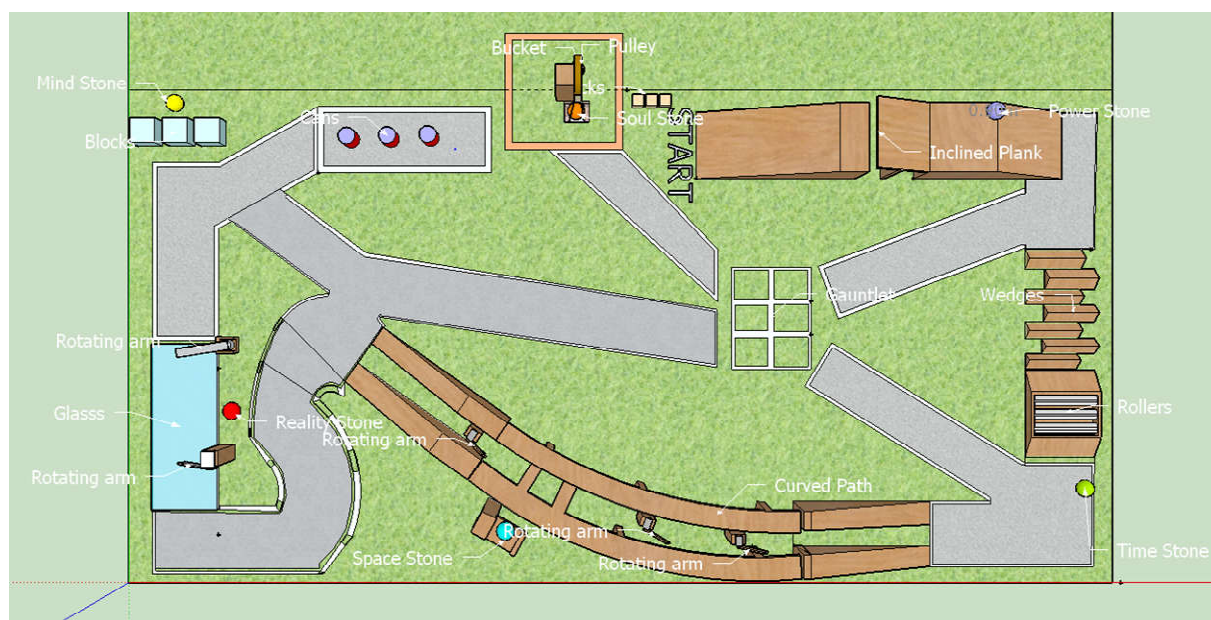
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- The first five Stones will be present in both teams' halves whereas there will be only one Soul Stone in the arena. Whichever team obtains and places the Soul Stone in their Gauntlet first will get bonus points.
- Points will be awarded or deducted on the basis of the robot's performance in the arena. The **"Scoring Scheme"** is given later in this document.
- The winners will be decided on the basis of points scored.

The Arena:



This is one half of the complete arena. The other half is a mirror image. The Soul Stone is common to both halves.

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Description of Main Hurdles:

- The bot starts from the position marked as “**START**”.
- The bot immediately faces an incomplete wooden wedge. The bot must use the hand mechanism to push the supporting pillar so that the raised section falls and the wedge is completed. This hurdle is shown in figure-1.

The bot crosses the wedge and obtains the Power Stone. It lifts the Stone and places it in the Gauntlet.

- Next, the bot must obtain the Time Stone. The manual bot must cross the unevenly placed triangular wedges (max height 2cm) and then the three rollers within a time limit. If successful, the team gets bonus points. However, if the bot fails to complete the hurdle in the stipulated time, it must restart the hurdle. This time, there will be no time limit and, hence, no bonus. The time limit will be decreased as the rounds progress. This hurdle is shown in figure-2.

The Stone is obtained and placed in the Gauntlet.

- Onwards, the bot must face a raised curved path having a slit in the middle. The width of the slit will only be slightly greater than the distance between the wheels of the bot. The controller must drive the bot safely while turning at precise points to collect the Space Stone. There will be a joint in the track for the bot to collect the Stone which will be placed at level with the track. This obstacle can be seen in figure-3.

While coming down from the wedge, a rotating shaft blocks the bot. The Space Stone is fit into the Gauntlet and the bot moves forward.



- Next, the bot goes for the Reality Stone. The bot must be driven at the proper time so that the rotating shafts are avoided and the bot reaches on the slippery glass surface. The bot must rotate on the oiled and soapy surface and get the Reality Stone before exiting the surface via another shaft. This is shown in figure-4.
- Now the bot must obtain the Mind Stone. A simple mathematical puzzle is provided to the team which must be solved to obtain an answer. The block corresponding to the answer must be moved first and brought into proper alignment before the Stone is obtained. The puzzles will be made progressively tougher as the rounds progress. This hurdle is shown in figure-5.
- The final hurdle is for the Soul Stone. The bot must use its hand mechanism to push the cylindrical cans in such a way that they land outside the marked area. Thus, the cans are sacrificed in order to obtain this Stone. Blocks are placed in a small tub using the bot and the Soul Stone rises from the ground. This is the last Stone to be collected. It is shown in figure-6.

Figures of Main Hurdles:

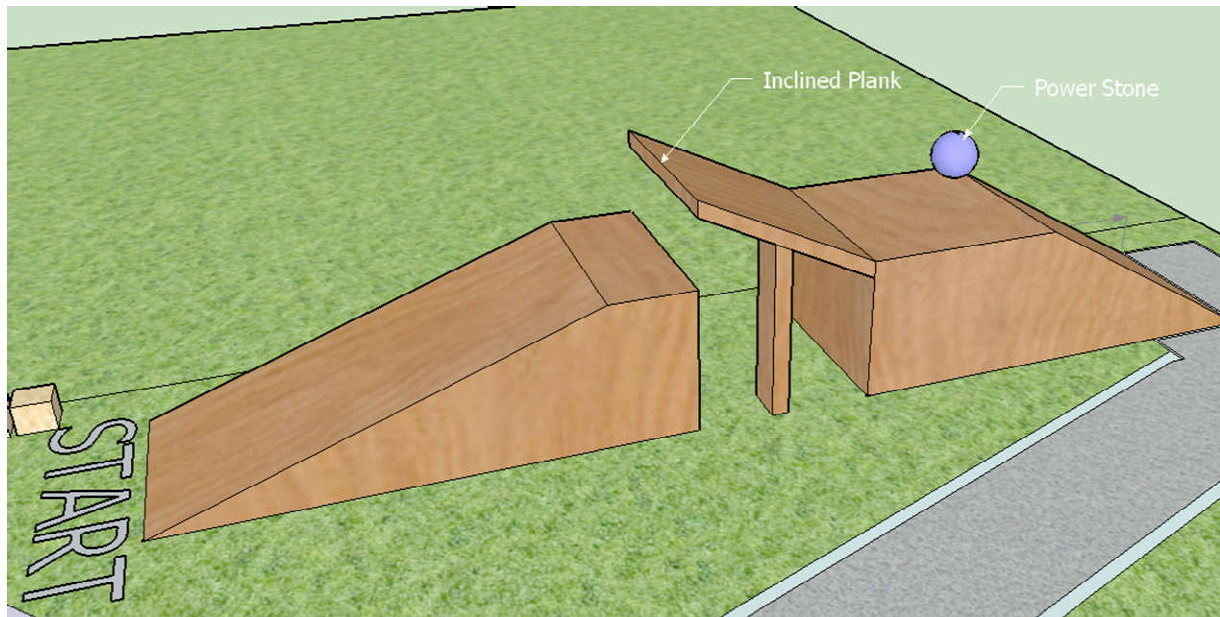


Figure 1: Power Stone

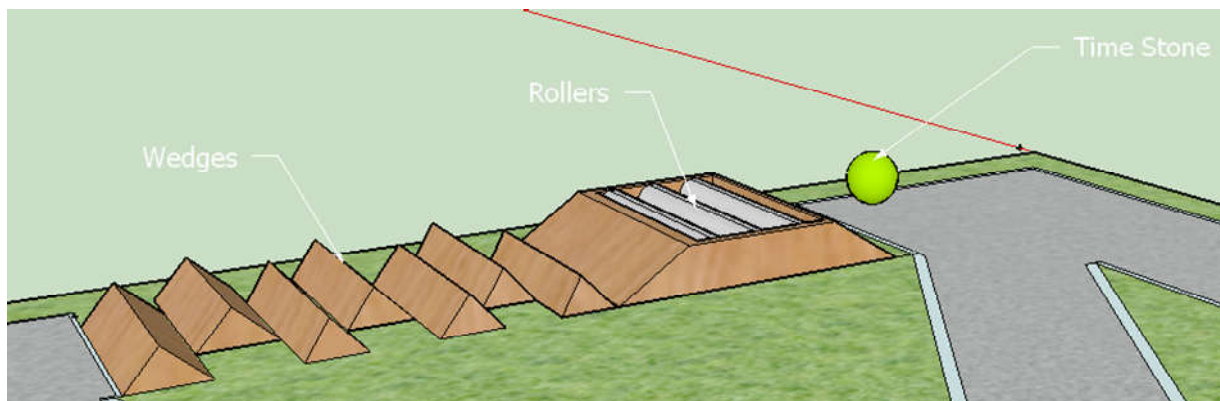


Figure 2: Time Stone

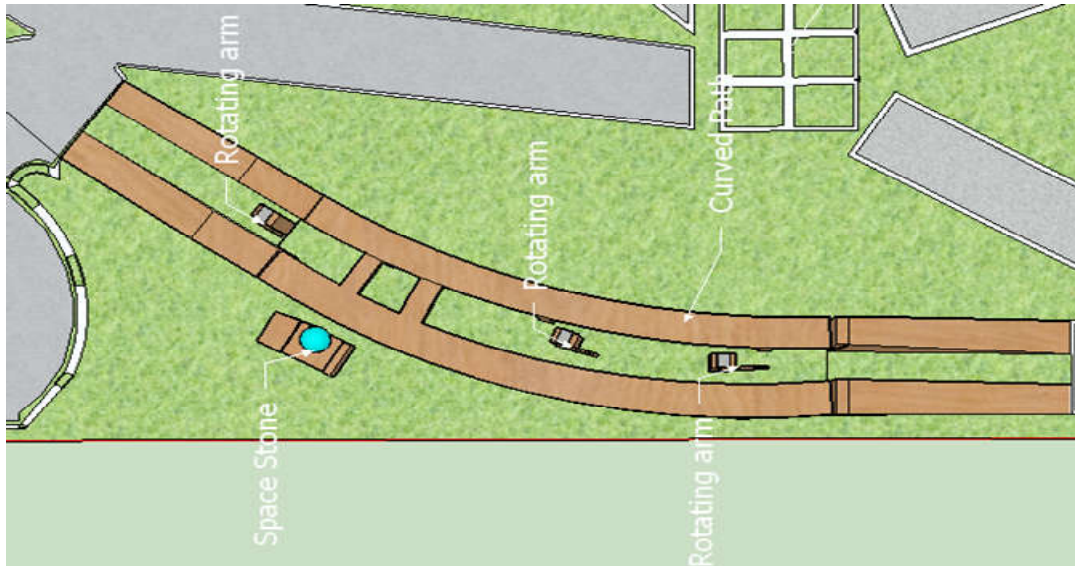


Figure 3: Space Stone

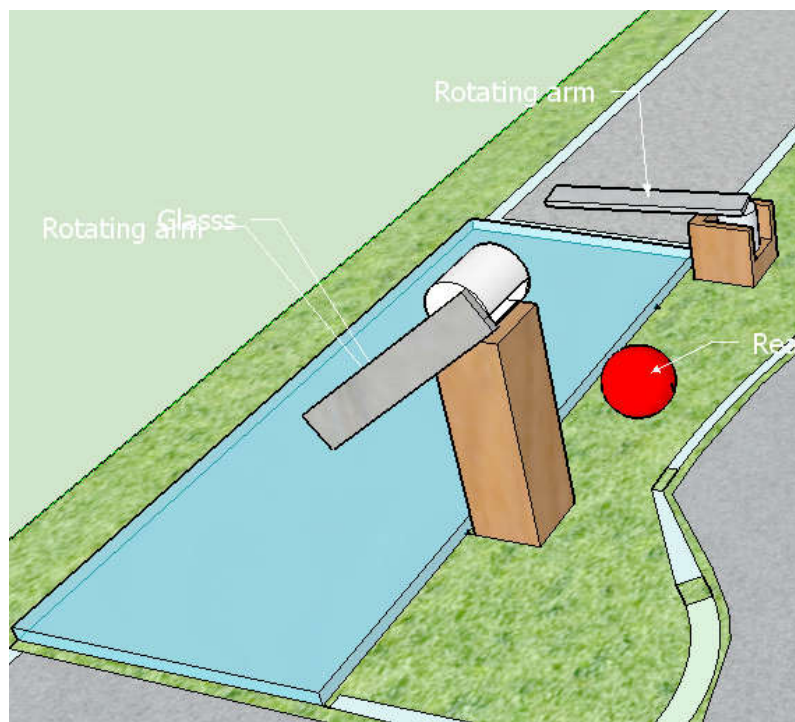


Figure 4: Reality Stone



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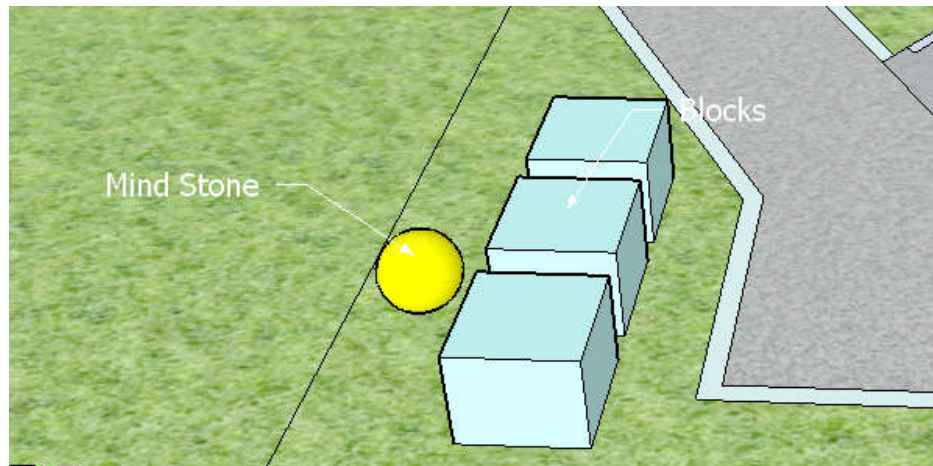


Figure 5: Mind Stone

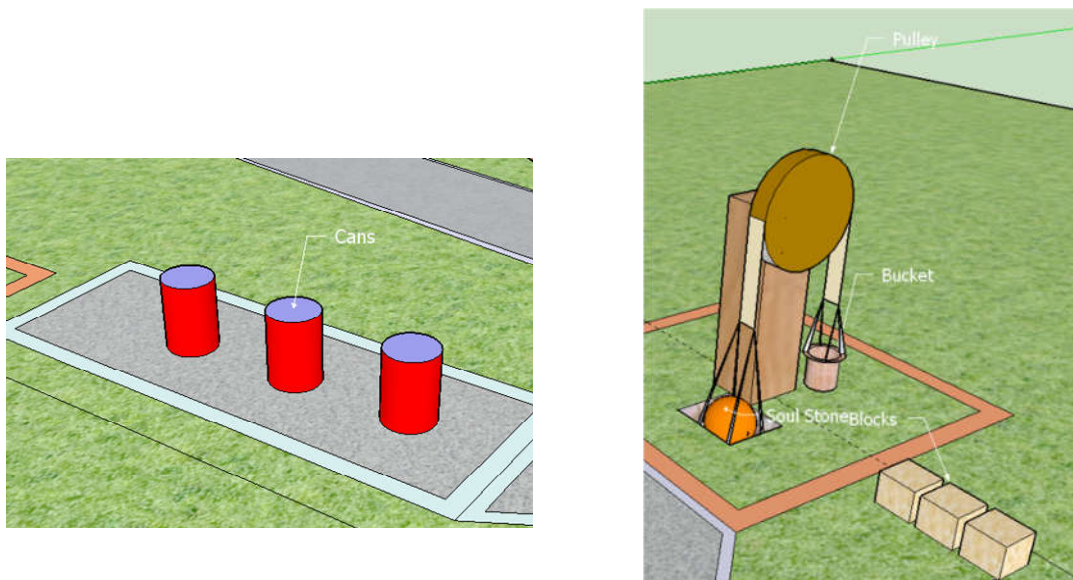


Figure 6: Soul Stone



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Scoring Scheme:

- Initially all teams start with **500 points**.
- **30 points** will be deducted each time the bot deviates from the path.
- **30 points** will be deducted each time manual assistance is provided to the bot.
- Each obstacle if skipped manually will cost **150 points**.
- **100 points** will be awarded for obtaining and placing the Power Stone.
- **100 points** will be awarded for obtaining and placing the Time Stone. Extra **25 points** are BONUS for completing the task within the time limit. **50 points** will be deducted if the task is not completed within the stipulated time.
- **100 points** will be awarded for obtaining and placing the Space Stone. If the Stone falls from the wedge at any point of time, **30 points** will be deducted. If the bot hits the rotating shaft, **20 points** will be deducted.
- **100 points** will be awarded for obtaining and placing the Reality Stone. If the rotating shaft hits the bot, **30 points** will be deducted on each contact.
- **100 points** will be awarded for obtaining and placing the Mind Stone. **50 points** will be deducted if the answer to the puzzle is obtained incorrectly. **20 points** will be reduced if the block is not placed in proper alignment.

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- **20 points** will be awarded for every can that is 'sacrificed'.
- **150 points** will be awarded to the team that manages to reveal the Soul Stone from the ground and place it in its Gauntlet.
- The team that finishes the course first will receive **30 points**.

The overall time taken by the team (in seconds) will be deducted from the final score. **The team having the maximum score will be declared winner.**

However, the maximum permissible total time for completion of the event is **900 seconds i.e. 15minutes**.

➤ Any damage to the arena by bot or participant will lead to **instant disqualification** of the team.

General Rules and Specification of the Bot:

- The dimensions of the bot must be **35cm*25cm*25cm** (l*b*h) throughout the event (including hand mechanism). It should not weigh more than **1.25kg**. If a bot does not adhere to these specifications, it will face disqualification.
- A team can consist of maximum **five** members out of which only **two** can step inside the arena.
- The bot must have a strong **hand mechanism** for gripping objects.
- The maximum power input to the bot will be **12V**. The wire of bot should be **slack** at all times.
- A **220V** supply will be provided at the arena.



- **Two** timeouts of **1 minute each** will be available to each team to fix any technical issues. The bot **must not** leave the arena for debugging. **Primary tools** will be made available by the organizers; however, the participants may bring their own tools and equipment.
- The organizers can change the arena or scoring scheme as they see fit. The decision will be **final and binding**.
- **No damage** should be caused to the arena or other competing bots. **This will result in instant disqualification.**

Contact:

Roshan: 9849842982

Aashrey: 9637752014

