Competition Ruleset

SOAR ROBOCLASH 2019 - Big Discovery

ROBOCLASH is an elimination-bracket tournament for SUTD students where teams face each other in 1 vs 1 score-based battles.

Teams will fight for points by having their robots collect and return scoring objects in the competition field to their scoring areas. Rounds will last 3 minutes each, with 30s of autonomous time, and 2min 30s of radio controlled (RC) time.

Teams will collect their starting kit and will be expected to construct their robot prior to the competition weekend. There will be a seeding contest to determine the competition match-ups.

One week prior to the competition weekend, a Planetary Anomaly will be unveiled - this element would result in changes to the competition field. Participants would be expected to make modifications to the robot.

Prizes:

- **1st Place:** 4x Nintendo Switch
- **2nd Place:** 4x Samsung Tablet
- **Design Award**

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Story

In ROBOCLASH: Big Discovery, two competing research organizations have landed on the alien planet SOMA VIII to gather fragments of mysterious alien monoliths for processing into a promising new volatile energy source - Gaseous Poly-Astralate.

Robots are deployed to break down the ancient monoliths into spheres and bring them back to the colony. The spheres can be sent into the labs for research or loaded onto the shuttle to be brought offworld and processed into raw energy.

Strong solar winds have also complicated the task and the robots will have to rely on onboard programming when solar winds interfere with communications.

0:00: Strong solar winds are interfering with the mission - the robots rely on pre-programmed commands to conduct their mission.
0:30: Solar winds abate, allowing drivers to reconnect with their robots and complete the mission. Teams score points by:

- Delivering harvested spheres to the lab for research (less points)
- Depositing harvested spheres into the shuttle for off-world processing (more points)

3:00: Solar winds are too strong and the mission is completed. Teams score points if the robot manages to finish within the starting zone.

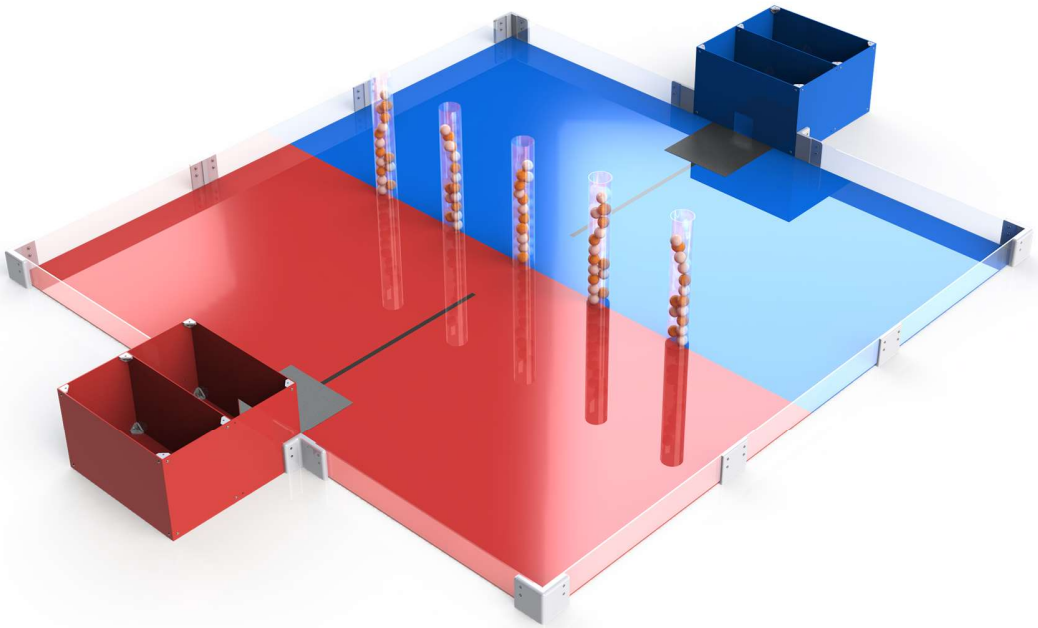

Figure 1: Full Competition Field

Timeline

Date, Time, Venue	Event
Sometime after registration (to be confirmed)	Kit Collection from Pipsqueak
4 May, 1400-1700, Multi-Purpose Hall	Teams can come down to test their robot on the field
5 May, 0900-1700, Multi-Purpose Hall	Field testing and briefing of Planetary Anomaly
11 May, 0900-1700, Campus Centre	Rehearsal and Seeding Contest
12 May, 1000-1700, Campus Centre	Actual day of competition

Competition Format

- **1 versus 1**, score-based competition
- The competition will be an **elimination bracket tournament system**.
- There will be a **seeding contest** (11 May, Saturday) the day before the actual day of competition. This will determine the matchups for the competition.
- **A Planetary Anomaly** will be introduced a week prior to the competition. **Further details will be provided** on how this element will be decided and announced.
    - Teams will be expected to **make modifications** to their robot to deal with the new elements.
- Teams that **fail to turn up for a round within 10 minutes** after their allocated timing would be **disqualified from that round.** The round will be counted as a win for the opposing team.
- At the end of the competition, the teams will be **allowed to keep their robots** and any prizes they win.
- **Good sportsmanship must be followed during all times. No cheating, or sabotaging of other teams will be tolerated.**

- Participants **register in pairs**, the organizers will form them up in teams of 4. Finalized teams will be notified via email.
- Participants will be **added to a Telegram group** where they can surface queries as well as receive updates from the organizers.

Robot Guidelines:

1. Teams are allowed to **begin planning and building** their robot after they have been placed into finalized teams. Collection of the robot starter kit will **occur at a later date** - participants will be notified accordingly.
2. Teams can build as many robots as they want but can only **submit one per round**.

Round Format:

1. **3min total** competition time
2. **30 seconds autonomous phase** followed by a pause to tally scores
3. **2min 30 seconds manual control phase** - drivers are allowed to control their robot with the provided transmitter
4. Teams will be provided **3 pre-loaded scoring objects (pre-loads)** during the set-up phase. These scoring objects are allowed to be placed anywhere as long as they are in contact with the robot.
5. Points scored during **autonomous phase** will be **worth 2 times the score.**
6. Teams are **not allowed to change operators** during the round (robot control should reside with the same team member throughout the round).
7. Teams are **not allowed to touch the field or robot** during round time - including the post-autonomous phase pause.
8. All transmitters of non-competing teams **must be turned off during round time**.
9. Teams whose robots leave the play area would be **allowed to reset their robot** to the starting area with the match still ongoing.
10. Scoring objects that leave the play area **will not be replaced**.
11. During the manual control phase, teams whose robots fail to respond after 20s are **allowed to reset their robot to the starting area** with the match still ongoing.
12. **Damage to the field will result in a disqualification from the competition, to the discretion of the judges.**
13. **Any lapses of safety will be dealt with severely by the judges, to the discretion of the judges.**

Robot Restrictions:

1. Teams are **not allowed to use rotors** as a means of locomotion.
2. Robot must fit into a 30cm x 30cm x 30cm space **before the round begins**
3. Robot can have a **maximum of 6x motors and 6x servos** (only 2 motors and 4 servos are provided). **Servo motors used only for locomotion will be counted as motors.**
4. All processing **on the robot** must be done through **1x Arduino Uno.**
5. The robot's on-board power supply must be within a **maximum of 8 AA batteries.**
6. The robot must be controlled using the provided **Turnigy 5x RC transmitter.**
7. The robot must be **able to start it's autonomous segment and manual control segment with driver input**.
8. The robot must be well built and **no part of the robot should detach** during the round. The robot **should not introduce any new elements** to the field.
9. Teams are **expected to cut materials and construct the robot** on their own, **pre-made designs will not be provided**. Teams will fabricate their robots at their leisure - no time will be provided for fabrication during the competition day.

Parts List

The SUTD Organisation of Autonomous Robotics will provide the following:

Quantity	Item
1	Arduino Uno (Microcontroller)
1	Breadboard
2	4 AA Battery Pack
1	BEC 12-5V (Voltage Regulator)
2	L298N Dual Motor Driver with H bridge
4	MG995 Servo Motor
1	Turnigy T6A-V2 AFHDS 2.4GHz 6Ch Transmitter w/Receiver V2
1	Pack of Jumpers (30cm Male-to-Male Wires)
2	DC motor with bracket
1	Caster Ball
1	IR Sensor for Line Detection

The following can be purchased from Pipsqueak:

Wheels
M4 Standoffs (4mm internal diameter spacers)
M3 Standoffs (3mm internal diameter spacers)

Scoring Rules

1. There is 1 type of scoring object in play, spheres (as seen in figure 3) - these are standard ping pong balls. They are arranged in a within an alien monolith as in figure 4 and five of such monoliths will be lined up along the middle line between the 2 team's zones. Please take note that the tube utilized in this competition is open on both sides. Teams are expected to destroy the monoliths by push and toppling them, breaking them down into mineral spheres and introducing the spheres into the environment.
2. The scoring box (shown in figure 2) is split into two sections. The top of the box is open to allow depositing of scoring objects from the top. The front section, the research lab, has a front door to allow spheres to be rolled in. The rear section, the shuttle, only has a vertical loading bay for spheres.
3. At the end of the game, the scoring of spheres is as follows:
    a. Sphere in research lab zone: 3 points
    b. Sphere in shuttle bay: 5 points
4. After the autonomous phase, there will be a pause for the judges to count the scores. The scoring during the autonomous phase is as follows:
    a. Sphere in research lab zone: 6 points
    b. Sphere in shuttle bay: 10 points

    The spheres will then be removed from the scoring zones but the scores will be recorded and added to the final tally when the round ends.

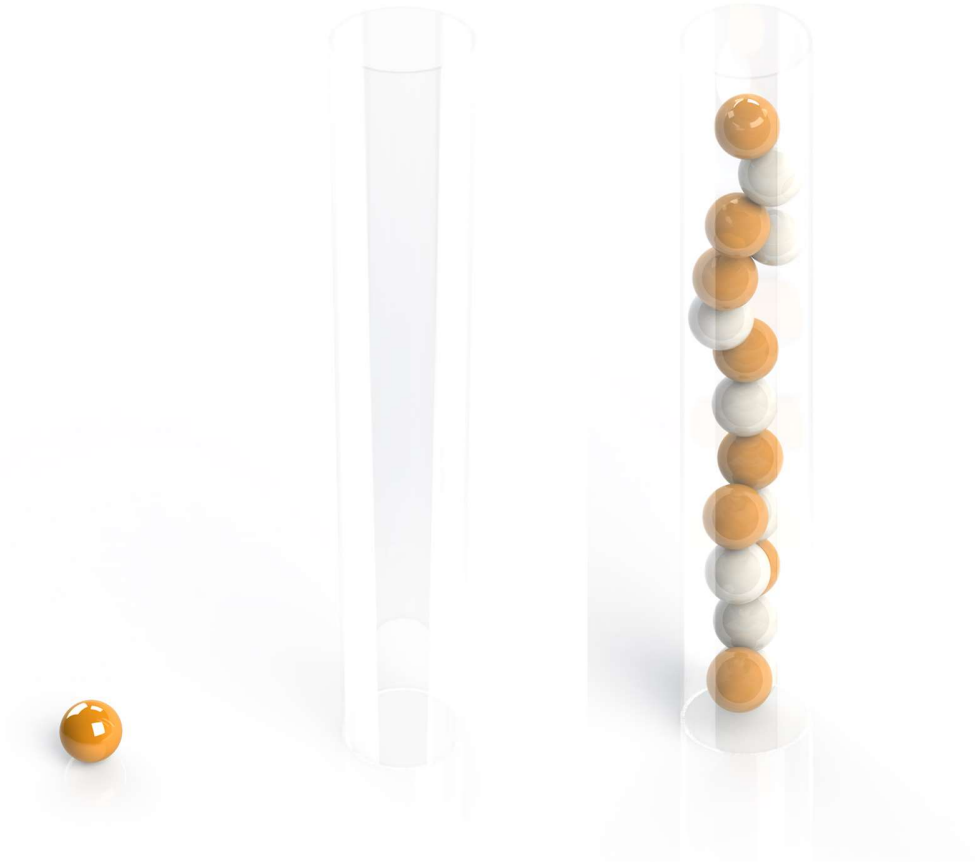

Figure 2: Left - ping-pong ball and tube, Right – Assembled tower

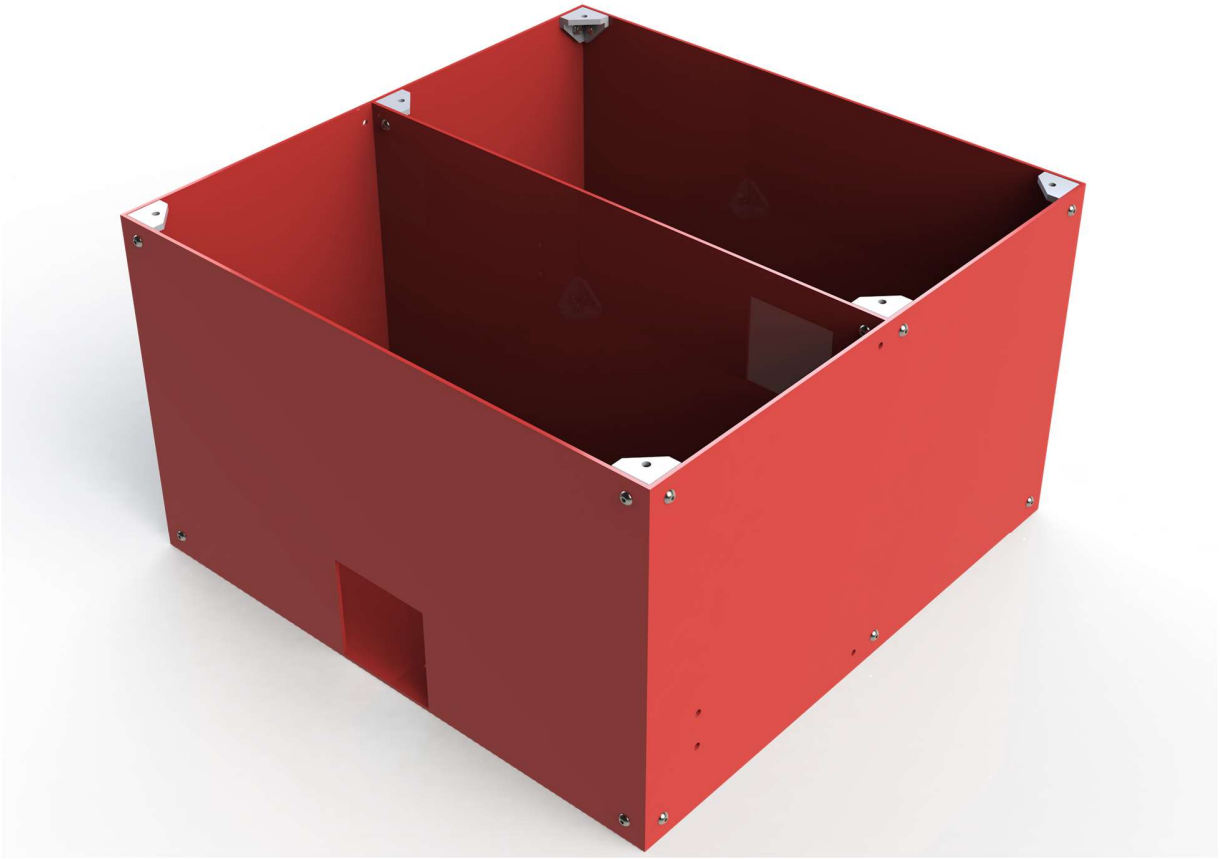

Figure 3: Starting Box

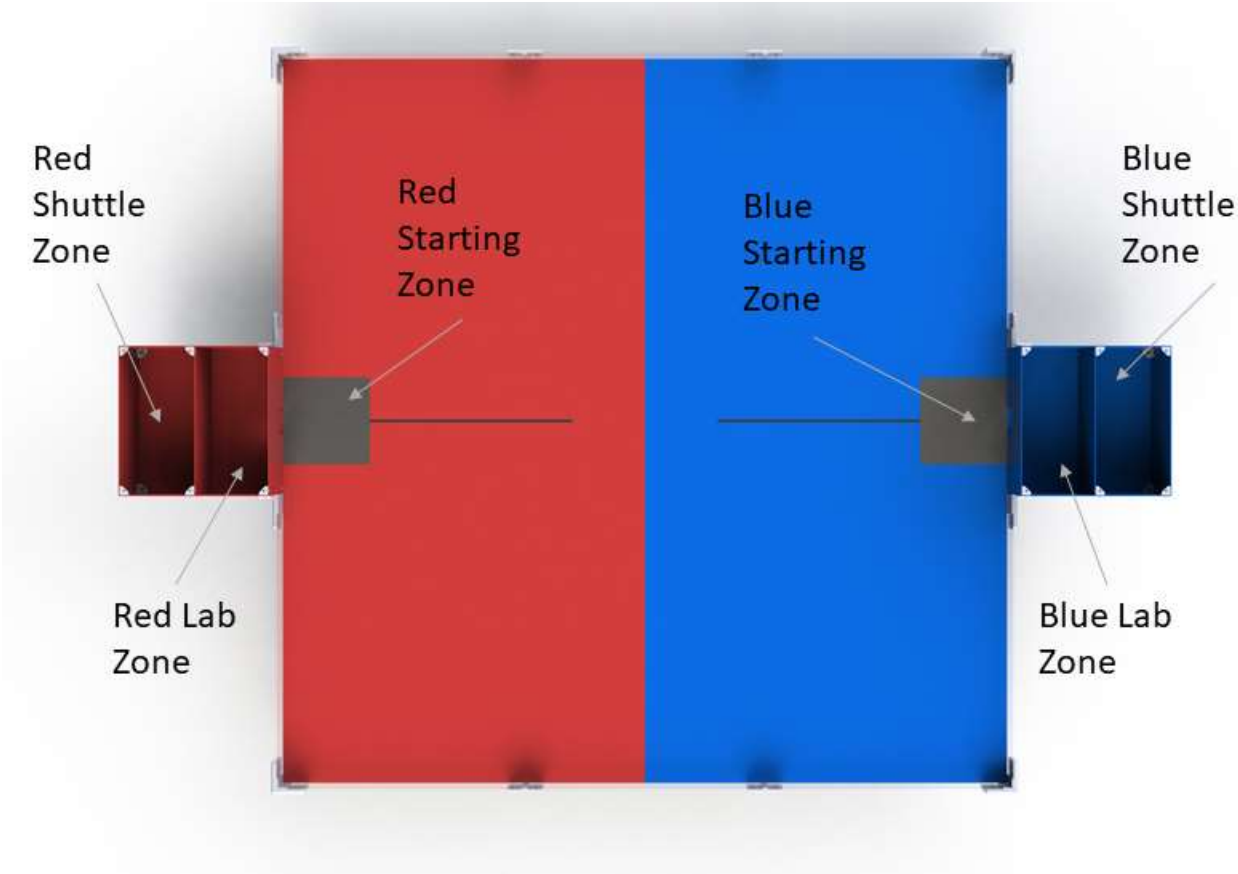

Figure 4: Field and scoring area

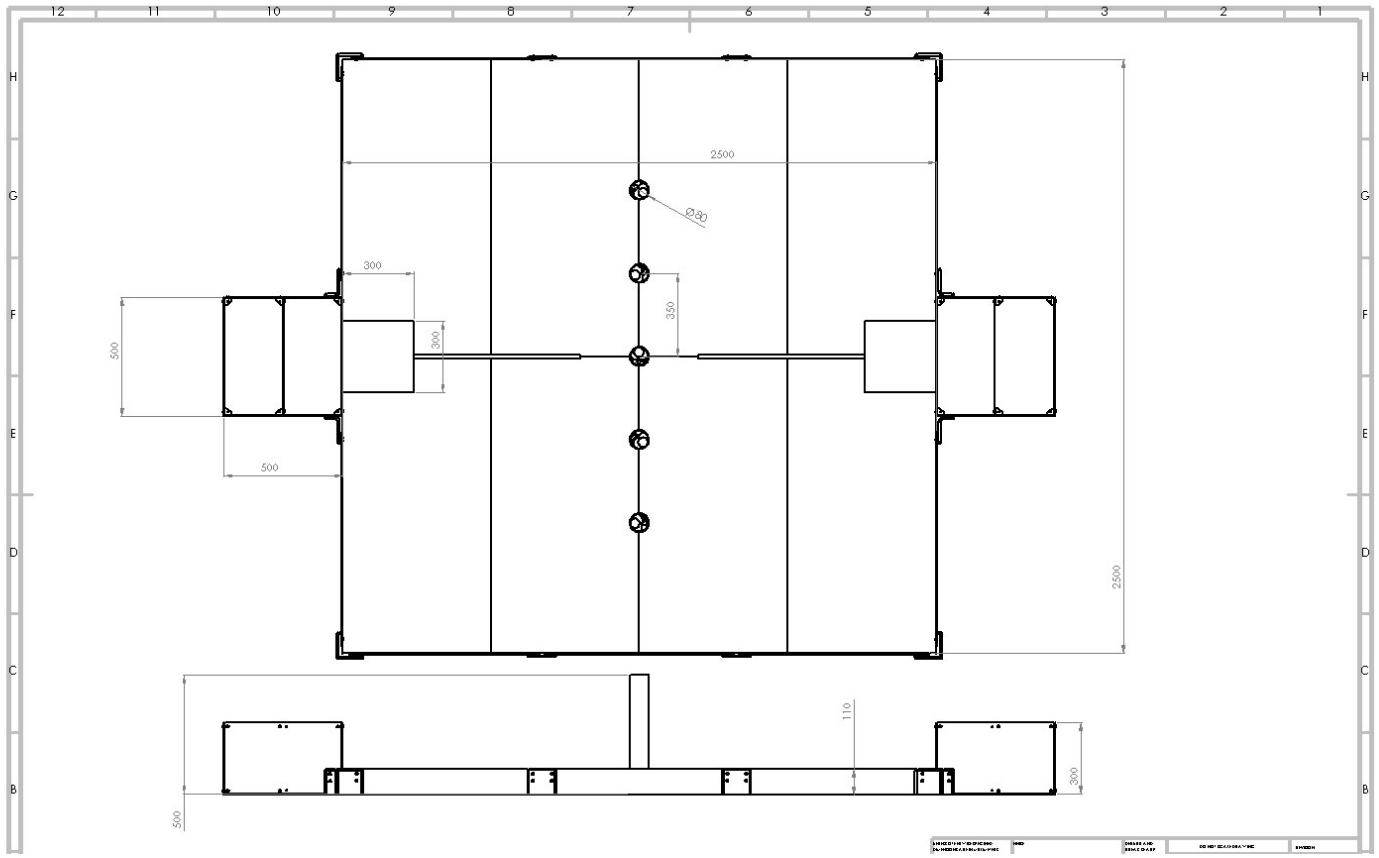

Figure 5: Dimensions of field and scoring area

Appendix

Autonomous-Manual Toggling Procedure

1. At the start, the driver is allowed to use the transmitter to start the robot's autonomous programming.
2. A judge will supervise and ensure that the driver does not control the robot during the autonomous phase.
3. At the end of the autonomous phase, the robot is to cease all movement within 5s. The driver may engage a kill switch on his transmitter to stop the robot. If the robot fails to stop within 5s, the robot will be stopped by the judges and a 50 point penalty will be levied upon the team at the end of the round. In the event that the robot had to be stopped by the judges, it will be reset to the starting position before the manual control phase.
4. The judges will then tally the autonomous score during the pause. Scoring objects will be removed from scoring zones, **but not the robot**. The scores obtained during the autonomous phase will be added to the team's score at the end of the round.
5. When the signal is given for the manual control phase to begin, drivers are allowed to use their transmitters to start the mission.

Disqualification

1. Contact with the opposing robot is heavily discouraged. Any form of contact if deemed intentional and malicious, might result in an immediate disqualification based on the judge's decision.
2. Intentional blocking or impediment of the opponent robot is grounds for immediate disqualification based on the judge's decision.
3. Detachment of any part from the robot, intentional or otherwise, will be deemed a safety hazard and may result in immediate disqualification based on the judge's decision.
4. Removing scoring objects from the opponent's play area as well as blocking scoring objects from entering scoring zones is allowed. Intentional blocking of the enemy however, is strictly not allowed. This will be subject to the judge's decision.
5. Scoring objects that leave the play area will not be replaced. However, intentional removal of scoring objects is grounds for qualification subject to the judge's decision.
6. Participants should not conduct any fabrication in the competition venue, only assembly. Failure to heed warnings will result in disqualification.

Additional Resources

Specifications for starter kit (Gitbook): https://roboclash-2019.gitbook.io/specifications/
Example code (Gitbook):
Terms and Conditions (Gitbook):

Additional Contact

For additional enquiries or clarifications, the following contact avenues are available:

Telegram:

Email: soar@club.sutd.edu.sg