SOAR Challenge 2019

Competition Ruleset (Draft)

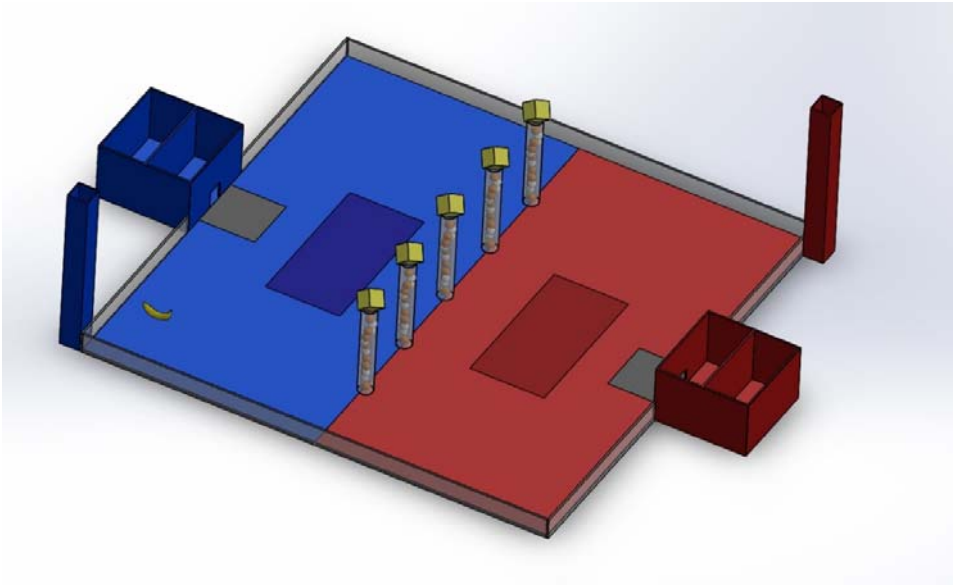

Figure 1: Full Competition Field (Banana Added for Scale)

Competition Format:

1. Teams of 4 submit 1 robot to the competition
2. 1 versus 1, score-based competition
3. Seeding contest followed by elimination bracket tournament system.
4. 3min total competition time (30seconds autonomous, 2.5min remote control)
5. 30cm x 30cm x 30cm starting size - Arduino-based robot
6. 6 weeks lead time for preparation
7. There will be an unknown element added to the competition at a later date.
8. Field access split into 4 days over 2 weekends:
    a. 4 May: Field testing from 2pm – 7pm @ MPH
    b. 5 May: Field testing from 9am – 5 pm @ MPH + briefing on field modifications (to be elaborated within the document)
    c. 11 May: Rehearsal and Seeding Contest from 9am – 5pm @ Campus Centre
    d. 12 May: Actual day of competition 10am-5pm @ Campus Centre
9. SOAR will provide the following:
    a. 1x Arduino Uno + Arduino cable
    b. Jumpers (20x jumpers of each type)
    c. 1x Infrared Sensor Array
    d. 1x Ultrasound Sensor
    e. 4x L298n Motor Drivers
    f. 4x Motors (to be sized)
    g. 4x Towerpro MG996R servos
    h. 1x Turnigy 5x 5ch remote and receiver
    i. Basic materials to build the base of the robot (to be finalized)
    j. Sample code for the servos and motors via Git Book
    k. CAD files and drawings of the playing field

10. The registration cost for teams will go towards the prize as well as funding the above components provided by SOAR.
11. Teams can buy more parts and materials but are not allowed to buy more servos, Arduinos or controllers
12. Teams are expected to cut materials and construct the robot on their own, no pre-made designs will be provided.
13. The fabrication will be done on their own time and own target at the Fabrication labs
14. SOAR will not be providing workshop coverage or directly assist in the design and construction of the robot. A telegram group chat will be created where teams can ask for clarifications of rules or written guidance.
15. There will be 3 field modifications that are available. These modifications will not be disclosed to the teams prior to 5 May. On the day itself, each team will send a representative to roll a 6-sided die. All die rolls will be totalled, and the sum would be compared against a table of ranges. If the total sum corresponds to a specific range, that field modification would be applied to the field and announced on 5 May itself. Teams will then have 1 week to modify their robot to deal with the rule change.
16. No touching or modification of robot during competition time
17. Only one driver during the competition time and no changing of drivers during play-time
18. Any disqualifications or failure to show up to a match would result in elimination from the bracket and count as a win for the opposing team.
19. At the end of the competition, the teams will be allowed to keep their robots and any prizes they win.

Match Rules:

1. The competition field will be set up in accordance to figure 1.
2. Teams to start with their robot inside the square box directly in front of the scoring box (as seen in figure 2). The box is 30cm x 30cm x30cm and no part of the robot is allowed to exceed the box before the round starts.

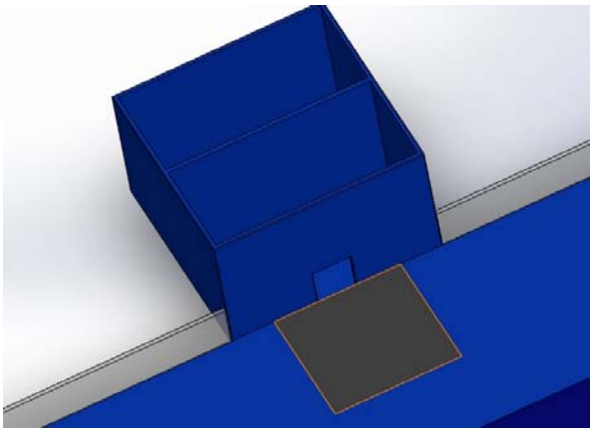

Figure 2: Starting Box

3. The initial segment of the competition would be a 30s autonomous period. Team members are not allowed to touch their control sticks or the robot for this period. The robot is expected to be pre-programmed to perform actions during this 30s that would be beneficial to the team. At the end of the autonomous period, points will be tallied. The team that score

higher would receive 20 bonus points on top of the tally. **The autonomous point tally counts towards the final score on top of points scored in the manual control segment.**

4. The next segment would begin after points have been allotted. The manual control segment is 2.5 minutes. During which teams would be allowed to touch their control sticks but not touch the robot. It is highly recommended that teams switch between autonomous and manual control states using the channel 5 switch on the controller, however any method that fulfils the rules can be used. Sample code will be provided for this feature.
5. During the round, robot contact is heavily discouraged. Any form of contact if deemed intentional and malicious, might result in an **immediate disqualification** based on the referee's decision.
6. Intentional blocking or impediment of the opponent robot is **grounds for immediate disqualification** based on the judge's decision.
7. Detachment of any part from the robot, intentional or otherwise, will be deemed a safety hazard and **would result in immediate disqualification**.
8. At all times, the robot should remain in the play area. Teams whose robots leave the play area would be allowed to reset their robot to the starting area **with the match still ongoing.**
9. Teams whose robots fail to respond after 20s are allowed to reset their robot to the starting area **with the match still ongoing.**
10. 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.**
11. Scoring objects that leave the play area will not be replaced.
12. Intentionally removing scoring objects is grounds for qualification subject to the judge's judgement.
13. At the end of the manual control segment, the score would be totalled and added to the autonomous score tally to obtain the final score tally. This score is what would be used to decide the winning team of the round.

Scoring Rules:

1. There are is are 2 types of scoring objects in play (as seen in figure 3). They are arranged in a tower as in figure 4 and five of such towers will be lined up along the middle line between the 2 team's zones. **Please take note that the tube is open on both sides.** Teams are expected to push the tubes and topple the towers to introduce ping-pong balls into the environment.

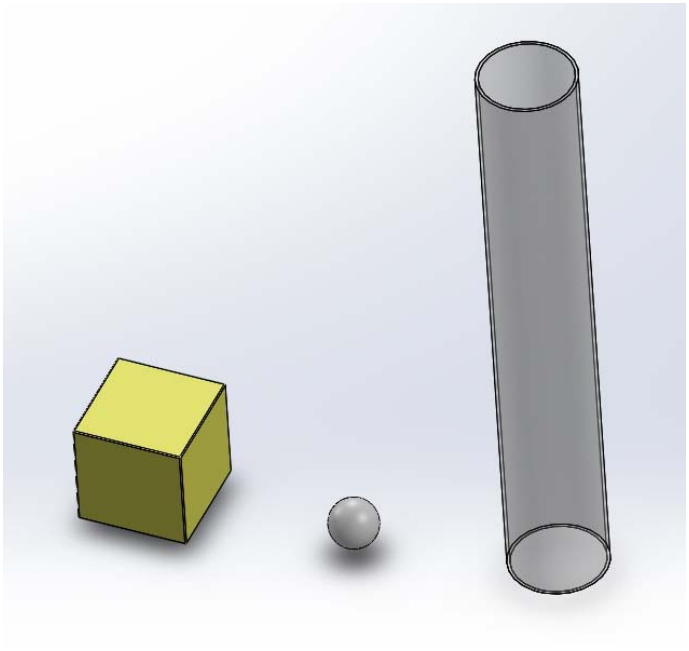

Figure 3: (From the Left) The cube, ping-pong ball and tube

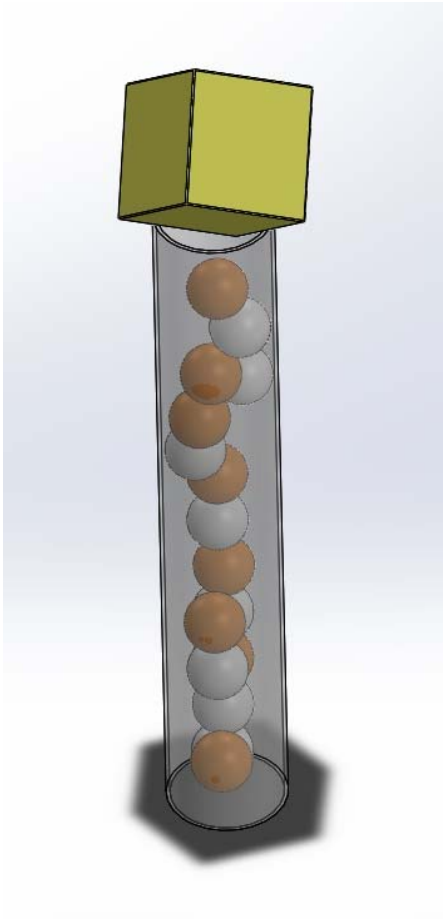

Figure 4: Stacking of the scoring objects in the field during set up

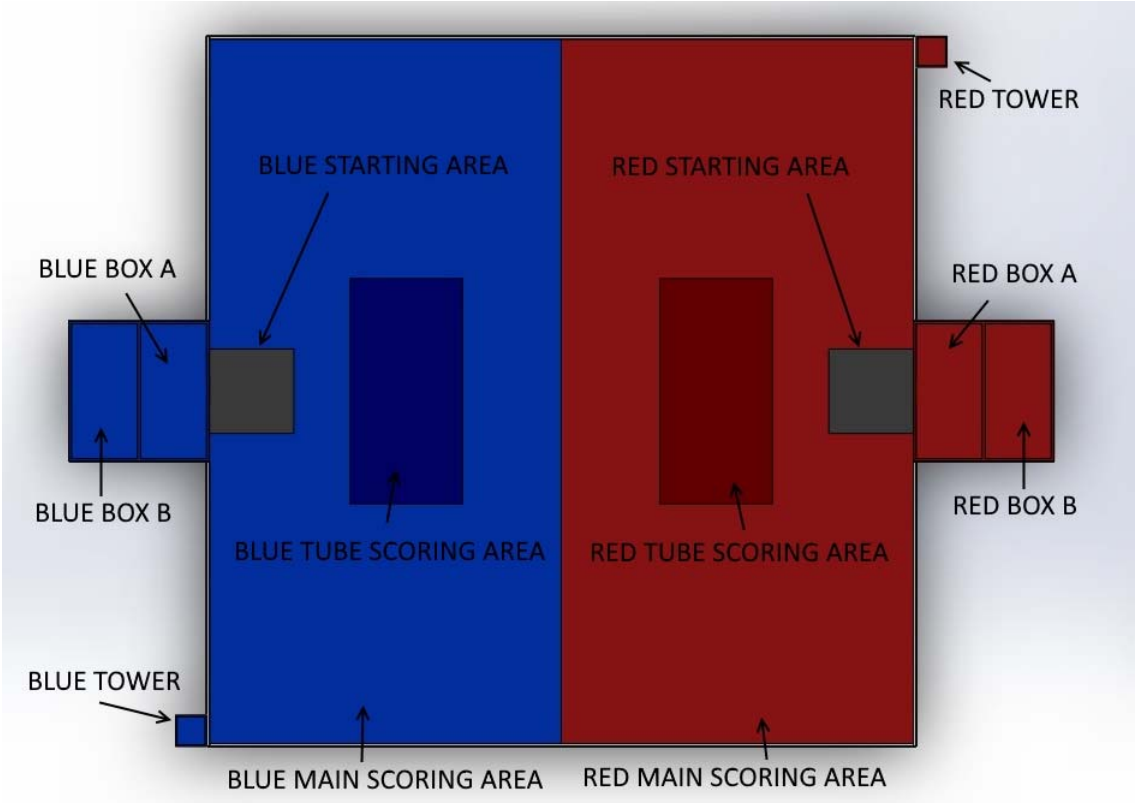

Figure 5: Field and scoring areas

2. At the end of the game, the scoring of ping pong balls are as follows:
    a. Ping-pong ball in the team's main zone (including pipe scoring zone): 1 point
    b. Ping-pong ball in the team's scoring box A: 2 points
    c. Ping-pong ball in the team's scoring box B: 5 points
    d. Ping-pong ball in the team's scoring tower: 10 points
3. At the end of the game, the scoring of tubes are as follows:
    a. Tube in the team's pipe scoring zone: 5 points
    b. Tube in the team's scoring tower: 50 points
    c. Tubes in any other locations do not provide any points
4. If there is a tie, the number of cubes that one team possess will determine the winner.
5. If a scoring object intersects with the centre line between both team's areas, the zone in which more of the object is within will be the team that gets the score.
6. Scoring objects that exit the zone will not be replaced.
7. For Box A, teams can opt to roll or put their scoring objects through the frontal opening or the top opening. However, for box B, there is only a top opening for scoring objects to enter.

Awards and Prizes

1. There will be 3 awards and accompanying prizes:
    a. Championship: Given to the team that finishes first at the end of the challenge. The prize will be 4x Nintendo Switch for the team.
    b. 2nd Place:
    c. Judge's Choice:

Unknown Element

There are 3 unknown elements that might be introduced on 5th March. These will be assigned number ranges, which will then be used on 5th March to determine which unknown element would be introduced to the competition. Each team will send a representative to roll a 6-sided die and sum will be totalled. The sum-total will be compared against the tale of number ranges and the corresponding unknown element will be added to the field from that point on.

Unknown Element 1: Scoring Cube:

An additional scoring element will be introduced into the competition.

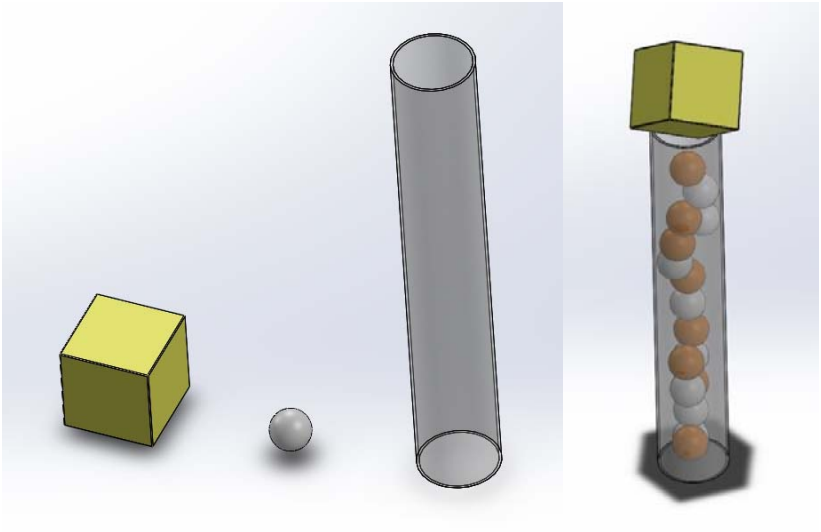

Figure 6: Stacking of the scoring objects in the field during set up

Additional scoring rules:

At the end of the game, the scoring of cubes are as follows:

a. Cube in team's scoring box A: 10 points
b. Cube in team's scoring box B: 20 points
c. Cube on top or in team's scoring tower: 30 points
d. Cubes in any other locations do not score any points, **including the main zone**

Unknown Element 2: Sloped flooring:

The competition field will be sloped at a 10 degree incline close to scoring box, which might necessitate a modification to the part of the robot that deals with scoring the ping pong balls.

Unknown Element 3: Sloped roof on scoring box:

A sloped roof will be introduced to the top of the scoring box while maintaining a small hole for balls to be scored. This prevents mass scoring/inaccurate scoring.