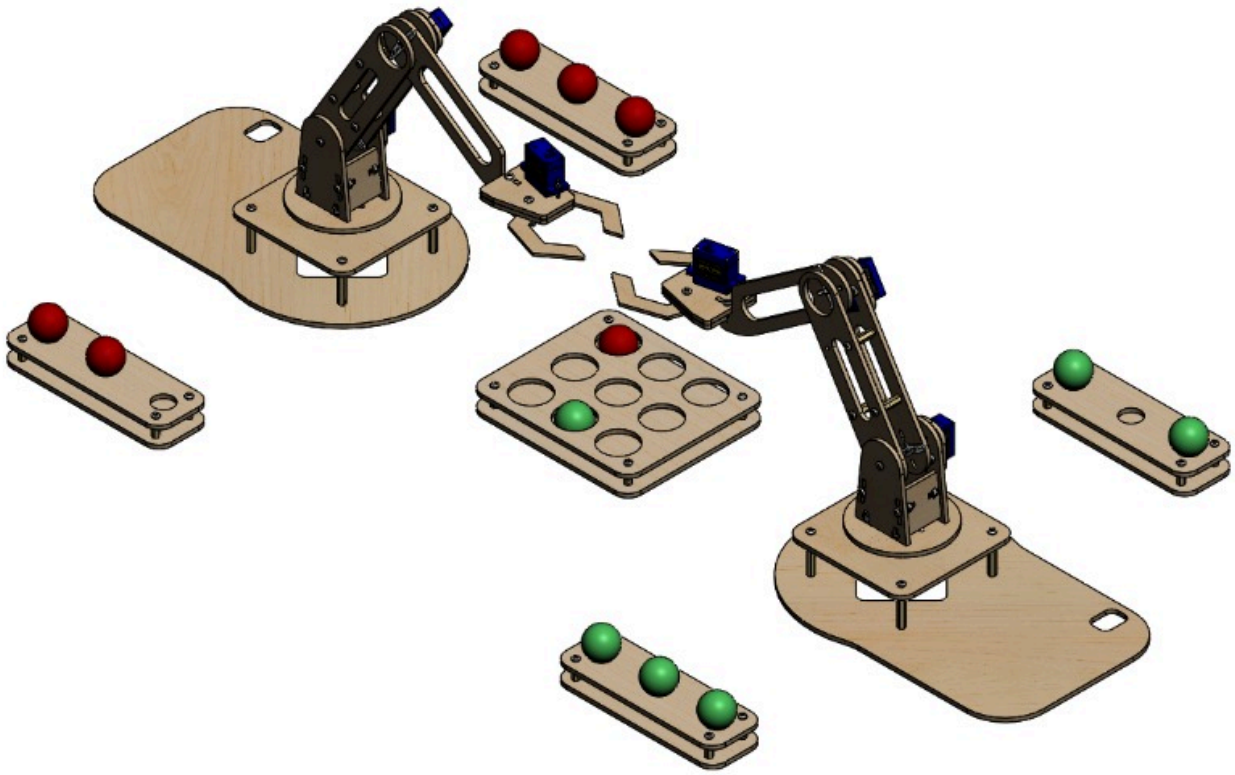
Game Rules

Competition Overview:

The final competition consists of two games. Each participant will compete against their opponent in both games. Points are earned in each game, and the player with the highest total points wins.

Game 1 (XO) :

Two participants will face each other in this robotic XO game. Each participant will be provided with a set of **six balls** to play the game. The objective is to strategically place the balls on the XO board and score points by forming lines according to standard XO rules.



Control Method

- In this game, participants must use the **Joysticks Controller** to control their robotic arm.

Game Duration

- The game is divided into **2 matches** each match is **3 minutes**.
- The match is divided into **9 turns**, each lasting **20 seconds**.

At the beginning of each match, the role of X will be decided by a coin flip. After each match, participants will alternate roles so that both get the chance to play as X and O.

Ball Colors and Symbols

- Yellow ball = X
- Green ball = O

Scoring System

- Each valid ball placement earns the participant **10 points**.
- If a participant completes a full line (horizontal, vertical, or diagonal), they immediately win the match and earn an extra **30 points**.

Winning a Match

- A match ends instantly when a participant completes a valid line of 3 balls (straight or diagonal).
- The winning participant secures the highest number of points.

Match Structure

- Each turn, one participant is given **20 seconds** to place their ball (X starts first).
- After that, the other participant is given **20 seconds** to make their move.
- There will be 10 seconds between each turn changing for repositioning and preparation.
- Turns alternate until the match ends.
- Participants are only allowed to place **one ball each turn.**
- Participants are only allowed to **move** their robotic arm **during their turn.**
- Participants are **not allowed to touch their robotic arm** once the match starts.

Retry

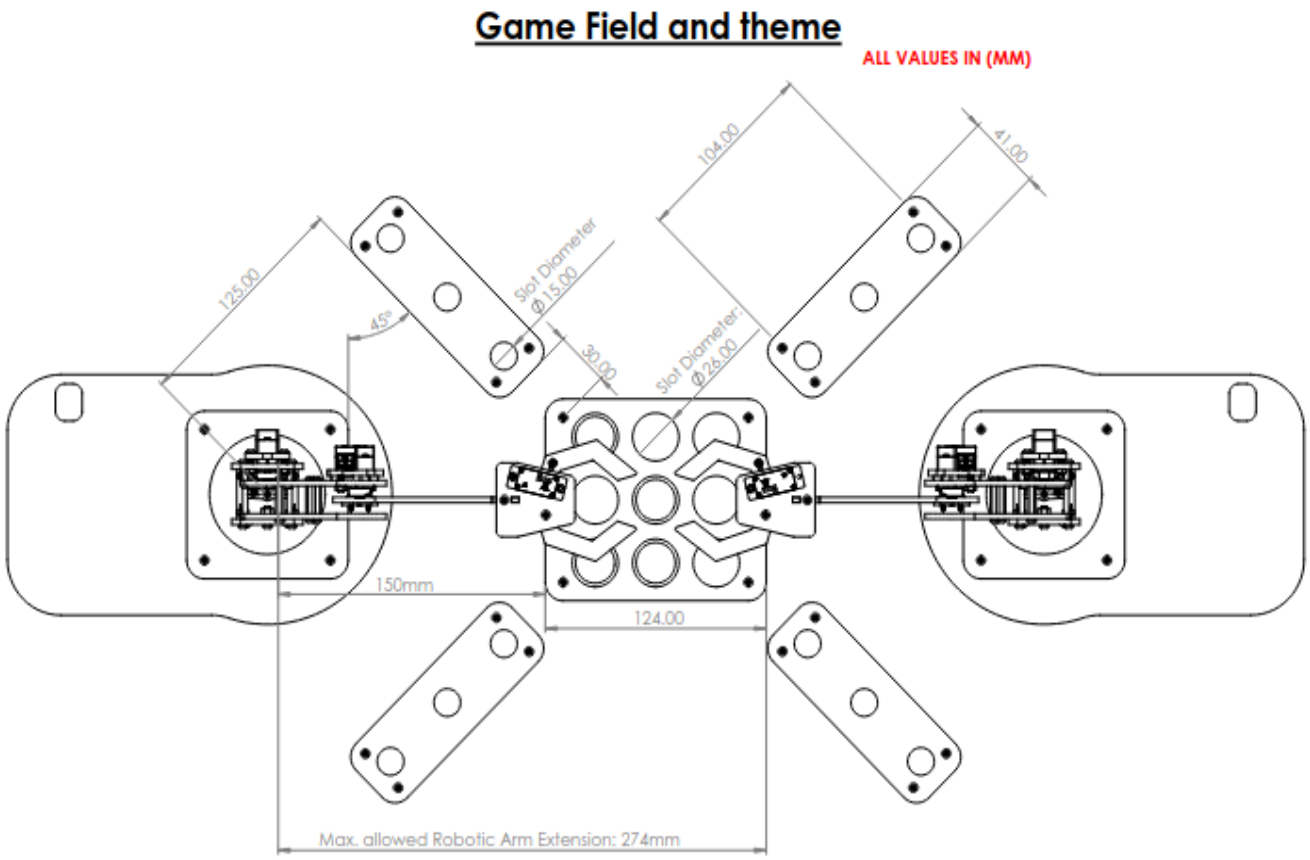
- If a participant faces a technical problem with their robotic arm, they may request a retry by **loudly shouting "Retry!" to the judge**.
- If the players has mistakenly dropped a ball outside the slide slots or the XO slots, they may request a retry to return the ball back within the round duration.
- Retries can only be attempted **during the participant's own turn**.
- During a retry, the participant is allowed to physically touch their robotic arm to fix the issue.
- Once the issue is fixed, the participant must **ask the judge for approval before resuming play**.

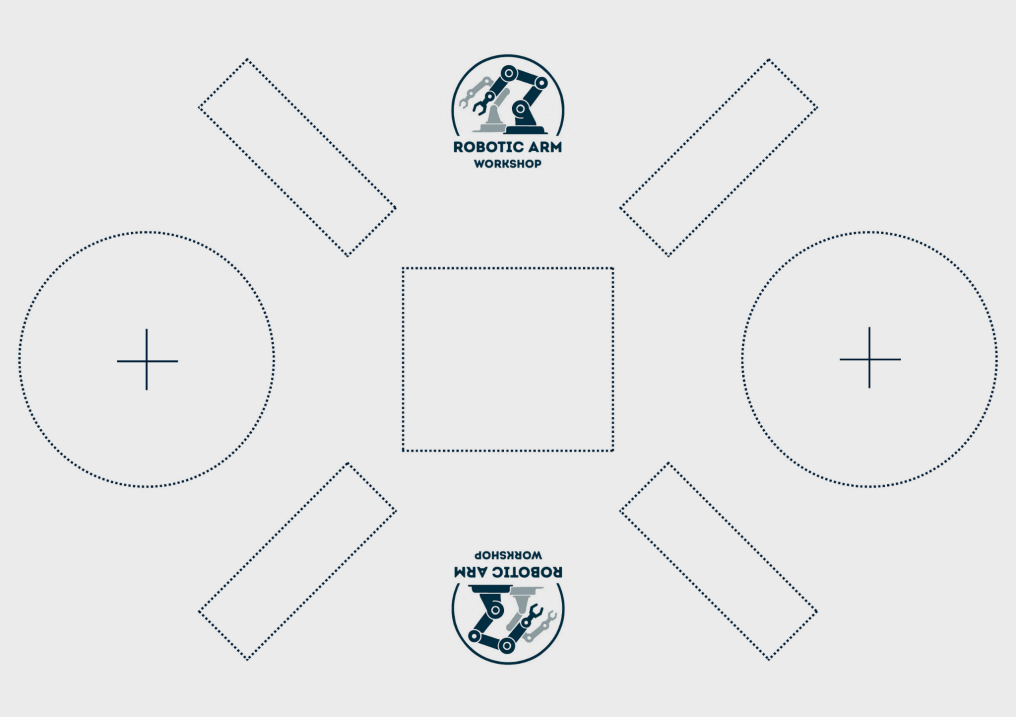
Violation

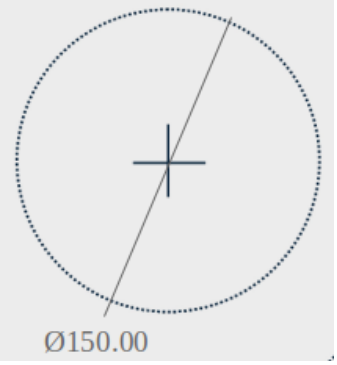
The player will receive a violation if the robotic arm was extended to outside of the player allowed zone, where the arm extension is limited to a maximum of **274 mm** measuring from the center of rotation.

Game Field

The image below is showing the overview of the game field placement and dimensions.





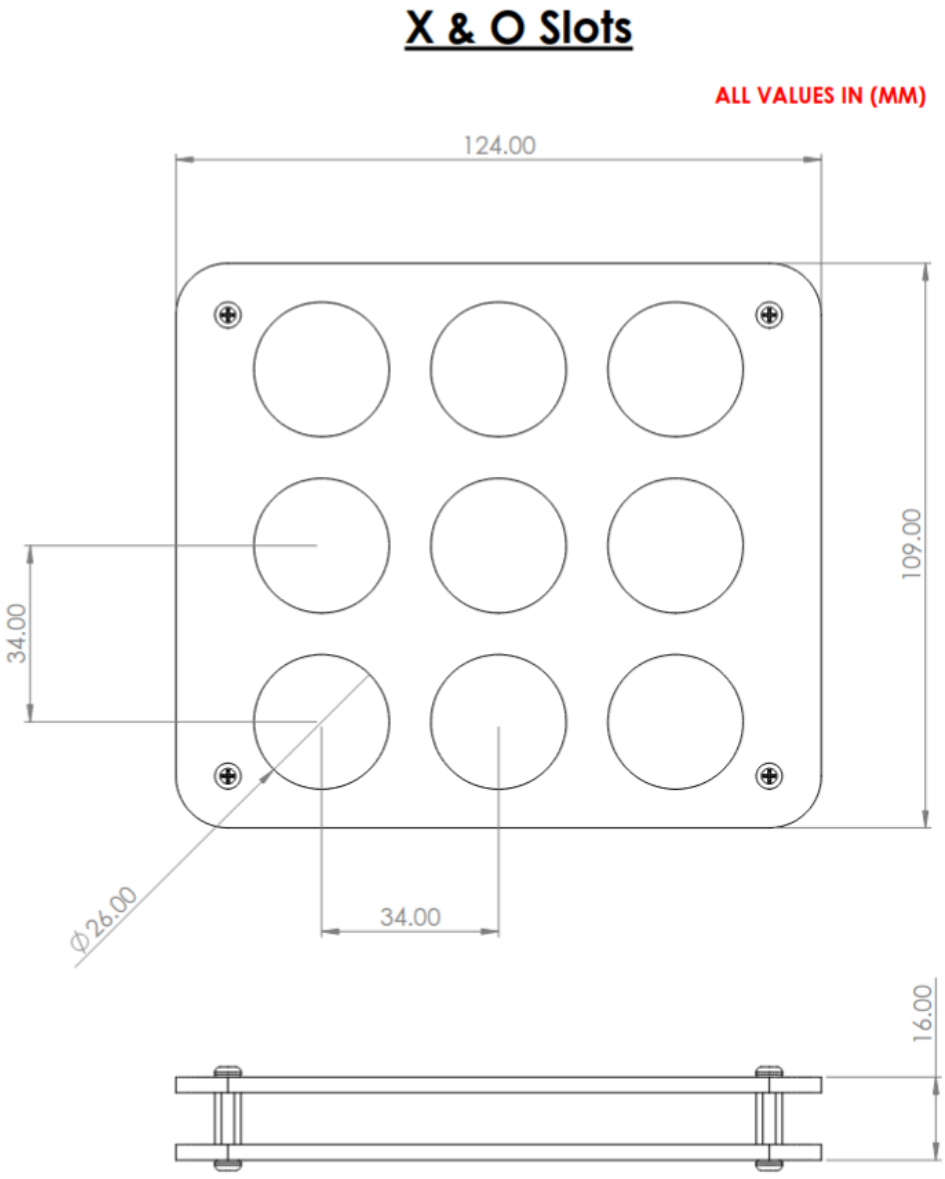


Note

- Participants are allowed to place their robotic arm center of rotation anywhere inside the ∅150.00 mm Circle.

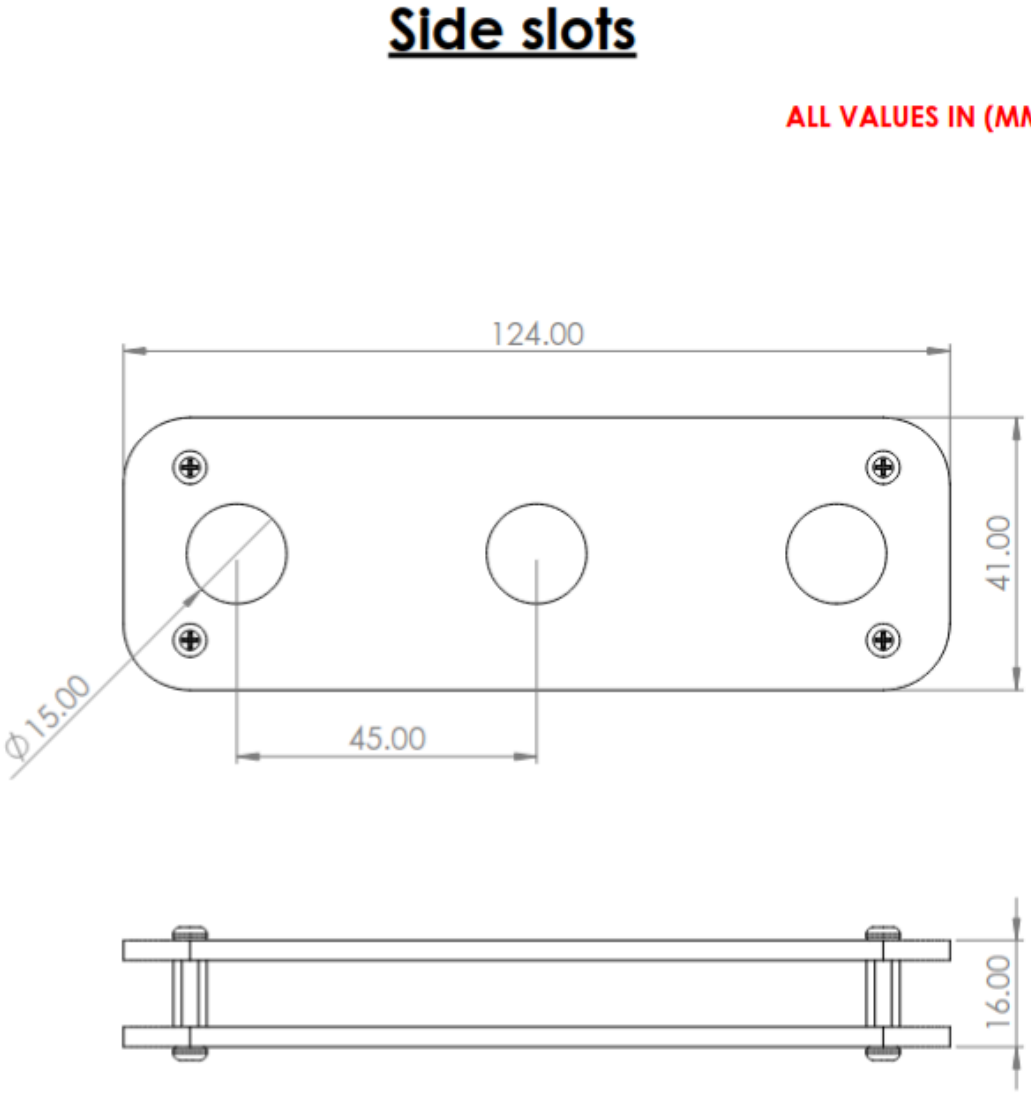
XO Slots

- A **3 × 3 slot grid** is positioned at the center of the game field, with each slot having a **26 mm diameter** to securely hold the competition balls for the XO game.



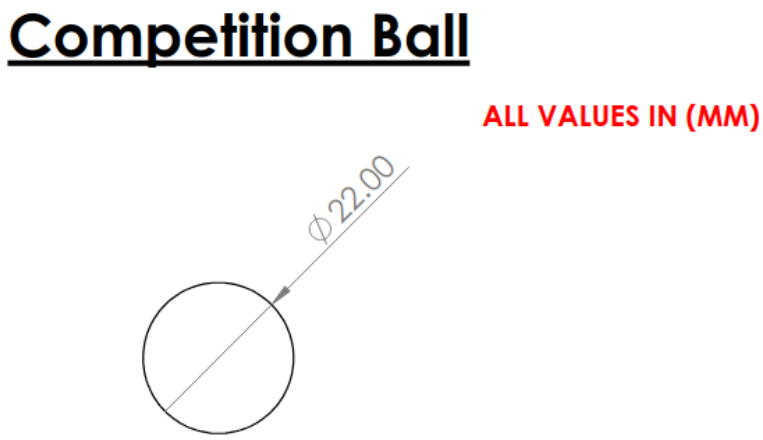
Side Slots

- The field is designed with **side slots** holding the balls of each competitor. The slots are equally spaced with a diameter of **15mm**.



XO Ball

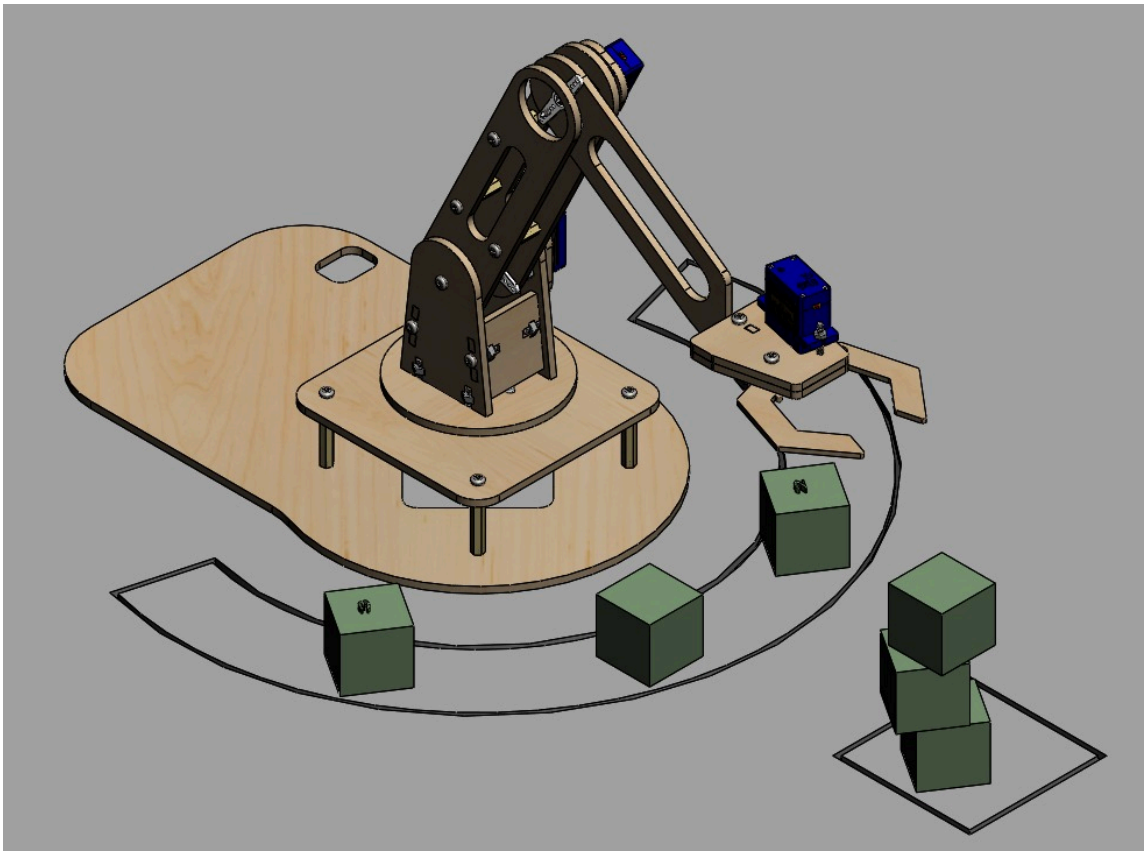
- Each player will have a stock of **6 balls** only, with different ball color for each side. The balls are made of rubber soft material with a diameter of **22mm**.



All measurements are standardized in millimeters.

Game 2 (Tower Building) :

In the **Tower Building** game, participants must use the **Potentiometer Arm Controller** to pick up numbered blocks from the **Block Collection Zone** and stack them in the **Tower Building Zone** within 3 minutes. If participants use the **Joysticks Controller** to control their robotic arm they will receive half of their total points. Points are awarded for each block placed, with bonus points for stacking in the correct numerical order. The match ends when a tower is completed or time runs out, and the player with the highest score wins.



Control Method

- In this game, participants must use the **Potentiometers Arm Controller** to control their robotic arm.

Game Duration

- Each tower-building match lasts **3 minutes**.
- Both participants start building their towers **at the same time**.
- The match will end either when:
    - A participant successfully completes their tower, or
    - The 3-minute time limit is reached.

Block Rules

- The blocks are **3D printed** with a **specific number** shown on its surface.
- The tower must be built in the **correct numerical order**, with blocks stacked from lowest to highest. You still can choose to not follow the order, but you will lose some points.

Match Structure

- The players can only collect the cubes from the **Cubes Collecting Area**
- If the player placed the base block outside the block placement zone will receive a violation, and must as for retry to manually put the block again in the collecting zone and try again
- If during building the tower, the player has destroyed the tower, he may ask for retry to manually put the dropped blocks again in the collecting area and try again.

Scoring System

- **10 points** are awarded for each block placement.
- **+10 bonus points** if the block is placed in the **correct order**.
- If the block has fall or drop from the tower, the player will lose their points
- **30 points** are awarded for completing the tower.
- If participants use the **Joysticks Controller** to control their robotic arm they will receive half of their total points.

Winning a Match

- A participant wins instantly if they complete the tower before the time limit and earns extra **30 points**.
- If neither participant finishes the tower, the match will finish at the end of the **3 minute** duration.

Retry

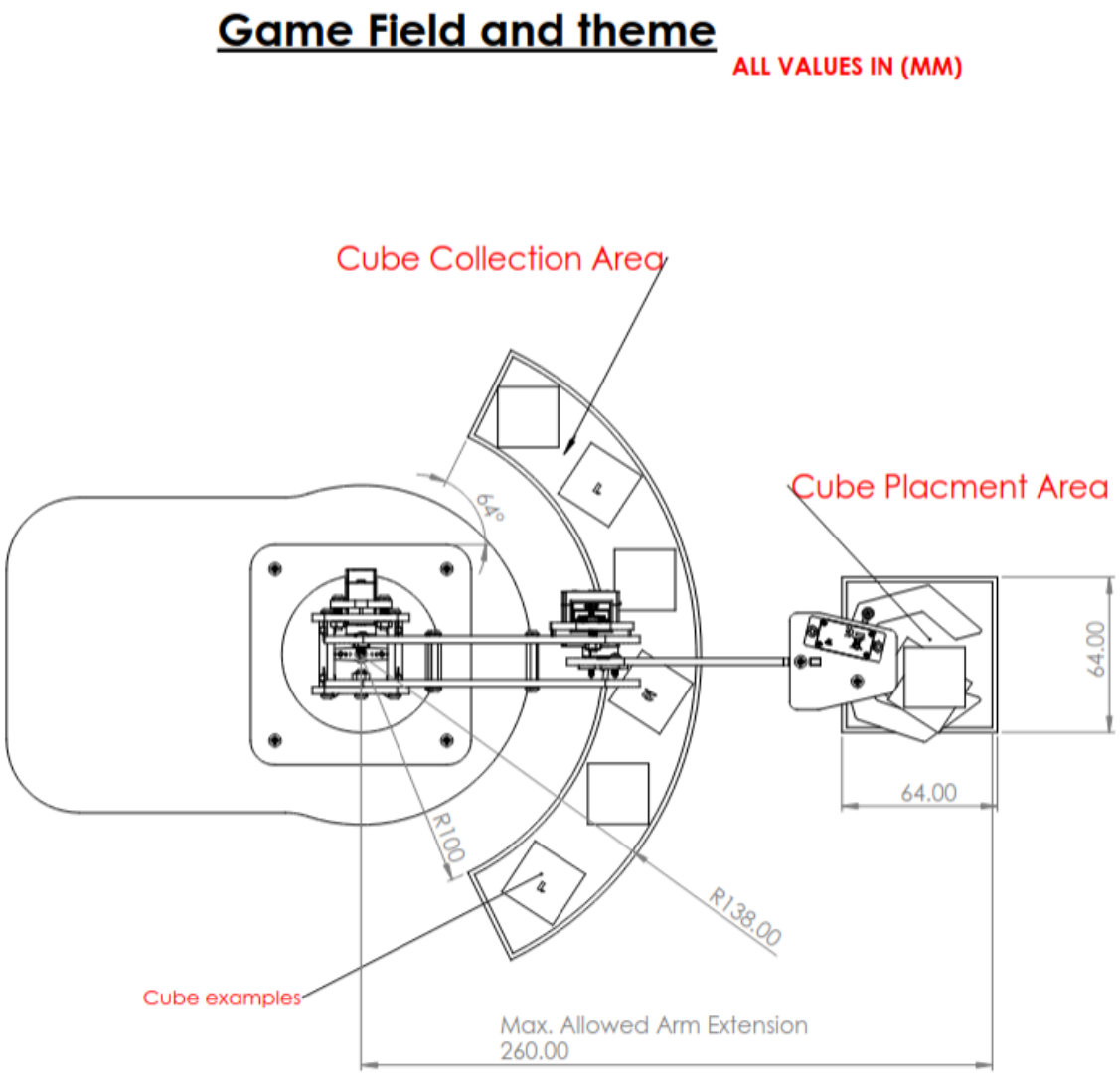
- If a participant faces a technical problem with their robotic arm, they may request a retry by **loudly shouting "Retry!" to the judge**.
- During a retry, the participant is allowed to physically touch their robotic arm to fix the issue.
- Once the issue is fixed, the participant must **ask the judge for approval before resuming play**.

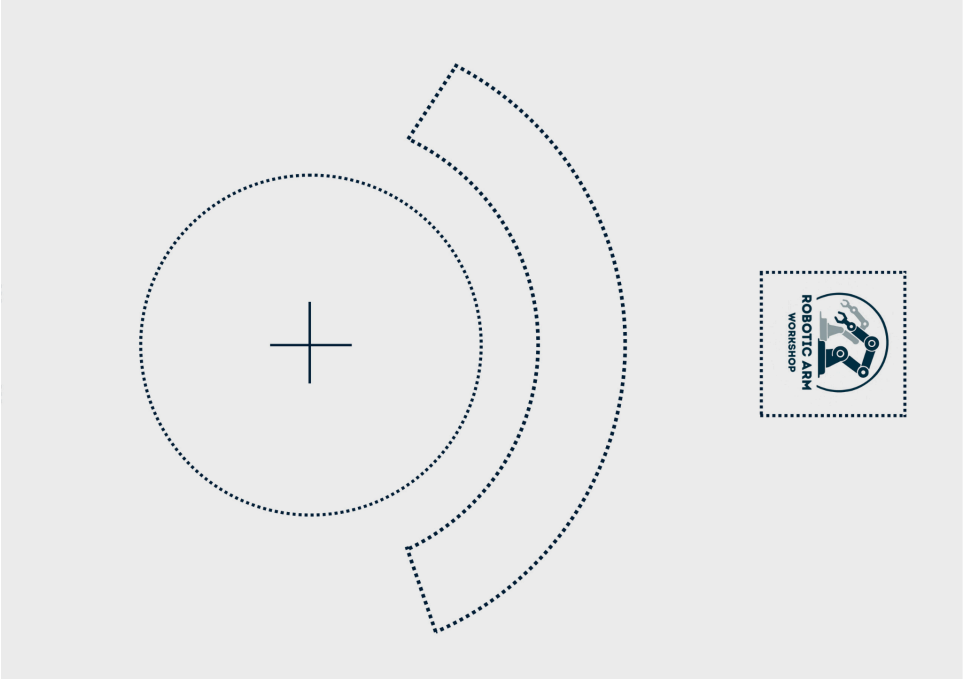
Disqualification

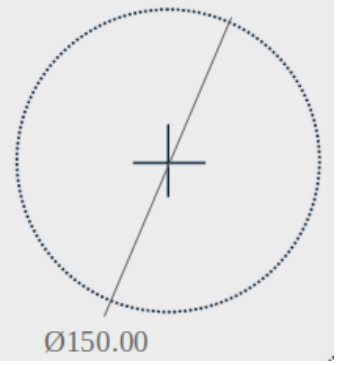
- A participant will be disqualified if they:
    - Damage the game field components.
    - Damage the opponent's robotic arm.
- Disqualification will be declared immediately by the judge.

Game Field

The Tower Building game is played on two separate and identical game fields, one for each participant. Each field is a flat surface divided into two functional zones as shown in the figure below:







Note

- Participants are allowed to place their robotic arm center of rotation anywhere inside the ∅150.00 mm Circle.

Block Collection Zone

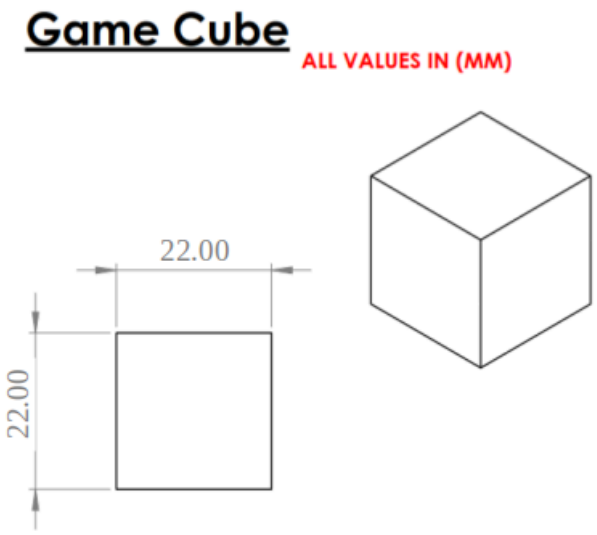
- Located in front of the robotic arm in an arc shape far **100mm** from the center of the robotic arm.
- Contains the set of 3D-printed numbered blocks arranged in a starting position.

Tower Building Zone

- Square-shaped area located around **200mm** far from the center of rotation of the player robotic arm.
- Clearly marked as the area where participants must stack their blocks to form the tower.

Tower Blocks

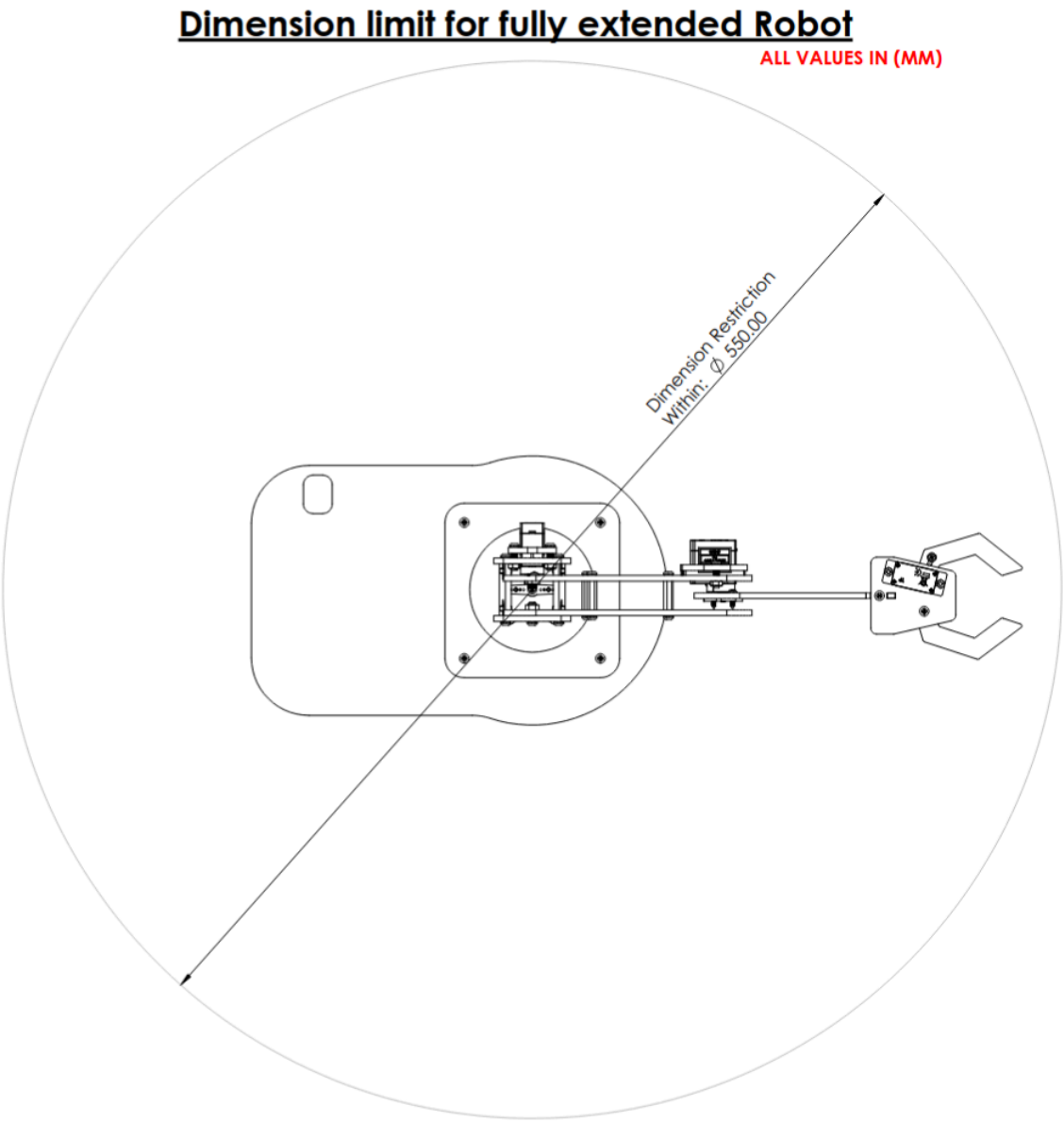
- The blocks are 3D printed 22 × 22mm cubes with numbers printed on its surface.



All measurements are standardized in millimeters.

Dimensions limits:

Make sure when you are designing and fabricating your robotic arm to follow the dimension limit clarified below. The robot should not extend the diameter of 550mm when it is fully extended, including the base and the electrical board. **Any robot with overdimension will be disqualified from joining the final competition.**



Best Design Award:

The best design robotic arm will be chosen based on the following criteria:

Evaluation Criteria

- **Stiffness**: The arm is strong and not shaking.
- **Soldering and Components Placement**: Components are neatly soldered and properly placed.
- **Good Wiring**: Wiring is neat, safe, and secured.
- **Appearance**: The arm is clean, well built, and colorful.
- **Innovation**: The design shows smart new ideas.
- **Safety**: No hazards, components are well-guarded

The robot must be **Functioning** to have the chance of winning the **Best Design** award.

Scoring System

- Each criterion will be scored from **1 to 5** by the judges.
- Additional notes may be provided for feedback.

Q&A Form

This is the first draft of the **Game Rules** file. If you have any question about any of the game rules or specifications, please help us by writing your question in the following form to improve the next drafts of the **Game Rules** guide. Google form link: https://forms.gle/msf71hfuDa3T8D3u5