ISCRAFT

COMPETITION SPECIFICATIONS

BY

INELECTRONICS STUDENT CLUB

FIRST EDITION **2025**

OUTLINE

ROBOTIC ARM COMPETITION SPECIFICATIONS

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CHAPTER 01

INTRODUCTION

SHORT OVERVIEW ON THE COMPETITION & ITS THEME AND INSPIRATION.

At ISC, Applied Engineering Is At The Core Of Our Philosophy. For The Past 20 Years, We Have Been Dedicated To Learning, Developing, And Sharing Knowledge. With The Launch Of The First Edition Of ISCraft, We Invite Aspiring Engineers Into A Competition Themed By The Futuristic World Of TRON—Where Precision, Innovation, And Human-Machine Take Place.

Test Your Skills, Tackle Real-World Challenges, And Shape The Future Of Robotics.
Join Us And Be Part Of A Growing Community Driving Technological Evolution!

OBJECTIVES AND GOALS

Hosting Its First-Ever Event Of This Kind, The Inelectronics Student Club (ISC) Proudly Presents The ISCraft Robotic Arm Competition—An Exciting Engineering Challenge Designed To Bridge The Gap Between Academic Learning And Real-World Robotics Applications In Industry. Themed By The Famous Movie Tron. This Competition Pushes Participants To Combine Mechanical Design, Control Systems, And Software Development, Helping Them Sharpen Their Robotic Manipulation Skills In A Hands-On Environment And Tackle Practical Industrial Tasks.

ISCRAFT IS YOUR GATEWAY TO REAL-WORLD ENGINEERING WHERE INSPIRATION MEETS APPLICATION.

CHAPTER 02

GENERAL RULES

TEAM COMPOSITION AND ELIGIBILITY

1 _ Team Size : Each Team Can Consist Of Up To 4 Members.

2 _ Team Leader : One Member Must Be Designated As The Team Leader, Responsible For Communication With Organizers.

3 _ Multiple Entries :

- Each Individual Can Participate In Only One Team.
- A Single Institution Or Organization Can Have Multiple Teams, But Team Members Cannot Be Shared.

Violation Of This Rule Will Result In Immediate Disqualification.

REGISTRATION PROCESS AND DEADLINES

1 _ Registration Steps :

- **Online Registration :** Teams Must Complete An Official Registration Form
- **Confirmation :** A Confirmation Email Will Be Sent Upon Successful Registration And After Acceptation.
- A Single Institution Or Organization Can Have Multiple Teams, But Team Members Cannot Be Shared.

2 _ Final Submission Deadline : 20th April 2025 – No Changes Allowed After This Date.

CODE OF CONDUCT

1 _ Respect & Fair Play : All Participants Must Respect Competitors, Judges, And Organizers.

2 _ Ethical Participation :

- No Plagiarism Or Use Of Pre-Built Commercial Robotic Arms Without Modification.
- No Tampering, Sabotage, Or Unethical Behavior Towards Other Teams' Robots.

3 _ Judging & Disputes :

- Teams Must Accept Judges’ Decisions As Judges Have Full Authority To Disqualify Teams On The Spot If Misconduct Is Observed.

4 _ Online & Offline Behavior :

- No Harassment, Hate Speech, Or Offensive Behavior On Any Official Communication Platforms.
- Misuse Of Social Media For Negative Campaigning Is Strictly Prohibited.

SAFETY GUIDELINES

1 _ Robot Safety Requirements :

- All Robots Must Have An Emergency Stop Mechanism.
- Sharp, Hazardous, Or Explosive Materials Are Strictly Prohibited.

2 _ Electrical & Mechanical Safety :

- Proper Insulation And Wiring Are Required.
- Only Approved Power Sources May Be Used

CHAPTER 03

TECHNICAL SPECIFICATIONS

3.1 ROBOT SPECIFICATIONS:

1 _ Only One Robotic Arm Is Allowed Per Team, Participants Are Allowed To Only Change The Gripper.

2 _ Maximum Dimensions: Base :30cmX30cm, Length: 120cm.

3 _ Robot Type:

- Only Custom-Designed Robots Are Allowed, Kits Such As LEGO Technic Or Ready-Made Robotic Arms Are Prohibited.
- Robots Must Incorporate Off The Shelf Components , Like Sensors , Microcontrollers, Actuators...Etc
- The Type Of The Robotic Arm (DoF, Servo-Based/Stepper-Based,Etc....) Is Not Constrained As Long As It Can Perform The Tasks Below.
- Only 230 Volts Outlets Are Provided As Power Source

2 _ Electrical & Mechanical Safety :

- Proper Insulation And Wiring Are Required.
- Only Approved Power Sources May Be Used(You May Bring Your Own Power Supply)

3.2 CONTROL SYSTEM & SOFTWARE:

- OpenCV Is Allowed.
- The Robotic Arm Control Must Be Autonomus For All Tasks .
- No Restrictions Concerning Sensors And Actuators.

3.3 DESIGN AESTHETICS (TRON THEME INTEGRATION):

In Addition To Technical Performance, Teams Are Encouraged To Embrace A Creative Design Approach That Reflects The Tron: Legacy Theme

- Participants Are Encouraged To Incorporate Neon Lights, LED Strips, Blue, Cyan, Orange, And White Tones To Mimic The Iconic Visual Style Of The Tron Universe.
- Specific Design Elements Drawn From Tron: Legacy Are Highly Encouraged Including:
  - Smooth, Futuristic Curves Or Edges In The Arm’s Frame
  - Geometric Patterns Or Etched Paneling That Resemble The Grid Environment
  - Digital-Looking Textures Or Symbols, Inspired By Some Elements In The Movie
- Teams That Successfully Integrate The Tron Aesthetic In Their Design Will Be Eligible For Bonus Points.

3.4 COMPETITION ARENA:

- The Tasks Will Be Performed On A 1 Meter By 1 Meter Arena.

3.5 COMPLIANCE & INSPECTION

- The Robotic Arms Will Be Inspected And Tested Before The Start Of The Competetion, Any Violation Of The Rules Will Result In A Penalty.

CHAPTER 04

COMPETITION TASKS & SCORING

CHALLENGE 01 : OBJECT SORTING

1 _ Challenge Goal :

- Simulate Industrial Sorting And Logistics By Testing The Robot’s Ability To Accurately Identify, Grasp, And Place Objects In Designated Locations While Optimizing Speed And Precision.

2 _ Task Description :

- Within A 1m X 1m Workspace, A Robotic Arm Autonomously Sorts Colored Cubes And Dodecahedrons, Retrieving Them From Two Top Zones Of 30 Cm X 20 Cm And Accurately Placing Them Into Three Color-Coded Bottom Boxes (Red, Blue And Green).

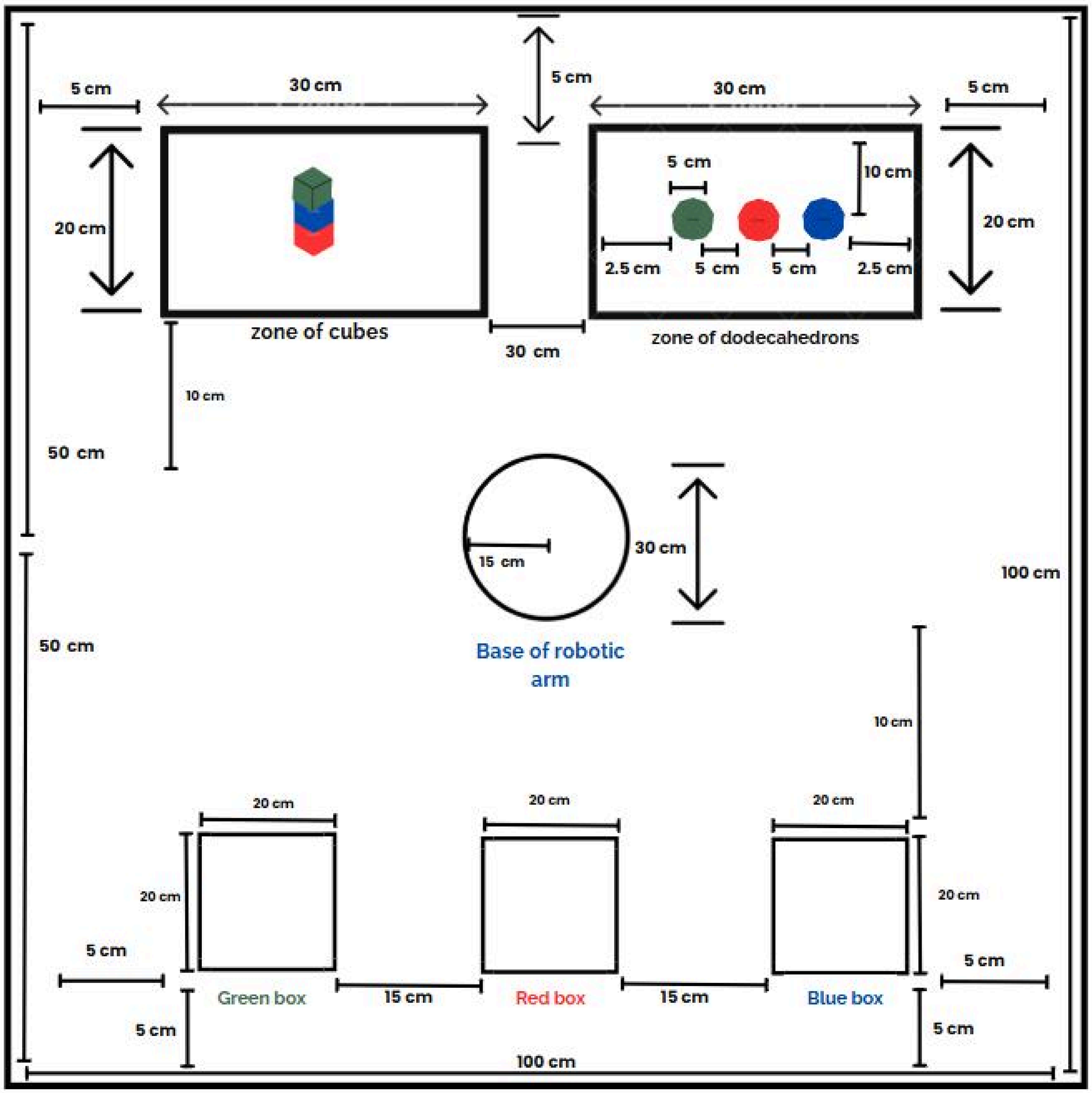
3 _ Objectives :

- Accurate Color Sorting: The Robotic Arm Must Successfully Sort The Objects (Cubes And Dodecahedrons) Into The Boxes That Match Their Respective Colors.
- Precise Object Placement: The Robotic Arm Needs To Place The Objects Within The Target Boxes Without Errors.
- Efficient Operation: The Robotic Arm Should Complete The Sorting Task In A Reasonable Time And Potentially With Minimal Movements.
- Successful Task Completion: The Overall Aim Is To Have The Objects Correctly Sorted Within The Given Workspace And Constraints.

4 _ Some Specifications :

- Cubes Have Dimensions Of 5 Cm × 5 Cm ×5 Cm And Are Stacked.
- Dodecahedrons Have A Diameter Of 5cm.
- The Height Of Each Sorting Box Is 15 Cm.

5 _ Design :



Task 01: Object Sorting

6 _ Timing : Time Limit: 4 Minutes For Each Attempt.

7 _ Trials :

- Each Team Gets Two Attempts For All The Tasks, The Higher Scoring Attempt Will Be Considered.

8 _ Scoring System :

- +5 Points For Correctly Picking An Object.
- +5points For Placing It In The Correct Sorting Box.
- -3 Points For Placing An Object In The Wrong Box.

9 _ Bonus :

- Teams That Complete The Challenge Before The 4-Minute Limit Earn +1 Point Per 10 Seconds Remaining.

10 _ Penalties :

- An Arm That Doesnt Start The Picking Process In Less Than 30 Seconds Will Lose The Attempt.

Hint :

- Bare In Mind The Friction Aspect When Designing The Gripper.

CHALLENGE 02: SCREW DRIVING

1 _ Challenge Goal :

- Mimic Robotic Screw-Driving In Assembly Lines, By Ensuring Precise Depth Control And Efficient Tool Handling, With An Added Challenge For Using Dedicated Grippers.

2 _ Task Description :

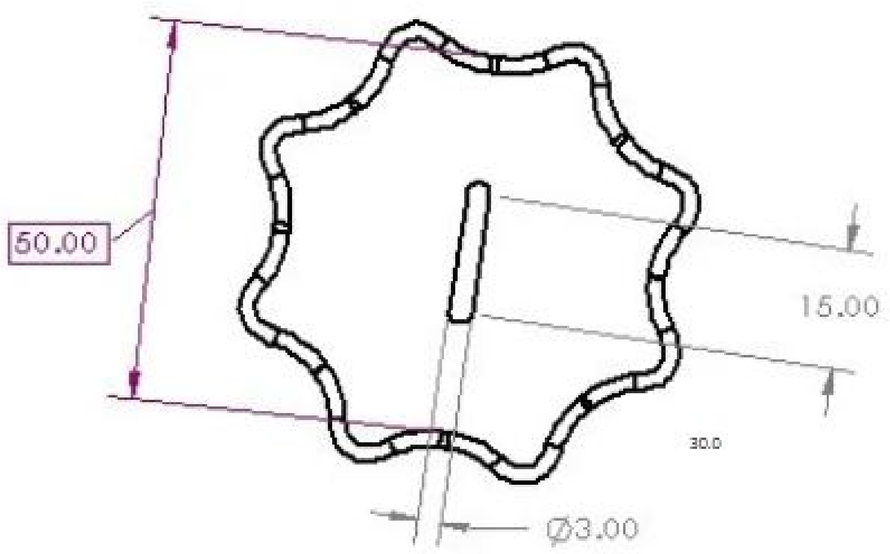
- The Screw Challenge Requires A Robotic Arm To Precisely Manipulate And Drive Two Distinct Types Of Screws That Are Partially Driven Into A Surface. The Goal Is To Drive The Screws To A Specified Depth With High Precision.. Additional Points Are Given To The Arms Using A Dedicated Gripper To Drive The Screws.

3 _ Objectives :

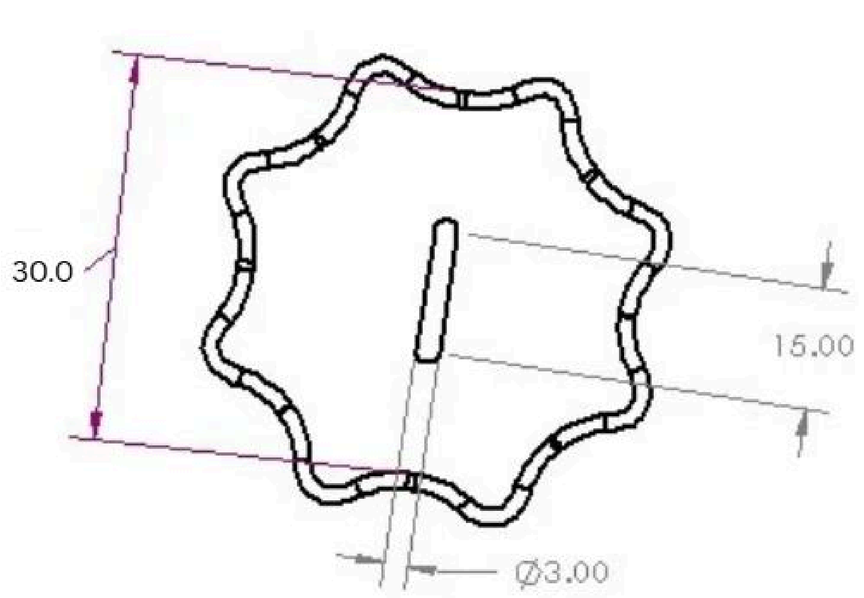
- Drive Each Screw Fully. (Pitch Of The Screws 5 mm/Turn)
- Optimize The Screwing Strategy For Speed And Stability
- Use A Dedicated Gripper To Drive The Screws

4 _ Some Specifications :

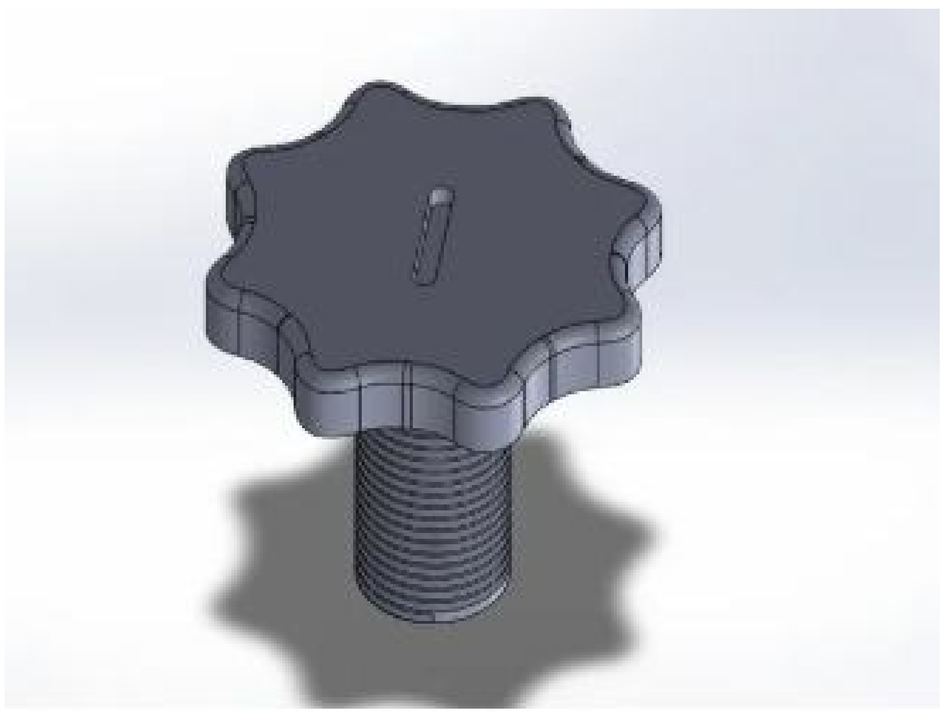
Screw 1

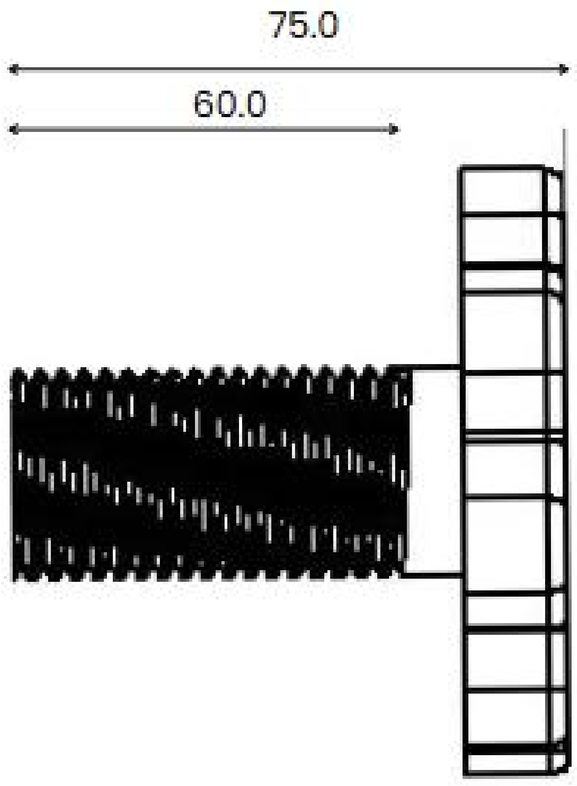


Screw 2

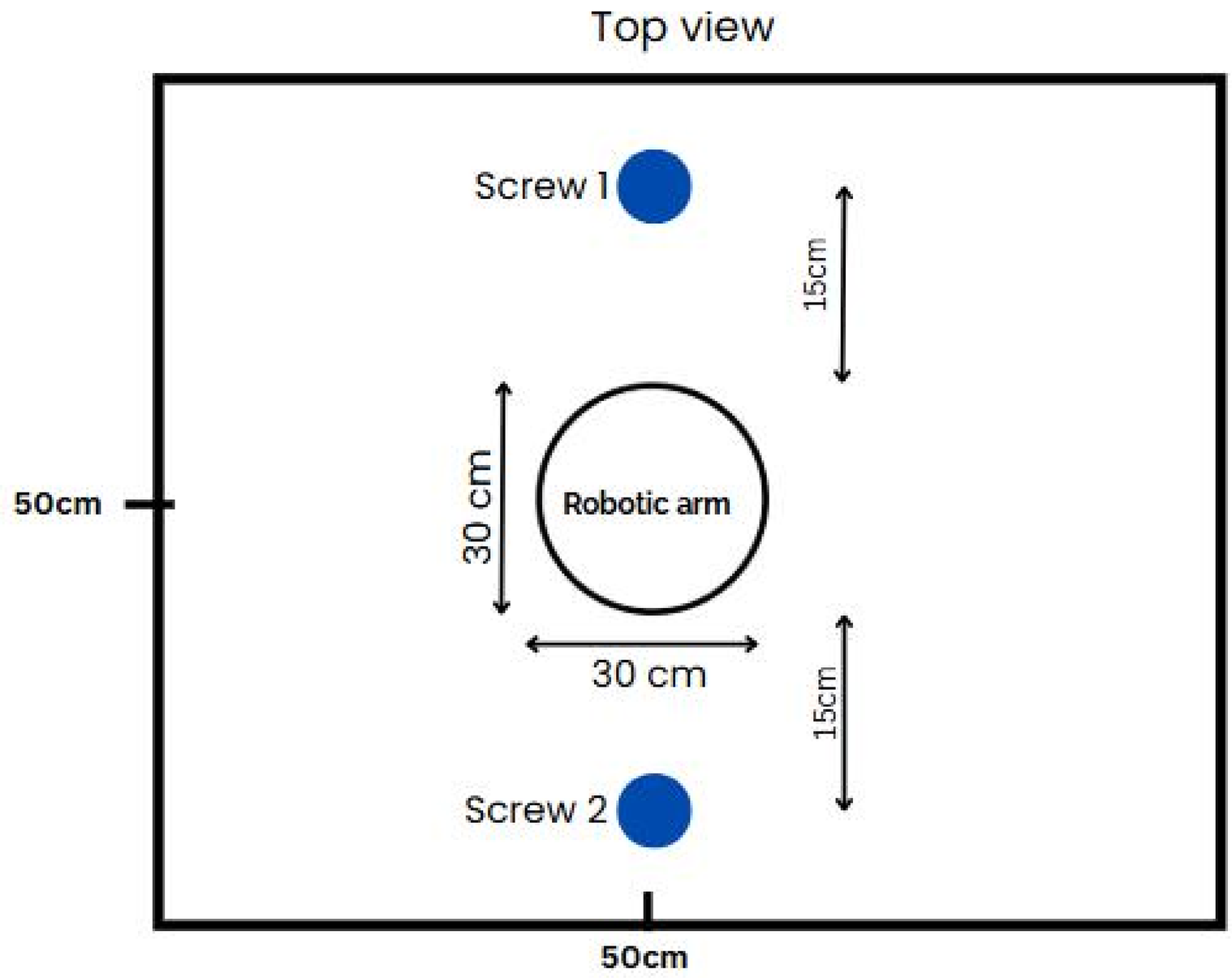


Dimensions are in mm





5 _ Design :



Cross-Sectional View Of A Single Screw

Task 02: Screw Driving

6 _ Timing :

- 2 Minutes For Each Attempt.
- 1 Minute Is Given For Each Screw.

7 _ Trials :

- Each Team Gets Two Attempts, The Attempt With The Highest Score Will Be Considered.

8 _ Scoring System :

- Screw 1 : 5cm Of Diameter, 20 Pts
- Screw 2: 3cm Of Diameter, 25 Pts

9 _ Bonus :

- Teams That Complete The Challenge Before The 2-Minute Limit Earn +1 Point Per 10 Second Remaining.

Hint :

- Participants Are Allowed To Change The Gripper Of Their Arm To Aa Screw Driver - Like Mechanism Or Use The Pinch Gripper Form The Previous Task To Rotate.

CHALLENGE 03 : PYRAMID BUILDING

1 _ Challenge Goal :

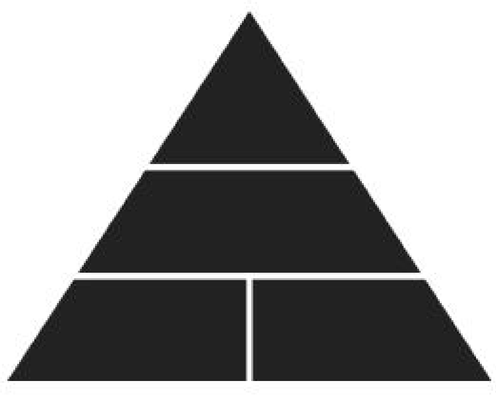
- Replicate Structured Stacking By Requiring The Robotic Arm To Assemble A Stable, Multi-Layered Structure With Controlled Placement And Balance.

2 _ Task Description :

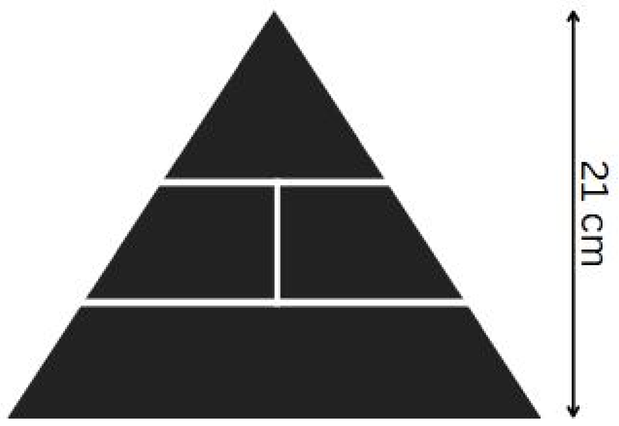
- This Challenge Requires Teams To Make Their Robotic Arm Assemble A Pyramid From A Set Of Provided Disassembled Components, Ensuring Correct Layering And Orientation To Achieve A Complete Structure.

3 _ Design :

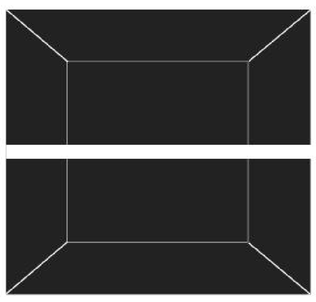
Front View Of The Pyramid



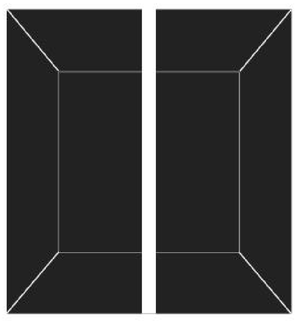
Side View Of The Pyramid



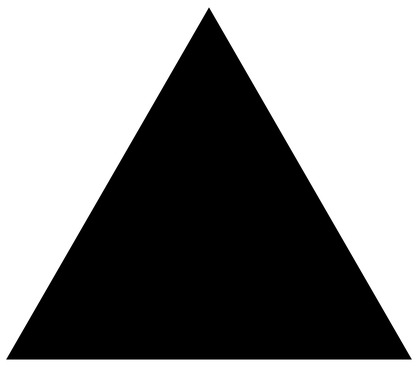
Top View Of The First Layer



Top View Of The Second Layer

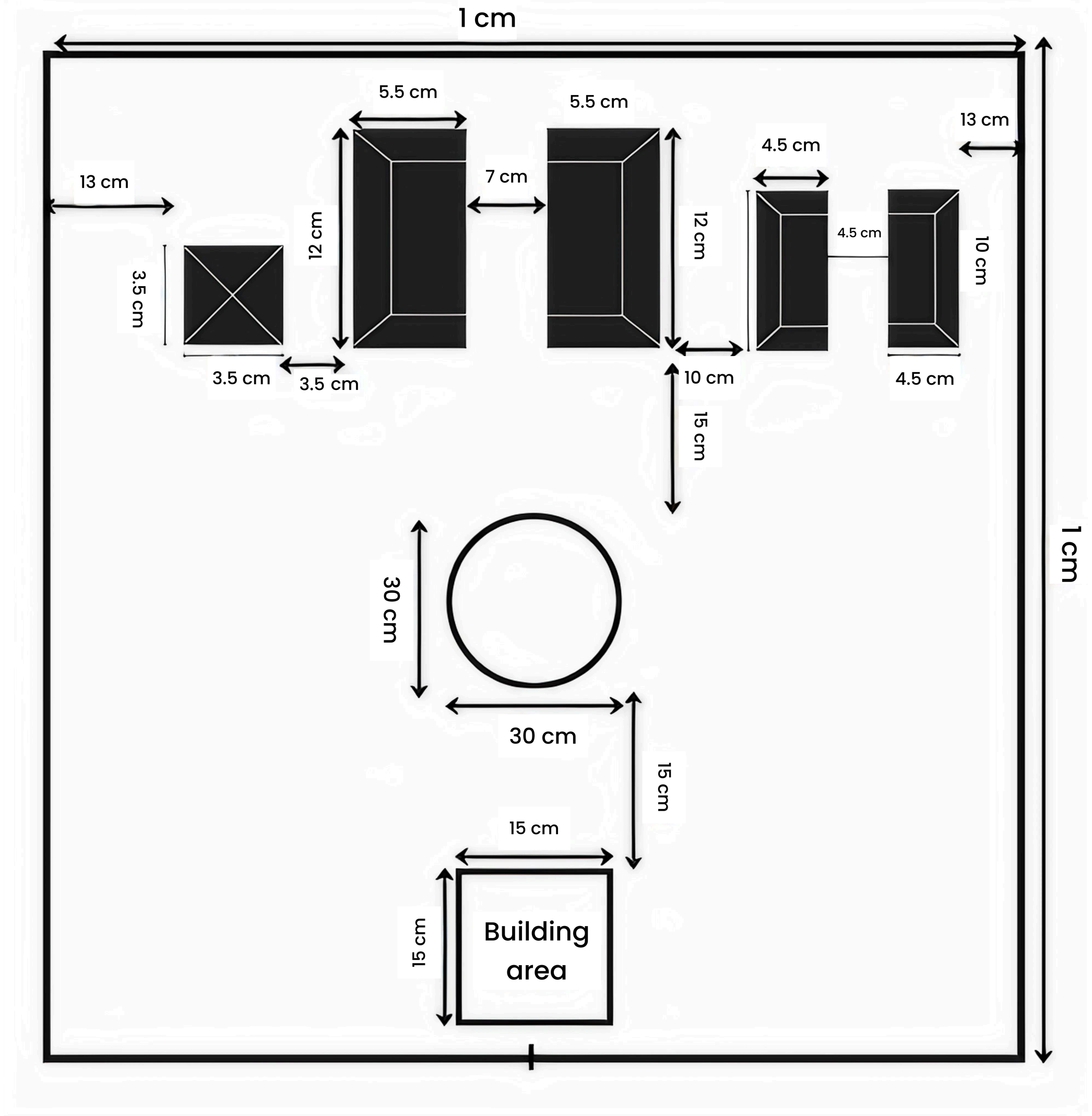


Last Layer Is A Small Pyramid



Note : Each Layer Is 7 Cm High

5 _ Design :



Task 03 : Pyramid Building

6 _ Time Limit : 5 Minutes For Each Attempt.

7 _ Scoring System :

- +10 Points For Correctly Assembling The First Layer (5 Points For Each Piece).
- +10 Points For Correctly Assembling The Second Layer.
- +15 Points For Correctly Placing The Top Pyramid Piece.

9 _ Bonus :

- Teams That Complete The Challenge Before The 5-Minute Limit Earn +1 Point Per 5 Seconds Remaining.

10 _ Penalties :

- -2 Points For Incorrect Placement Or Dropping A Piece.
- Participants May Restart The Placement If A Misplacement Occurs.
- After Two Misplacements, The Attempt Will Be Forfeited.

Remark :

- Dropping Or Misplacing One Piece Will Require The Team To Restart The Building From The 1st Layer.

Hint :

- To Aid The Robotic Arm In Grasping, The Titled Faces Of The Blocks Includes Bumpy, Contoured Surfaces, Increasing Friction And Preventing Slippage During Manipulation

CHALLENGE 04 : ISC PAINTING(OPTIONAL)

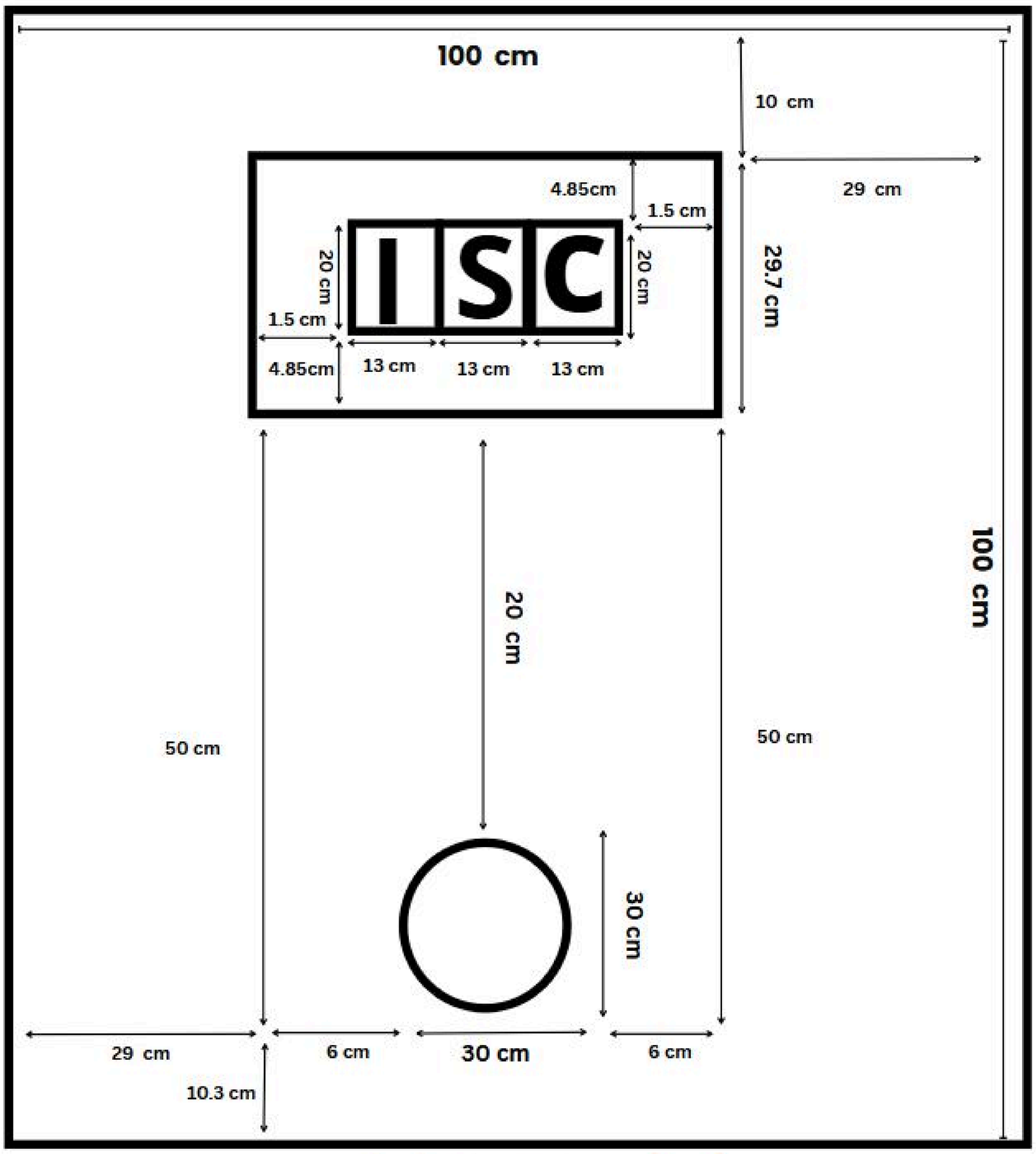
1 _ Challenge Goal :

- The Goal Of This Challenge Is To Mimic The Industrial Process Of Soldering.

2 _ Task Description :

- On This Challenge Participants Are Asked To Use A Simple Painting Tool To Mark "ISC" On An A3 Paper, The Painting Tool Is Of Participants' Choice.

3 _ Design :



Task 04 : ISC Painting

COMPETITION TASKS & SCORING

4 _ Time Limit :

- 5 Minutes To Complete The Challenge.
- 2 Minutes 30 Seconds For Each Trial.

5 _ Scoring System :

- +10 Points For Writing The First Letter(I).
- +10 Points For Writing The Second Letter(S).
- +10 Points For Writing The Third Letter(C).
- +1 Point For Each 10 Seconds Remaining.

6 _ Penalties :

- -2 Points If You Exceed The Space Allocated For Writing The Required Letter.

SCORING SYSTEM

Participants Will Be Ranked Based On Their Scores. The Team With The Highest Score Will Be The First-Place Winner.

The Final Score Follows This Format :

S = P+B+T-D

S: Score

P: Points Earned From Successful Actions

B: Bonus

T: Task Completion

D: Penalty Deduction

Tr: Remining Time

Task	Max Points To Earn	Task Completion Bonus
60+Tr	1	5
25+Tr	2	5
35+Tr	3	5
30+Tr	4	5

Note :

- In Case Of A Tie, The Team With More Accurately Faster Completion Will Win.
- Designs That Follow Tron Theme Will Be Awarded 1 To 10 Points

THANK YOU !