ROBOSOFT 2027 WILD COMPETITION

RELEASE HISTORY

Version	Description	Approval Date
Version_v1	Document is released on 30th October 2026	

Purpose

This document describes the scenarios and rules for the RoboSoft 2027 Competitions: Wild Manipulation and Wild Locomotion. It serves as the primary source for rules and scoring. [1]

The RoboSoft 2027 competition scenarios and rules are planned with the goal of giving teams achievable entry points, with progressively more demanding tasks to challenge teams, motivate innovation and provide opportunities to demonstrate useful soft robot capabilities. To that end, scores are derived from observable task outcomes wherever possible. Ultimately, however, the competition is intended to be a positive experience that is welcoming to newcomers to the field. Soft robotics is hard, and everyone that wants to contribute is welcome!

Document status

This Rulebook Version 1 sets out the shared competition framework and rules for both competitions.

Release requirements

This rulebook defines the competition format. Final dimensions, facilities and access details will be released in the open access Google Drive folder.

Competition Details

Date: 5-7 April 2027

[Note: competition activities are planned to span multiple days, but will not take the entirety of each day].

Venue: Brisbane Convention & Exhibition Centre

Competition Chairs and Authors: Gina Olson, Xing Wang

Competition Local Chair: Ge Shi

[1] The organisers can change and refine all the rules until the first day of the RoboSoft Competition (5th April, 2027). Please check our website (https://robosoft27.com/) regularly for the latest version.

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1 Competition Overview

1.1 Objectives

The competition evaluates intelligent soft robotic systems through physical tasks that require robust wild interaction with objects and/or environments. Soft elements must enable a relevant function. The format supports diverse robot architectures and levels of development, with partial credit awarded for meaningful progress toward task completion and demonstrated soft-robot capabilities.

1.2 Challenges

Challenge	**Scope in this version**
Wild Manipulation	Rules for (1) diverse object grasping, (2) cluttered retrieval, and (3) firmness sorting with safe handling.
Wild Locomotion	Rules for locomotion challenge and scoring; arena dimensions still subject to change; transition surface not yet specified.

The two Challenges are separate competition categories. This document first defines the Wild Manipulation challenge, as shown in Section 5.1. Locomotion challenge details are given in Section 5.2.

1.3 Participation across Challenges

Teams may apply for either or both Challenges. A team may use the same robot or different robots across Challenges. Submit a **separate entry** for each Challenge and each distinct robot design. Each entry is reviewed and ranked independently.

Teams may include students, researchers and other collaborators. Each entry names a team leader (corresponding person) and its operators. Shared personnel or equipment must be declared so that the organiser can assess scheduling feasibility before accepting entries.

The number of teams selected to partake in the challenge is limited by logistics, but the organizers will seek to maximize the number of teams within the following parameters: sufficient onsite resources to each team (e.g., table space, power, competition time); allowable time in conference schedule; availability of personnel to run the competitions. In the event of a high number of entries, the organizers may ask teams entering both challenges to state a preference for one or the other.

1.4 Official information

The Website Announcement will be made from the official website (https://robosoft27.com/) by competition chairs, technical contact or media chair. The website hosts the current rulebook, files, clarifications and revision history.

Within this rulebook, Sections 1 to 4 apply to the entire competition. Sections 5.1 and 6.1 define the Wild Manipulation Challenge, while Sections 5.2 and 6.2 define the Wild Locomotion Challenge.

Challenge-specific procedures govern their own timing, scoring, and task requirements, while general safety and conduct requirements apply throughout the event. Any apparent conflicts must be resolved through a published clarification before affected teams compete.

1.5 Notes

This rulebook is subject to changes and refinement until the first day of the RoboSoft Competition (5th April, 2027)

In case of any questions regarding the technical and logistics, please contact the Competition Chairs Gina Olson (mailto:ginaolson@umass.edu), Xing Wang (mailto:xing.wang@canberra.edu.au) and Competition Local Chair Ge Shi (mailto:Ge.Shi@csiro.au).

2 Venue and Schedule

2.1 Venue and facilities

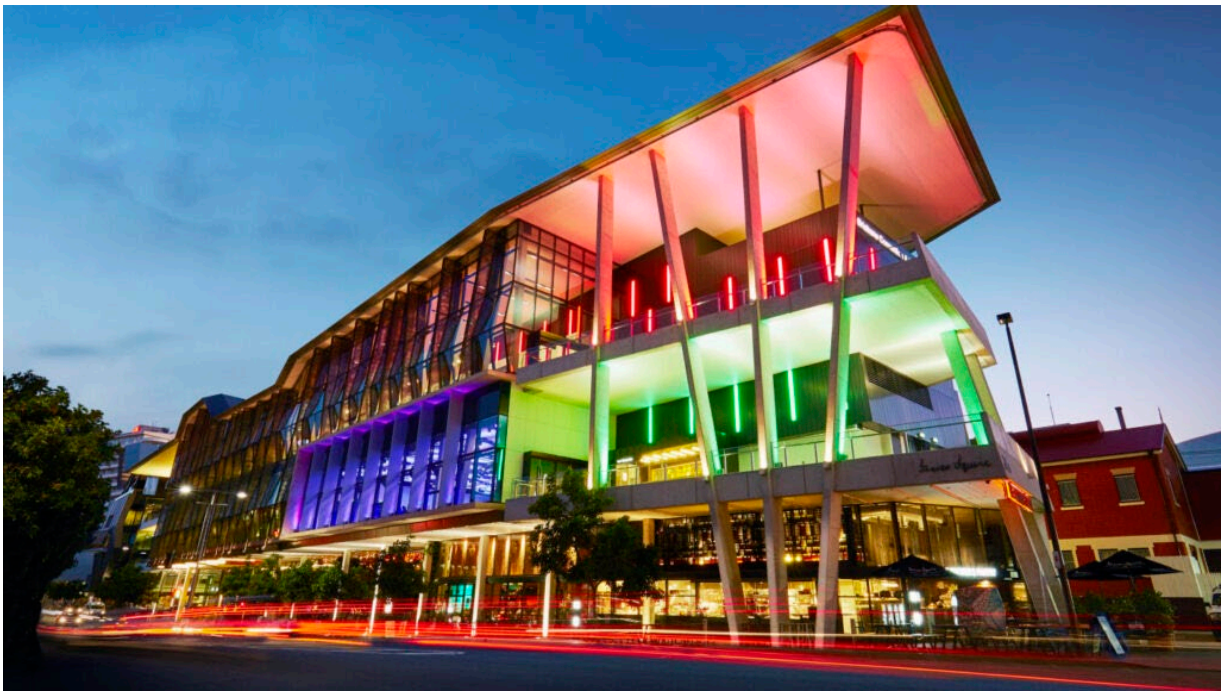

Fig: RoboSoft 2027 will be held at the Brisbane Convention & Exhibition Centre (BCEC)

RoboSoft 2027 Wild Competition will take place in the *Plaza Terrace Room* (883m^2) at Brisbane Convention & Exhibition Centre between 5-7 April 2027. The initial layout of the competition is shown below.

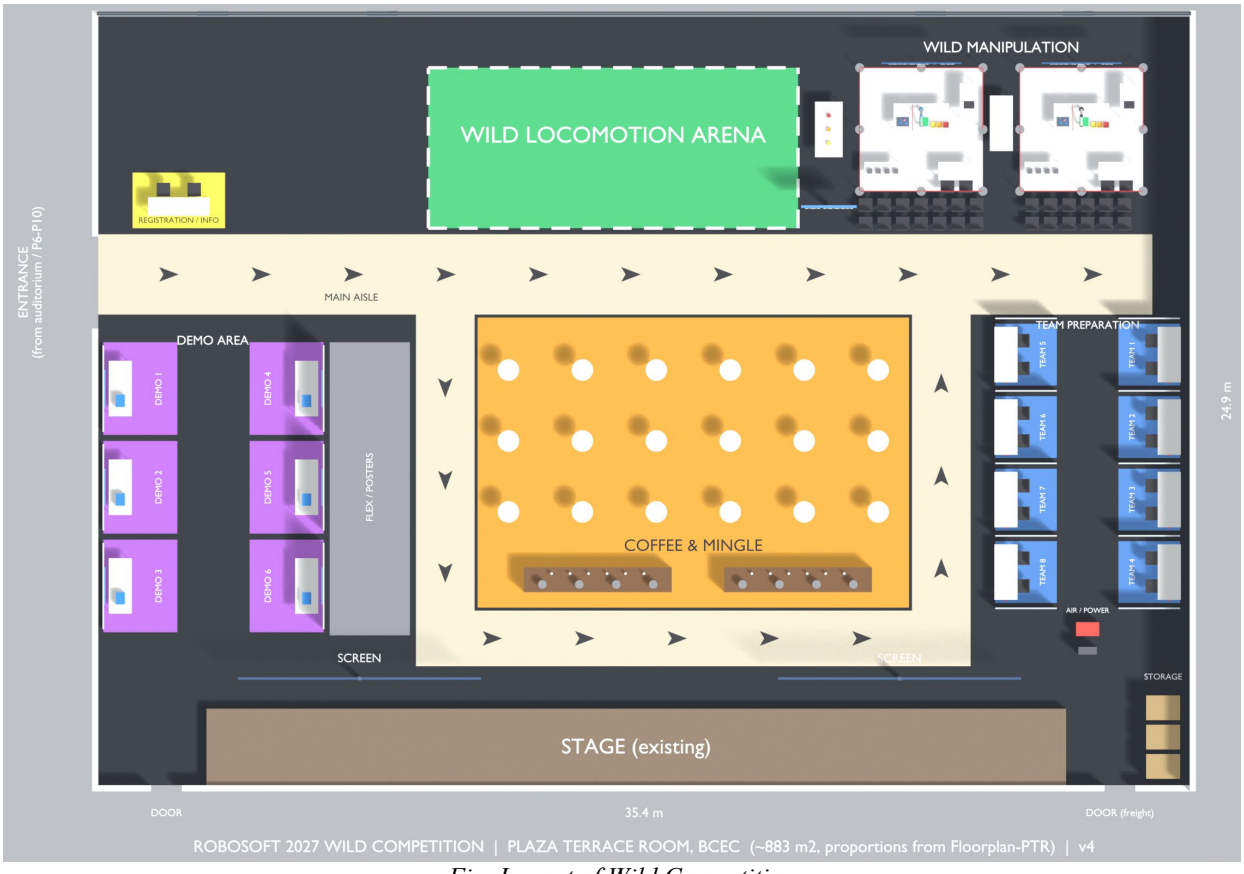

Fig. Layout of Wild Competition

2.2 Schedule

A preliminary schedule of the competition is shown below (subject to revision if needed).

Day	Date	Events
1	5 April 2027	○ Teams' arrival and registration ○ Team set-up and safety inspection ○ Afternoon: final configuration check and release of competition objects
2	6 April 2027	○ Wild Manipulation Qualification Round (list Top 3 Teams) ○ Wild Manipulation Final Round
3	7 April 2027	○ Wild Locomotion Qualification Round (list Top 3 Teams) ○ Wild Locomotion Finals Round ○ Closing Ceremony: Competition Awards Ceremony

Teams should arrive on Day 1 (5th April) to set up and test their systems. A working area is provided for each team; its size, allocation and facilities are as shown in the layout figure.

The venue will be equipped with the following:

- Manipulation Arena: Franka Arm FR3*2, both mounted on the workbench
- RealSense D435i *1
- 1 table per team
- 230V, 50Hz, power extension (10A)
- Internet (Wi-Fi)
- Compressed air: 1MPa Maximum, 6&8 mm Tube (shared equipment)

The committee will evaluate requests for additional equipment.
However, teams should bring all the materials and equipment they need and declare their space, power, air and network needs in the technical description.

For Wild Manipulation, practice should be booked with equal access and labelled Task 3 references (21 minutes). After the configuration check, Task 1 objects and Task 2 scenes are revealed to all teams together. Only declared gripper and matching control-profile swaps between tasks, and identical-spare repairs, are allowed. Teams may inspect scored objects visually but may not handle them. Task 3 classes and order remain confidential.

For Wild Locomotion, two practice periods of 20 minutes are allowed. While the practice will be supervised, draft scoring *will not* be available.

3 Submission Procedure

3.1 Application materials

A pre-submission is required to ensure that participating teams demonstrate a minimum level of technical readiness and competence.

Each entry should submit a technical description and a video of no more than 2 minutes through the official application channel. The description identifies the Challenge, team leader, robot architecture, soft robots, current capabilities, intended improvements, control mode, sensors, footprint and utility requirements (link available under Section 3.3).

The video must show the submitted system performing at least one relevant basic skill.

- For Wild Manipulation, demonstrate grasping and placing or another directly relevant contact-handling skill, and show the functional contribution of **softness**. A full competition run is not required for eligibility.
- For Wild Locomotion, we recommend demonstrating locomotion on a reasonable stand-in terrain in order to show progress that suggests likely completion by the competition. A full competition run is not required.

3.2 Eligibility and Softness

Material compliance, structural compliance or both are acceptable. The compliant component must clearly enable a relevant robot function, e.g., not just added for show. Describe the mechanism and show how compliance is central to the robot; decorative soft **coverings alone** do not establish eligibility.

A technical committee evaluates demonstrated capability, relevance, safety information and compatibility with the published arena. There is no separate innovation score or requirement to establish research novelty.

3.3 Application and confirmation timeline

Date	**Milestone**	**Required action**
18th Jan 2027	Application deadline	Submit the entry and video via online form (RoboSoft Competition Form).
25th Jan 2027	Acceptance notification	Organiser issues acceptance, conditions or a reasoned decision.
15th Mar 2027	Participation confirmation	Team confirms attendance, operators and equipment needs.
5th Apr 2027	On-site registration	Verify entry identity and complete physical safety inspection.

The Website Announcement shall specify all relevant dates, including the deadline for rule changes and the practice timetable. Registration shall not open until all essential arena, utility, and participation requirements have been clearly defined and published.

4 General Rules and Restrictions

4.1 Technical review and safety inspection

Participation is subject to technical review and on-site safety inspection. Teams must declare relevant hazards, operational limits, utility requirements, and emergency-stop procedures. Robots may not operate until identified safety concerns have been resolved.

4.2 Teams and operators

Up to **two** registered operators may enter the designated operating area when the robot is not in operation. The team leader serves as the primary point of contact for official communications. Anyone may call an emergency stop. No person may enter a robot workspace while the robot is in operation. Please note that this includes entering the arena to release tether snags during locomotion; in the event of a tether snag, teams must either attempt to release it only through robot movement or declare an end to that run.

4.3 Equipment and external sensors

Teams must declare all robot systems, controllers, sensors, and external fixtures used during competition. Competition objects, arenas, and infrastructure may not be modified without prior approval. External sensors and supports must keep access routes and the judge's view clear. Similarly, the robot action should not permanently alter the state of the test arena, e.g., a robot may not locomote across small rocks by throwing all the rocks out of the bin.

4.4 Conduct and stop decisions

Teams must not interfere with other entries, competition equipment, or the judging process. The judge may suspend a run or disqualify an entry for unsafe operation, rule violations, or deliberate interference.

4.5 Control modes for Wild Manipulation

Mode	Definition
Fully autonomous	After the start command, the system selects and executes actions and any classification without human commands or tuning. Emergency stop remains available.
Supervised autonomy	A human may select high-level actions or authorise state transitions, while the robot executes the underlying motions. Record the permitted commands.
Teleoperation	A human directly commands motion, actuation or equivalent low-level behaviour. VR and other interfaces are acceptable when declared.

Teams must declare their operating mode before each run. Record any operator assistance; the least autonomous mode used determines a mixed run's verified mode. Emergency stopping alone does not change the mode. Operator control, human classification or in-run tuning may make a run ineligible for the Autonomous Performance Award.

All modes use the **same** scoring system.

4.5 Control modes for Wild Locomotion

Mode	Definition
Fully autonomous	After the start command, the system selects and executes actions and any classification without human commands or in-attempt tuning. Emergency stop remains available.
Untethered teleoperation	A human commands the robot movement, either through actuator-level commands, motion primitives or similar, and those commands are delivered without wires. Power is onboard.
Tethered Teleoperation	A human commands the robot movement, either through actuator-level commands, motion primitives or similar. Some aspect – either those commands or power – is delivered over a wire, e.g. command + power over wire; power over wire and wireless commands, etc

Teams must declare their operating mode before each run. Untethered teleoperation provides a small score bonus. Any teams operating fully autonomously are separately eligible for the Autonomous Performance Award.

4.6 Rule governance

The competition shall maintain a single published rulebook and revision history. Rule clarifications interpret existing rules and shall be made available to all teams.

Any change affecting eligibility, scoring, task difficulty, or attempt allowances must be published as a rulebook revision or formal amendment.

4.7 Awards and recognition

All teams participate in Qualification. Up to three highest-ranked teams advance to the Final; if three or fewer teams compete, all advances. Awards are determined from Final results. *Robots may be repaired between qualification and final, or between runs as time allows, but should be essentially the same robot.*

For Wild Manipulation, Winner requires at least two eligible entries, Runner-up at least three, and Third Place at least four. Ranking and tie-breaking procedures are defined in Section 6.1.

No overall ranking across challenges is defined. Any prizes or additional awards shall be announced before registration opens (5th Apr 2027).

The organiser may establish a separate **Autonomous Performance Award**, which is assessed on Qualification Round runs. Eligibility requirements will be announced before registration and shall not affect the main Challenge ranking. A start command is permitted, but operator control, human-assisted decision making, and in-run parameter tuning are not.

5 Competition Challenges

5.1 Wild Manipulation

5.1.1 Purpose and scenario

Wild Manipulation evaluates the ability of soft robotic systems to interact effectively with diverse objects and environments. The Challenge assesses the complete manipulation system, including the end effector, manipulator, sensing, control, and decision-making components. A calibrated RealSense camera will be provided with the Franka arm.

The three tasks represent a progressive manipulation scenario. Task 1 evaluates reliable grasping and placement of objects with diverse shapes, sizes, surfaces, and compliance. Task 2 evaluates target retrieval in clutter environment, requiring manipulation while preserving the surrounding environment. Task 3 evaluates contact-informed manipulation: samples are visually indistinguishable but differ in firmness, requiring the robot to acquire information through interaction and use it to guide safe handling and sorting.

Together, the tasks progress from basic object handling to manipulation in cluttered environments, to manipulation informed by physical understanding. Scoring rewards both successful task completion and meaningful progress toward task objectives. Teams may continue to subsequent rounds regardless of performance in earlier rounds.

5.1.2 Competition format

Wild Manipulation consists of **Qualification** and a **Final**. All teams participate in Qualification; up to 3 advances under Section 6.1.6.2. Both stages use the same tasks and scoring system. There is no separate novelty requirement.

Each accepted entry receives one Qualification run of 13 rounds; finalists receive a second run of 13 rounds in the Final Round. A permitted retry forms part of the same round and is not considered an additional competition run.

Task	Rounds	Score Per round	Total Score	Active time
1. Diverse Object Grasping	6	5	30	1.5 min each round
2. Cluttered Object Retrieval	3	10	30	2 min each round
3. Firmness Sorting and Safe Manipulation	4	10	40	1.5 min each round
Manipulation total	13		100	21 min maximum

Each round is evaluated through defined checkpoints. Teams retain points earned during an incomplete attempt and may continue to subsequent rounds.

Qualification Round: Up to two attempts are permitted within the allocated round time. Only the better attempt is scored, and points from different attempts may not be combined.

Final Round: one attempt per round, with no retry. The same Task 1 object set, and different Task 2 scene types are used, with layouts as uniform as possible (e.g clutter) for every finalist. Task 3 uses updated samples with the common hidden class mix and randomised order described in Section 5.1.8.1.

Speed does not contribute to the score, and a permitted retry carries no penalty. Damage, safety incidents, and other exceptions are governed by the relevant Challenge rules.

5.1.3 Reading this Challenge

Detailed scoring and ranking are specified in Section 6.1.

5.1.4 Arena and equipment

5.1.4.1 System provision

Teams may bring a complete system or request the shared Franka FR3. The organiser provides each shared arm and its native controller. Teams bring their gripper, adapter, gripper controller, cables, computer and software. Interfaces and mounting details are published in advance; arm compatibility and access are confirmed before the event. If both stations are used, their task conditions must be equivalent.

Soft elements must contribute to task execution. Declared grippers and their matching control profiles may be swapped between tasks. Identical-spare repairs during a round use its active time.

5.1.4.2 Planning dimensions

Element	Planning dimensions	Use
Main competition table	1.8 × 0.9 m	Robot and interchangeable task props
Clutter tray	About 0.40 × 0.30 m	Three separately prepared scenes
Spare and prop table	1.2 × 0.6 m	Replacement props in neutral containers; labelled Task 3 reference samples stay outside the workstation during Task 3
Competition workstation	About 4 × 4 m	Robot, officials and controlled access
Eight teamwork areas	About 2 × 2 m each	Preparation outside the workstation

Element	Planning dimensions	Use
Manipulation area estimate	About 80-100 m²	This challenge only, including preparation, circulation and a small audience

The competition uses a standard workstation consisting of a robot mounting area, task workspace, and designated object-placement regions.

The robot shall be installed within the approved base position. All competition tasks must be executable from this location, and teams using their own robot shall demonstrate reachability to all published task locations during technical inspection.

Task objects, transfer lines, destination zones, and Task 3 classification bins are clearly identified within the workspace. Only the published competition layout may be used during scored runs.

5.1.4.3 Layout release

All scored runs shall use the published competition layout. Teams may not modify official markers, task areas, or destination locations unless explicitly authorised by the organiser.

5.1.5 Round procedure and timing

5.1.5.1 Start and finish

Each round begins when the referee issues the start signal. The robot shall start from the published ready pose. Qualification permits up to two attempts sharing one round time allowance; the Final permits one. A round ends when:

- the maximum round score is reached (Task 1: 5; Task 2: 10; Task 3: 6 visible points: Lift: L, Hold: H, Transfer: T, Place: P, No drop: N);
- the allotted time expires or the team chooses to end or skip the round; or
- all attempts permitted in that stage have ended.

Only checkpoints fully completed before time expires score, including the full hold and settling periods.

- Task 1: 1.5 minutes per round (up to two Qualification attempts; one Final attempt)
- Task 2: 2 minutes per round (up to two Qualification attempts; one Final attempt)
- Task 3: 1.5 minutes per round (up to two Qualification attempts; one Final attempt)

The clock pauses when the judge announces a scene reset and resumes on the start signal. During a reset, teams may only return safely to the ready pose; decisions and repairs use active time.

5.1.5.2 Completion

An attempt ends after a valid placement has settled for 3 seconds, target damage, manual intervention, a team request to stop, time expiry or a judge stop. Robotic recovery of an accidental drop may continue within the same attempt.

A completed attempt below the round maximum may be retried in Qualification if time and an attempt remain. The Final has one attempt. Teams may skip any round and continue. Task 3 classification results remain hidden; attempt selection follows Section 6.1.

5.1.6 Task 1 Diverse Object Grasping

Objective: Pick up and place **diverse objects** using reliable and controlled manipulation.

Task 1 comprises six independent rounds of increasing difficulty. Only the current target is presented: transfer it from the source area to the designated target zone before moving to the next round.

Each round has a 1.5-minute time allowance. The same time allowance applies in the Final Round. The maximum Task 1 score is 30 points. Scoring is defined in Section 6.1.

Six geometrical distinct objects will be used for this task, including 2 EGAD objects printed with soft materials, 2 toys off the shelf, and 2 fragile objects (egg & Tofu). The exact CAD model will be published in the shared Google Drive Folder.

5.1.7 Task 2 Cluttered Object Retrieval

Objective: Retrieve a specified target object (same as Task 1) from a cluttered scene and place it in the designated target zone while minimising disturbance to surrounding objects.

Task 2 consists of three independent rounds of increasing difficulty:

- Round 1: Loose arrangement
- Round 2: Contacting objects
- Round 3: Partial occlusion

Before each round, teams are provided with the identity of the target object. Each round uses a separately prepared scene and does not depend on the outcome of previous rounds.

Each round has a 2-minute time allowance. The same time allowance applies in the Final Round. Scoring is defined in Section 6.1.

5.1.8 Task 3 Firmness Sorting and Safe Handling

Objective: Sort look-alike objects by firmness. The robot judges each sample through its own contact, declares Soft, Medium or Firm, and places it in the matching bin without dropping or damaging it.

Objects that look the same can need very different handling, for example when grading produce or sorting waste. Compliance lets a gripper feel these differences and stay gentle while doing so.

5.1.8.1 Sample set

Task 3 consists of four independent rounds using samples with matched external appearance. Each sample belongs to one of three firmness classes: **Soft**, **Medium**, or **Firm**.

The firmness class of each sample is set by the organiser's published measurement method and matches the labelled reference samples. The class mix is not disclosed. Each stage uses the same hidden class counts for all teams, in independently randomised order. A replacement must meet the same specifications and belong to the same hidden class. All Task 3 samples contain embedded sensing, so that excessive grasping force can be detected while firmness is evaluated. The robot must not damage a sample at any time.

Classification results remain hidden until all teams in that Round (Qualification/Final) have completed Task 3. Each round has a 1.5-minute time allowance. The same time allowance applies in the Final Round. Scoring is defined in Section 6.1.

5.1.8.2 Classification Declaration

Teams may contact, and regrasp before declaring Soft, Medium or Firm. Submit one declaration during an active attempt, after contact by the handling gripper and before the round’s first deliberate release. Without a valid declaration, Place: P, Declaration: D and Bin: B are all zero.

The declaration is locked for the entire round, including any permitted retry. A correct declaration may score classification points even if the handling task is not completed.

The selected destination bin must correspond to the declared class. Placement into a different bin does not constitute a new classification attempt and is scored according to Section 6.1.

An accidental drop before declaration does not prevent a later declaration. Damage ends the attempt, so declarations after damage or during reset are invalid. If none was locked and no deliberate release occurred, an available retry may declare after fresh contact.

5.1.8.3 Permitted information

Teams may use any approved sensors within their declared system, including tactile, force, pressure, motor-current, displacement, vision, or other robot-derived measurements. A teleoperator may interpret this information where permitted by the declared control mode.

Firmness classification must base on information acquired through the robot system. Team members may not samples by hand.

Classification contact must be made using the end effector that performs the handling task. Separate hardness-testing devices, whether handheld or robot-mounted, are not permitted.

5.2 Wild Locomotion

5.2.1 Purpose and Scenario

The goal of the locomotion challenge is to demonstrate inherently adaptive movement across wild-like terrains. The challenge mimics multiple natural terrains on a small scale, and teams are asked to develop a similarly small soft robot, with the goal of moving across as many different types of terrains as possible within the time limit. Scoring rewards tackling a high number of distinct terrains, moving quickly, as well as higher technical maturity (e.g. untethered). However, teams are allowed significant path customization for their runs, choosing which and how many terrains to attempt.

5.2.2 Competition Set-up

The locomotion challenge will take place on a custom arena that combines terrains through mats and low, long shallow plastic bins with transition or bridging features. Each mat or bin will contain a distinct terrain. A map that gives size and mat/bin layout will be added in the next revision, but currently each bin is expected to be around 0.5 m wide and 1 m long.

A key theme of this challenge is tackling reasonable variance in terrain. While pictures and links to sample materials will be provided in future revisions, along with approximate dimensions of each bin, exact dimensions will not be provided and terrains will have some variance.

5.2.2.1 Terrains

The following terrains are confirmed to appear. Additional detail will be added as material is procured. We anticipate adding additional terrains, some of which may be added as late as March 2026 as ‘challenge’ terrains.

1. Loose, dry sand, e.g., playbox sand
2. Artificial grass, e.g., turf roll
3. Small loose rock, e.g., aquarium gravel
4. Loose, dry dirt; consistency TBD
5. Shallow water over loose aquarium gravel
6. Rock slab, e.g., decorative split face granite boulder
7. Log (likely decorative round)

We are aiming for a total of at least 10 unique terrain types.

5.2.2.2 Definition of a Run

A single run consists of 15 minutes: 5 minutes of set-up and 10 minutes of locomotion time. Teams may select their own path, but “traversing” a terrain requires exiting out a different side than entering. Teams must pre-declare the intended path before beginning the locomotion time; see the scoring section for options to alter the path after the locomotion time begins.

Teams that reach their declared end point before 10 minutes have elapsed may choose to either attempt more terrains or declare an early end in exchange for a small multiplier on score (see scoring)

5.2.3 Locomotion Challenge Rules

This section presents the locomotion-specific rules. As a reminder, the general rules regarding robot safety and softness still apply. Traditional components such as motors within the robot are permissible (e.g., tendon-driven actuation of an otherwise soft robot), but motors driving wheels is not permissible.

1. Ground contact: The robot must maintain ground contact for the majority of each run. Flying or flying jumps, even with brief touchdowns, is not allowed. Borderline cases will be evaluated by the following criteria: is the locomotion foundationally terrestrial; is it foundationally controllable; could the approach reasonably be used in wild or natural settings, where overhanging obstacles such as branches may be present.
2. Size: the robot must fit within a 20 cm x 20 cm x 15 cm box. Any included tether may be exempted from the box size limit if and only if it only contains communications lines, “power” lines (air, electrical, etc), an enclosing wrap and is less than 2 cm in diameter.
3. All robots that attempt the water terrain must be demonstrably safe in water, with no exposed wiring, appropriate precautions for all high voltage actuators, etc.

5.2.4 Qualifying and Finals

During qualifying, teams will have two runs; the higher of the two scores will be used for qualifying. During the finals, each team will have only one run.

6 Scoring

6.1 Wild Manipulation

6.1.1 Common checkpoint definitions

Controlled handling means the system deliberately supports or constrains the target. The object must not be thrown, launched or dragged across a transfer line to claim airborne transfer. The organiser provides visible reference markings so judges can assess clearances and boundaries consistently.

Term	Judging definition
Lift	The whole target is clear of its support. Tasks 1 and 3 additionally require its lowest point to be at least 30 mm above the original support surface.
Stable hold	The target remains continuously controlled and airborne for at least 2 seconds after meeting the lift requirement.
Controlled release	A deliberate release made while the lowest point of the target is no more than 50 mm above the zone surface. A release from a greater height is treated as an accidental drop.
Deliberate release	The robot intentionally lets go of the target while any part of it is inside.
Successful placement	After controlled release, the whole target is inside the designated zone or bin and remains there for at least 3 seconds with no robot contact.
Damage	A new tear, puncture, leak or structural break relative to the pre-round inspection. Reversible compression and temporary surface indentation are not damage.
Accidental drop	Unintended loss of control followed by contact with a surface or an uncontrolled fall. A deliberate controlled placement is not a drop.

6.1.2 Partial credit

Award each checkpoint once per attempt. Milestones are assessed on their own stated criteria; a missing hold does not automatically cancel an otherwise valid transfer. A placement requires the prescribed controlled transfer or extraction in that attempt. A throw or accidental landing never qualifies as controlled placement.

A dropped object may be recovered robotically and transferred again. Previously earned valid milestones remain, and the same milestone cannot earn points twice. Task 3 loses its no-drop point for that entire attempt, even after recovery.

6.1.3 Single attempt selection

Qualification: select the higher-scoring single attempt. If tied, prefer the attempt earning P, then the earlier attempt. Task 3 uses visible points first under Section 6.1.5.1. Final: the single permitted attempt is the round score.

Points from different attempts shall not be combined.

6.1.4 Task 1 and Task 2 score tables

6.1.4.1 Task 1 Diverse Object Grasping

Code	Checkpoint	Points
L	Controlled lift at least 30 mm clear of the initial support surface.	1
H	Stable airborne hold for at least 2 seconds.	1

Code	Checkpoint	Points
T	Controlled airborne transfer of the whole target across the transfer line.	1
P	Controlled release inside the target zone, followed by at least 3 seconds of stable placement.	2
Total	Maximum for one object	5

Task total: 6 rounds × 5 points = 30 points. Each round has 1.5 minutes: up to two attempts in Qualification, one in the Final.

A team lifts, holds and transfers the target, then drops it outside the zone. That attempt earns 3 points.

Attempt 1 earns lift and hold for 2 points. Attempt 2 earns lift, transfer and placement for 4 points. The round score is 4, because the hold from Attempt 1 cannot be added to Attempt 2.

6.1.4.2 Task 2 Cluttered Object Retrieval

Code	Checkpoint	Points
L	The target is fully free of its supporting surface or objects and is held under control.	2
E	After L, the target alone fully exits the vertical projection of the tray's outer rim while airborne and controlled in all three directions, including height. No non-target is carried out with it. Pushing or sliding does not earn E.	3
P	After extraction, controlled release inside the destination zone, followed by at least 3 seconds of stable placement.	3
C	Clean retrieval: no non-target exits the tray or is damaged during the attempt. Available only when checkpoint E is achieved.	2
Total	Maximum for one tray	10

Task total: 3 rounds × 10 points = 30 points. Each round has 2 minutes: up to two attempts in Qualification, one in the Final.

Incidental motion and reversible deformation of non-target objects inside the tray are allowed. A non-target that leaves the tray removes the clean bonus for the entire attempt, even if later returned. Extraction and placement points remain available once the target is retrieved alone.

For boundary judging, "exits" means the entire object is outside the vertical projection of the tray's outer rim. A neighbouring object displaced partly over the rim is not a completed exit, but must remain safe and undamaged. Judges assess the clean bonus at the end of the attempt.

Example: the target is lifted, extracted alone and placed successfully, but a neighbour falls out. The attempt earns 8 points. If the team never extracts the target, the clean bonus is 0 even when all neighbours remain untouched.

6.1.5 Task 3 score table

Code	Checkpoint	Points
L	Controlled lift at least 30 mm clear of the original support surface.	1
H	Stable airborne hold for at least 2 seconds.	1

Code	Checkpoint	Points
T	Controlled airborne transfer of the whole target across the transfer line.	1
P	Controlled release in the declared bin, followed by at least 3 seconds of stable placement, with no defined target damage.	2
D	Correct Soft, Medium or Firm declaration, made after robot contact and before the first deliberate release.	2
B	Successful placement in the declared bin, and that declared class is correct.	2
N	No accidental drop at any time in the attempt. Available only if P is achieved.	1
Total	Handling 5 points + classification 4 points + no-drop 1 point	10

Task total: 4 rounds × 10 points = 40 points. Each round has 1.5 minutes: up to two attempts in Qualification, one in the Final.

6.1.6 Incidents and results

6.1.6.1 Damage and manual intervention

Target damage immediately ends the attempt. Valid process checkpoints already earned remain, but P and dependent B or N are zero. A valid locked Task 3 declaration remains eligible for D.

Damage to a non-target object removes eligibility for the Task 2 clean-retrieval checkpoint.

Manual intervention requested by the team ends the current attempt.

The referee may pause or terminate an attempt for safety reasons. The chief referee may terminate a run for continued unsafe operation or serious rule violations.

6.1.6.2 Ranking

Qualification Ranking: The final score is the sum of all selected round scores.

Qualification ranking uses total score, then the number of selected-attempt placements P, then correct Task 3 declarations D. Other ties share placing; a tie for the last available Final place follows the procedure below. Speed is not considered. Up to three teams advance.

For a tie at the Qualification cutoff, use the verified control mode under Section 4.5: Fully autonomous, then Supervised autonomy, then Teleoperation. If still tied, allocate the remaining Final places by a public draw.

Final ranking uses Final scores alone, then P count, then D count.

6.1.6.3 Score confirmation

Qualification and Final Round results are published separately.

Visible scores are presented after each task. Task 3 classification scores are released only after all teams in that stage finish Task 3.

6.2 Wild Locomotion

Scoring for the wild locomotion uses a set of base points and multipliers based on time taken and technical maturity. Each unique terrain traversed is worth 1 point if it was traversed along the intended path and 0.5 points if it was traversed but not along the declared path. The total sum of points is then multiplied by:

- Tethering: 1.0 if tethered; 1.1 if untethered.
- Time:

- Completed in 9-10 minutes: 1.0
- Completed in 7-9 minutes: 1.05
- Completed in 5-7 minutes: 1.1
- Completed in 3-5 minutes: 1.2
- Completed in 0-3 minutes: 1.3

The minimum scorable run requires two terrains to be traversed, i.e., enter the arena, cross one terrain and successfully transition to another, traverse it and then exit the arena.

7 Appendices

Appendix A Website Announcement Requirements

The Competition Chairs and/or Media Chair may publish Website Announcements to inform participants of the release of new versions of this Rulebook, important dates, and other administrative updates.

This Rulebook is the sole authoritative source of competition rules and requirements. Any modification, addition, clarification, or amendment to the competition rules shall be incorporated directly into an **updated version** of this Rulebook.

Website Announcements are provided for notification purposes only and do not constitute separate rules. Participants are responsible for ensuring they refer to the most recent version of the Rulebook.

Appendix B Frequently Asked Questions

B.1 General

Must one robot enter both Challenges

No. Apply separately for each Challenge and robot entry. The same team may use different robots. Scheduling and shared equipment must be declared before acceptance.

Does the robot need to be entirely soft

No. Material or structural compliance must enable or materially improve a relevant function. The technical review assesses that contribution.

Is autonomy required

No. All modes use the same task points. Verified autonomy is used only for a Qualification-cutoff tie under Section 6.1.6.2 and any separate autonomy award.

B.2 Wild Manipulation

Is a public robot arm guaranteed

One UR5 and one Franka FR3 are provided. Confirm your compatible arm and operating slot with the organisers before the event (Section 5.1.4.1).

Does a retry reduce the available points

No. There are at most two attempts per round (except for Final), sharing one active allowance. A judge reset pauses the clock. During the pause the team may only return the robot to its ready pose. Only the better single attempt counts.

Can points from the two attempts be combined

No. Task 3 retains one declaration across the round, but its declaration points are counted only once in the selected round total.

Can a team change its firmness declaration

The declaration stays locked across ordinary retries. Organiser-fault exceptions are described in Section 6.1.6.3. Correctness stays hidden until all teams in that stage finish Task 3.

Does sample damage erase every point

No. Valid process checkpoints and a valid Task 3 declaration remain. Target damage ends the attempt and removes placement, correct-bin and no-drop points.

Can a damaged soft component be replaced during a task

Yes, with an identical spare declared at technical inspection. It counts as a repair.

How are finalists selected?

Up to three teams advance by Qualification total, then P and D counts. A cutoff tie uses verified control mode and, if still tied, a public draw (Section 6.1.6.2).

Appendix C Implementation Details

C.1 Manipulation

The organisers will share CAD models, dimensioned drawings, a parts list with supplier links, mounting interfaces, and setup and reset instructions before teams prepare their systems. The illustrations below are planning models; use the final preparation files for dimensions.

Practice files will specify Task 1 object size and mass ranges and damage examples; Task 2 tray dimensions, object counts and reproducible clutter layouts; and Task 3 sample fabrication or sourcing, conditioning, firmness measurement and class bands, separate damage criteria, and replacement checks. Numerical sample limits must be bench-tested before release.

Workstation

Each station is a 4 × 4 m floor area with one main table. The tabletop is made of three optical breadboards (600 × 900 mm each) placed with their 600 mm widths side by side and 900 mm depth. Together they give a 1.80 × 0.90 m working surface with a threaded hole grid. All tasks take place in a task area of about 1.00 × 0.60 m in front of the robot.

Illustration of experimental setup for 3 wild manipulation tasks:

Task 1 Diverse Object Grasping

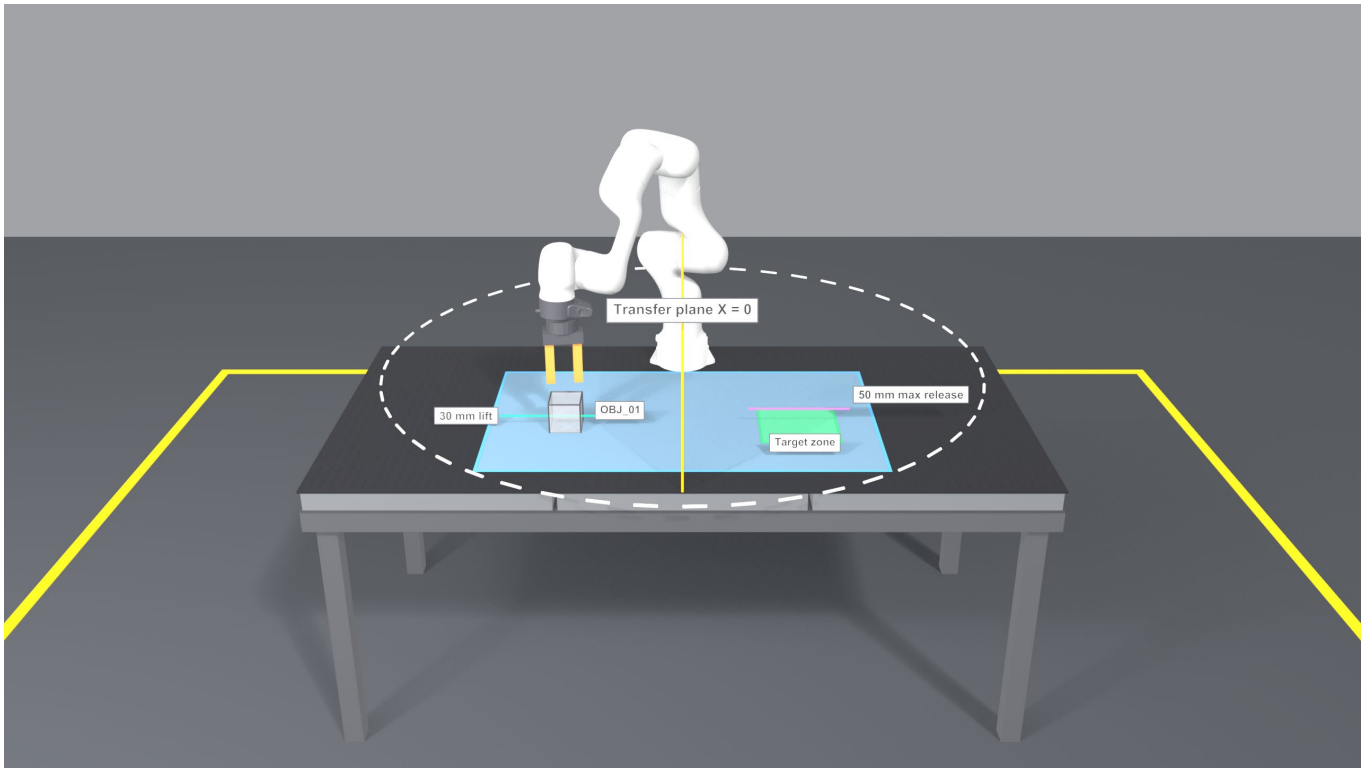

Fig Setup for diverse object grasping

Task 2 Cluttered Object Retrieval

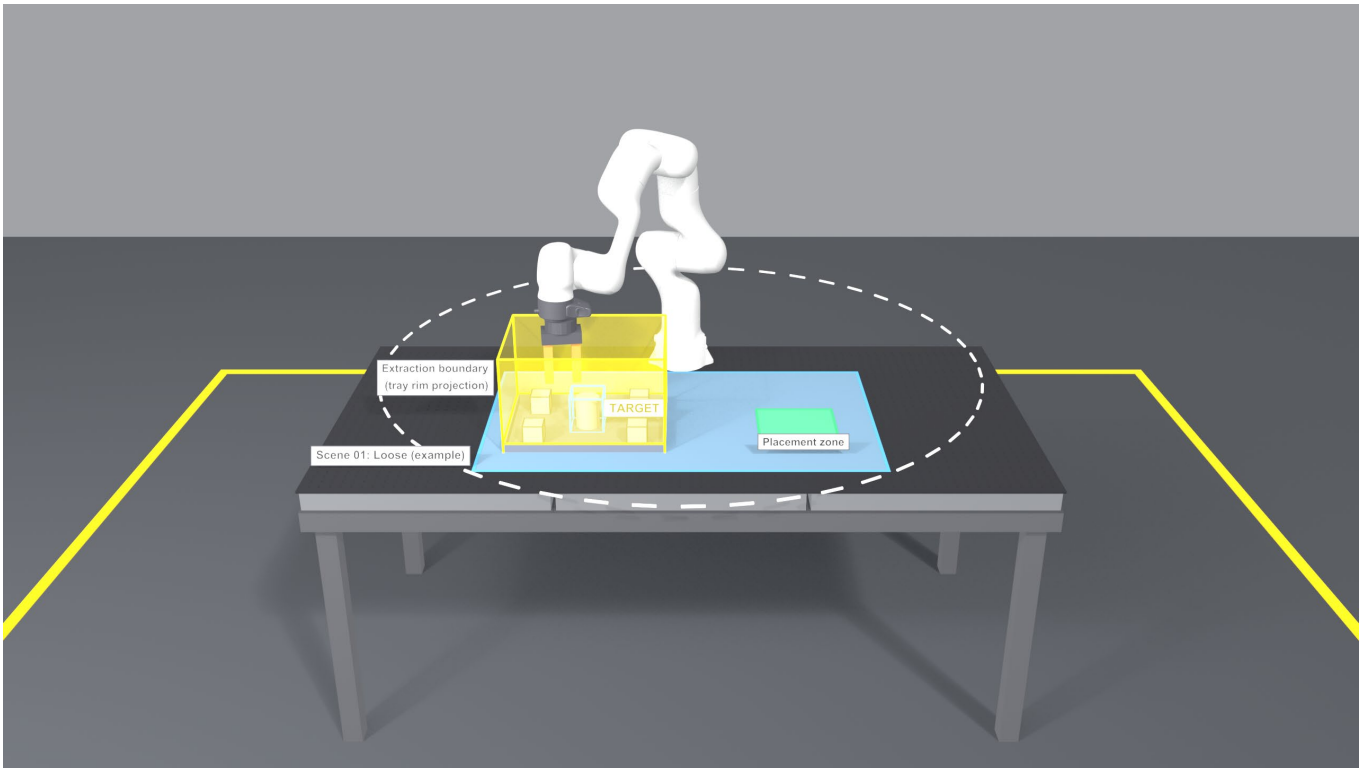

Fig Setup for cluttered object grasping

Task 3 Firmness Sorting and Safe Handling

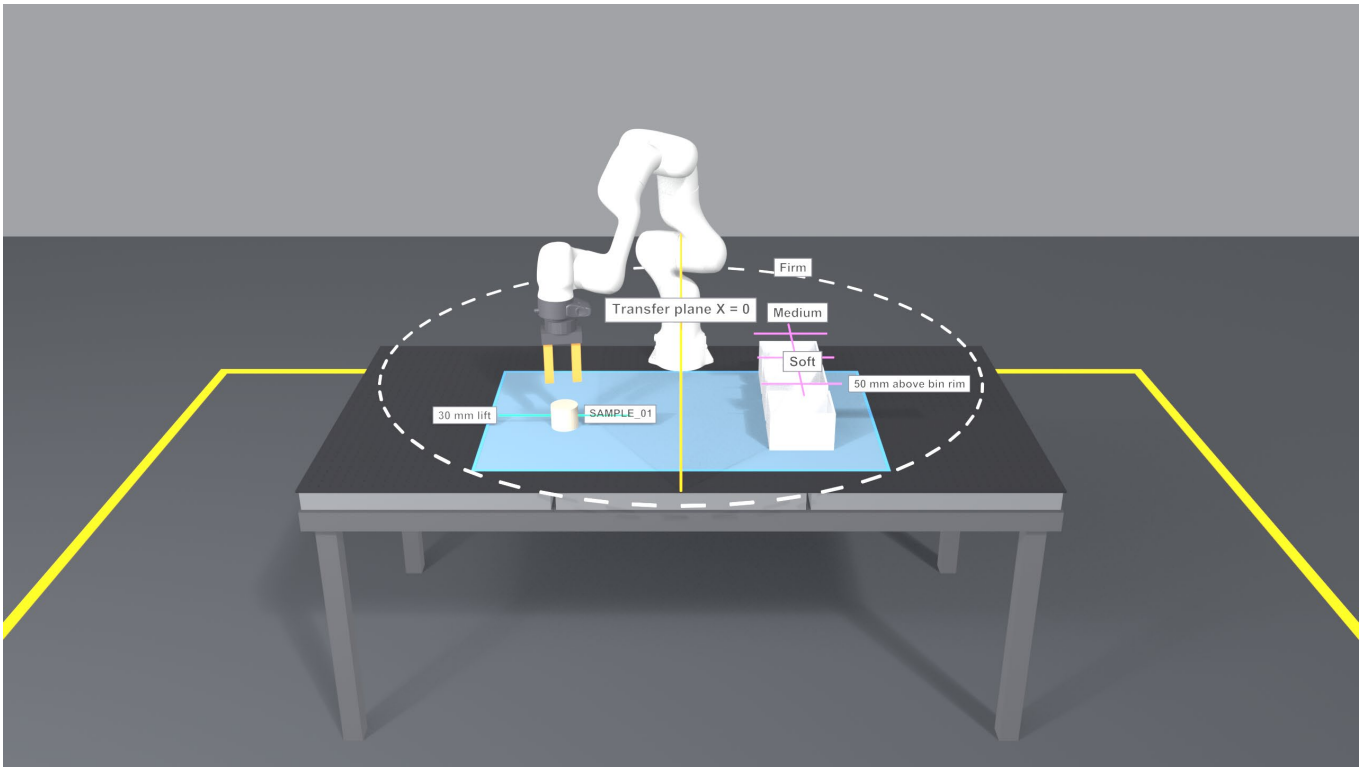

Fig Setup for contact-informed manipulation

Robot arms and mounting

Participants are free to bring their own arm. They should bring a mounting plate that bolts to the breadboard hole grid at the robot base position, or contact us about other mounting options.

For participants bringing just a gripper, a UR5 and a Franka FR3 with native arm controllers are provided. Bring your flange adapter, gripper controller, cables, computer and software. Confirm the compatible arm and access slot in advance.

Power, air and network

Each station has 230 V / 50 Hz power, shared compressed air (up to 1 MPa, 6 mm and 8 mm tubing) and Wi-Fi. Please bring any adapters and extra equipment you need. Confirm connector and flow requirements with the organisers and regulate air to your equipment’s operating pressure.

Appendix D Judge Sheets and Result Records

D.1 Task 1 Diverse Object Grasping

Team _____ Stage: Qualification / Final Date _____

Judge _____ Control mode _____

One sheet per team and stage. Enter points or 0 and select one attempt per round. Both Qualification attempts share 1.5 minutes; in the Final, mark Try 2 as N/A.

L = lift 1 H = hold 1 T = transfer 1 P = placement 2

Object IDs: 1 _____ 2 _____ 3 _____ 4 _____ 5 _____ 6 _____

Round	Try	L 0–1	H 0–1	T 0–1	P 0 or 2	Total 0–5	Selected and active time used
1	1						
1	2						
2	1						
2	2						
3	1						
3	2						
4	1						
4	2						
5	1						
5	2						
6	1						
6	2						

Selected scores: 1 ____ 2 ____ 3 ____ 4 ____ 5 ____ 6 ____ Total ____ / 30

Successful placements ____ / 6 Judge _____ Team receipt _____

Presented at _____ Review requested Yes / No Record incidents on the reverse.

D.2 Task 2 Cluttered Object Retrieval

Team _____ Stage: Qualification / Final Date _____

Judge _____ Control mode _____

One sheet per team and stage. Enter points or 0; C requires E. Both Qualification attempts share 2 minutes; in the Final, mark Try 2 as N/A. Select one attempt per round.

L = lift 2 E = extraction 3 P = placement 3 C = clean retrieval 2

Scene IDs: 1 _____ 2 _____ 3 _____

Round	Try	L 0 or 2	E 0 or 3	P 0 or 3	C 0 or 2	Total 0–10	Selected and active time used
1 Loose	1						
1 Loose	2						
2 Contact	1						
2 Contact	2						
3 Occluded	1						
3 Occluded	2						

D.3 Task 3 visible record

Team _____ Stage: Qualification / Final Date _____

Judge _____ Control mode _____

Record one locked declaration per round, including the attempt number with its time. Keep D/B blank until every team in the stage finishes Task 3. Both Qualification attempts share 1.5 minutes; in the Final mark Try 2 as N/A.

Round	Declaration time	Locked declaration	Contact verified	Screened until lock
1				
2				
3				
4				