



brainhack

INTO THE MULTIVERSE





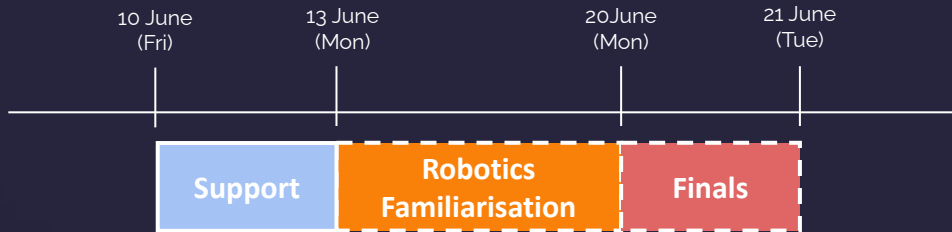
Qualifiers Info Pack

Today I Learned (TIL) 2022

Content:

1. TIL 2022 Timeline
2. Prelude
3. Challenge Overview
4. Tasks Overview
5. Challenge Evaluation
6. Challenge & Finals Schedule
7. Conduct of Finals
8. Navigation
9. FAQ

Timeline TIL 2022



Robotics Familiarisation Period: 13 June 2022, 0900H - 17 June 2022, 1800H
Finals: 21 June 0900 - 1800H

CAUTION!! CAUTION!! CAUTION!!

Come, Finalist rescuers! You have successfully completed the training and outperformed expectations and thus, your assistance is required urgently.

There has been an incident at the research facility in the ancient civilisation dig site and some researchers are trapped underground. You will commandeer a semi-autonomous robot, and navigate to areas that potentially require assistance through audio clues of voices heard throughout the dig site. Once the robot discovers a potential target, it is to identify if the target is fallen.

Due to the difficult environment, there can be substantial noise in retrieving the robot location so please be sure to account for that!

The best team that send out to perform an actual rescue operation in the finals stands the chance to be named the champion team of 2022!

1. The Robotics Challenge is an amalgamation of the CV and NLP challenges that you have completed along with a new Robotics element.
2. You are tasked to write scripts for a semi-autonomous robot to:
 - a. Use your trained NLP model to perform **speech emotion recognition**.
 - b. Plan a path for the robot to **navigate** and **find** targets in the arena.
 - c. Use your trained CV model to detect the bounding boxes and **classify** the positions of humans in target(s) found.
3. The final ranking of the teams will be determined by the total final score, number of fallen targets classified correctly, and total effective run time of the robot

Overview

Robotics Challenge

What is the Robotics Challenge about?

Overview

Robotics Task

What is the Robotics Task about?

1. The aim of the robot is to solve the clues (in the form of **NLP tasks**), navigate to locations that could potentially contain targets, and identify the status of the humans in the target (in the form of **CV Tasks**)
2. Code stubs will be given, and these should be filled by the team. These scripts will be run in a loop, thus the robot will keep checking for clues and navigating every step of the way.
3. The robot has **15** minutes of total run time. Each team will start in the same location with the same initial destination.
4. The team can choose to restart **once** within 2 minutes of starting the first run, There will be no restarts allowed in subsequent runs.
5. Once the robot has some coordinates that it wishes to explore from the NLP clues, the script provided by the team should be able to plan a path to explore these locations.
6. Each team has **10** minutes to submit an appeal after their run to the Game Masters.

Overview

NLP Task

What is the NLP Task about?

1. As the robot moves within the arena, should the robot enter certain regions in the arena, clues will be sent to the robot as a **pair** of .wav file and a pair of x,y coordinates i.e. (.wav, (x,y))
2. Teams will be notified that they have received new clues.
3. The robot can receive multiple clues in a single region.
4. Clues with .wavs of **"Angry"** or **"Sad"** classification will contain coordinates that will be near images. Other classifications will contain coordinates that may or may not contain nearby images.
5. Please note, similarly to the Qualifiers, **only the emotional** aspect of the .wav file is scored, and not the actual speech in it.

Overview

CV Task

What is the CV Task about?

1. Once the robot is at a coordinate with potential target(s), the team should develop a behavior for the robot to scan the surroundings for target(s).
2. The robot should be able to infer the status of humans in the target(s).
3. There could be more than 1 target in a given location.
4. The final score would only take into account the **most recent** classification provided for each target.
5. There will be **score penalties** for false positives and false negatives.
6. There are two levels of tiebreakers, described in the infopack.

1. Final rankings will be determined first by total points:
 - a. Every true positive and true negative classification will be accorded **1** point.
 - b. Every detection with an appropriate bounding box with incorrect classification will be accorded **0.5** point per target.
 - c. Every detection with inappropriate bounding box will be accorded **0** points and an additional **-0.5** point penalty per target.
 - d. If the robot makes sustained physical contact with a target (>1s) or a high speed contact with the target, there will be a **-2** point penalty. This penalty will only be affected once per target.
2. In the event of tie breaker, the teams will be ranked by correct targets found per 5 effective minutes. Effective time is calculated as the time taken for the last recent correct submission.

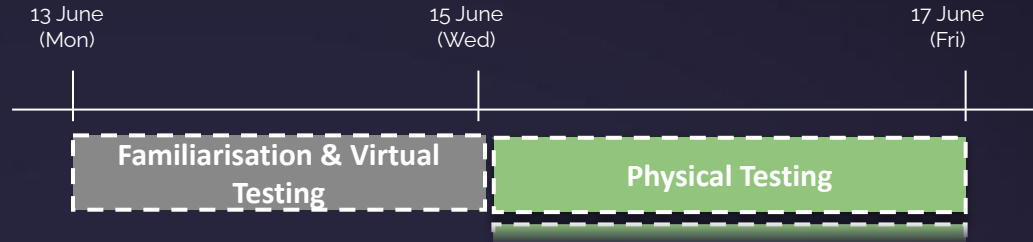
$$S_{eff\ 5min} = \left(\frac{target_{correct}}{t_{last_positive} - t_{start}} \right) * 5$$
3. Classification submissions will be throttled to a max of **1** per second,
4. Classification submissions for a target has to be made within **1** m from the target.
5. The organising committee reserves the right to make changes to the scoring metrics.

Evaluation Robotics Challenge

How will the Robotics Challenge be evaluated?

Schedule for Robot Familiarisation

How can I get ready?



1. Teams will be able to interact with the robot **virtually** from 13 June to 15 June, thereafter, teams will be able to send a max of **2 members** to test **in-person** at [NUS Shaw Foundation Alumni House](#), Innovation Room,
2. Slots requests can be made at <https://go.gov.sg/til-22-fam-booking> by **12 June 10am**. Slots requests will come on a round-robin, first come first served basis. Every team will take turns picking their first slot, before going back to the first team who submitted their requests.
3. Teams **must download** [TeamViewer](#) and set up an account before the start of the familiarisation.
4. All teams are strongly encouraged to attend the virtual introductory demo on **13 June 9am** at the following zoom link:
<https://us06web.zoom.us/j/82340338562?pwd=TnpDZThKbVMwdC9wTlXhzYmVaalBqZz09>

Schedule for Finals

Where should I be on Finals
Day?

Time	Location	Event
0900H-0930H	Coriander	Start of Registration*
0930H-1000H	Innovation	Arena Tour**
1000H-1220H	Innovation	Start of Round 1
1200H-1300H	Innovation	Appeals for Round 1
1230H-1430H	Foyer	Lunch
1300H-1430H	Coriander	Code Fix Pit Stop***
1440H-1700H	Innovation	Start of Round 2
1700H-1730H	Innovation	Appeals for Round 2
1730H-1800H	Coriander	Award Ceremony

*Order of teams for Round 1 and Round 2 to be released

All teams will get **15 minutes to study the Arena

***4 teams will be fixing concurrently at a time, in the same order for Round 1 & 2

Conduct for Finals

What should I do before
and during Finals day?

1. Each team will have a code freeze by **Monday, 20th June at 1400 hrs.**
2. Each team will port their entire codebase to their submission folder labelled as **"Pre-Finals_<team_name>"**
3. This version of code will be used to start your Finals; a thumbdrive will be given to you containing this version of code on the Finals day.
4. This thumbdrive will be used to copy code between machines.
5. The laptop you are working on will NOT have Internet access.
6. Teams **shall not install** their own software on machines provided.
7. Teams **shall not share code** even across tertiary levels and if found to do so, will be **penalised and even disqualified.**

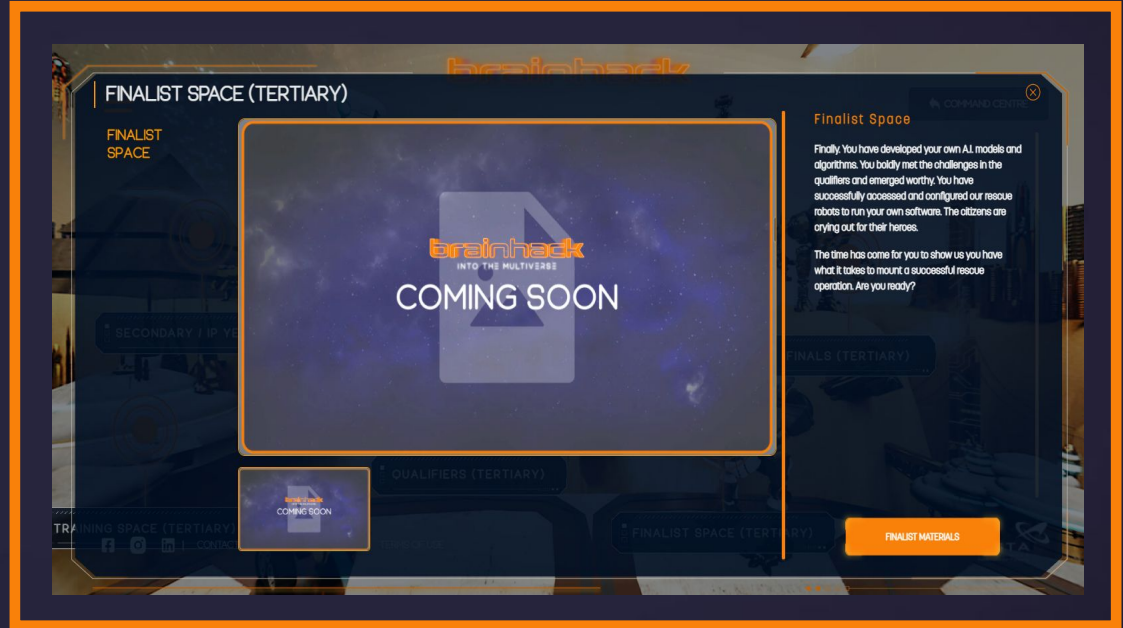
Conduct for Finals

What should I do for each Round?

1. Each team will have **15** minutes of prep time in Coriander Room where you can make code edits, and save your work in a folder in the thumbdrive assigned as **"Round_<X>_<team_name>"**
2. Each team will then have **5** minute of set up time in Innovation Room once it is your turn.
3. Each robot will have **15** minutes of runtime, Each team can choose to use **1** reset in the first **2** minutes of each Round; there will be no more reset available in subsequent run for the team in the same Round.
4. Each team can submit appeals. The time limit for the team to submit an appeal is **10** minutes after their run, after which the team is no longer able to submit an appeal.
5. After every run, human judges will inspect the results before results are updated on the leaderboard.
6. You will be able to see the rankings and scores at the end of each Round.
7. The organising committee reserves the right to make changes to the conduct of Finals.

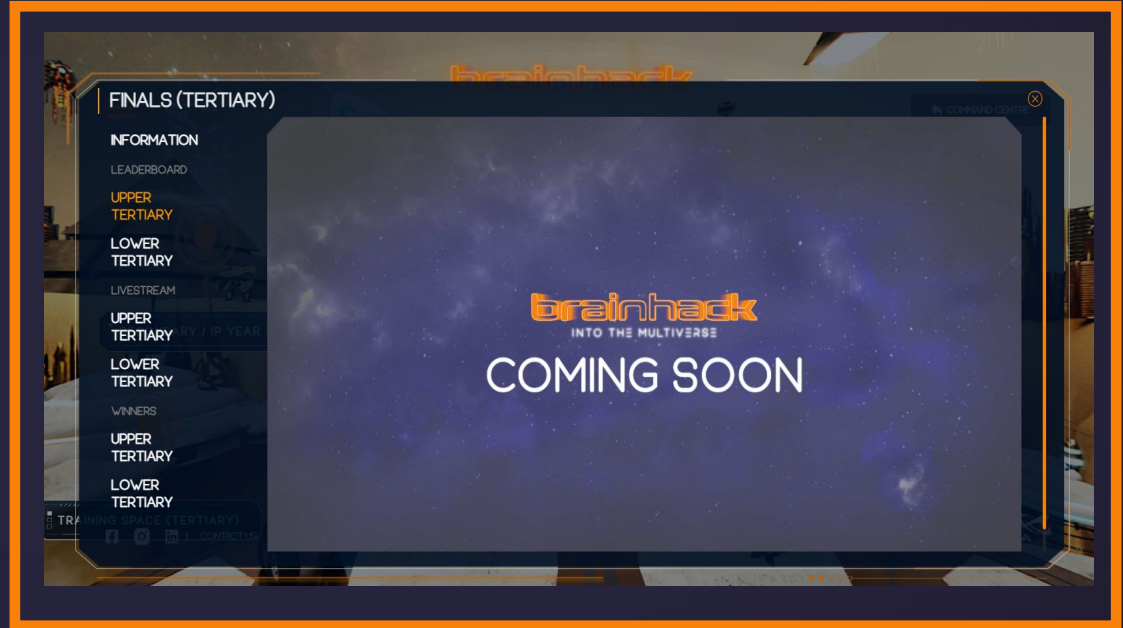
Finalist Space Navigation

Where to locate the training materials for the Finalists?



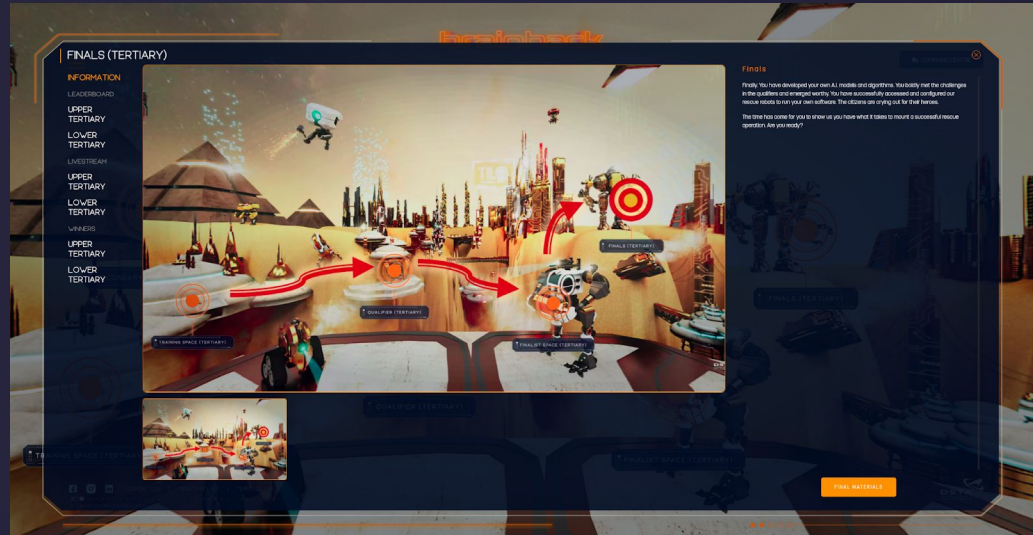
Leaderboard Navigation

Where to locate the
Leaderboard?



Finals Navigation

Where to locate the live stream of the Finals?



Extra Bites That You Might Need

FAQ

Resources

Q: Where can I find information on RoboMaster?

A: <https://robomaster-dev.readthedocs.io/en/latest/>

Q: Do we have a storage/work environment?

A: Each Team has a submission folder to store their work.

Extra Bites That You Might Need

FAQ

Models

Q: Will we be allowed to retrain the models?

A: Teams will be allowed to retrain their models without violation of competition rules.

Q: What machines will the models be run on?

A: Models will be run on a single MSI RTX 3080 concurrently, thus please ensure that models are optimized to fit on a single card.

Extra Bites That You Might Need

FAQ

Scoring and Appeals

Q: Will qualifiers scores affect the finals score?

A: No, it will not.

Q: How is the final score calculated between the two runs?

A: It will be the best of the two runs.

Q: Does the NLP accuracy affect my score?

A: It will not directly your score, but it will implicitly affect your path design and your timing.