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## **NIHERST FLL Preliminary Rules**

### **OBJECTIVE:**

The objective of this competition is to create a robot that will act as a transporter for our Tyre Shop simulation:

- Tyres will be moved from their starting position to various target zones within the tyre shop.
- Garbage or Disposal items are to be moved to the dumpster or the garbage area.
- The Car is to be moved from its starting zone to the finish zone. Alternatively, you can leave the car completely in its starting area for fewer points.



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## **RULES:**

Rules for the NIHERST Preliminary are as outlined in the FLL “Animal Allies challenge guide” (Pages 15 – 20, also included in the appendix here at the bottom). With the following notes:

- The safe zone used is the 18” by 18” gray square on the mat.
- A round lasts 3 minutes.
- Only one team competes at a time. If multiple teams run at the same time, they do so on separate fields and cannot interact with one another.
- Each team is allowed to run the course 3 times in order to make a qualifying score. If teams have already made a qualifying score, they will not need to make an additional run unless “all non-qualifying teams have completed all 3 of their runs” or “their score gets bumped off the qualifying list by other teams beating their score”. **ONLY YOUR TOP SCORE** in the 3 matches counts.
- After all the qualifying teams have been decided, extra runs are permitted only if time permits. This will be just for fun and glory.
- Only three team members (designated technicians) may interact with a robot while it is competing in a round.
- Any mission model pieces that completely leaves the field of play is removed from the play by the ref. It does not return to play for the duration of that round.
- Mission pieces that leave the field of play but are still partially on the playing surface will remain where they are unless moved by the robot.
- Mission pieces completely in the safe zone or base when the robot is interrupted can be moved around by hand within the safe zone. They must be completely still before the robot can be relaunched.
- Mission pieces partially in the safe zone (and partially in regular play area) when the robot is interrupted have to be handed to the referee and are removed from the field of play for the rest of the match.
- The playing surface measures 3 feet by 6 feet. For the competition this will be placed on a solid surface measuring 4 feet by 8 feet. Therefore expect a flat solid border around the playing field (6 inches on the top and bottom, 12 inches on the sides)

If you are unsure of the meaning of a rule, or are unsure if a type of action is permissible, ask your mentor or coach. If they are still unsure, the coach/mentor can contact the NIHERST Preliminary team for clarification.



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**POINT SYSTEM:** (Maximum point 1002)

- For **each** tire (maximum 510 points):
  - Completely inside RED ZONE: 45 points
  - Completely inside Blue/Red zones: 36 points
  - Completely inside Green/Blue/Red zones: 27 points
  - Partially inside green zone (part is in white area): 15 points
  - Bonus
    - Exact Matching tires on either side: 12 bonus points per pair
  
- Car (maximum 192 points):
  - Car in Starting position:
    - Each car rim completely inside starting area: 24
    - Each car rim partially inside starting area: 12
  - Car in Finish position:
    - Each car rim completely inside finish area: 48
    - Each car rim partially inside finish area: 30
  - For “completely inside” and “partially inside” we are only considering the parts of the rim that are touching the mat, note those in mid-air.
  
- For **each** Garbage pieces (maximum 300 points):
  - Completely inside Black dumpster area and inside dumpster: 30
  - Completely Inside Black dumpster area (but not inside dumpster i.e. dumpster out of position): 18
  - Completely inside brown/black garbage area: 15
  - Partially inside Brown/Black garbage area (i.e. part is in white area): 9
  
- Penalties:
  - Interfering with the robot (to reset) while it is outside the designated safe zone (but at least partially inside the game mat): -75 points
  - Interfering with the robot (to reset) while it is outside the safe zone (and also completely off the mat): -50 points
  - Interfering with the robot (to reset) while it is partially inside the safe zone, but not completely in the safe zone: - 50 points



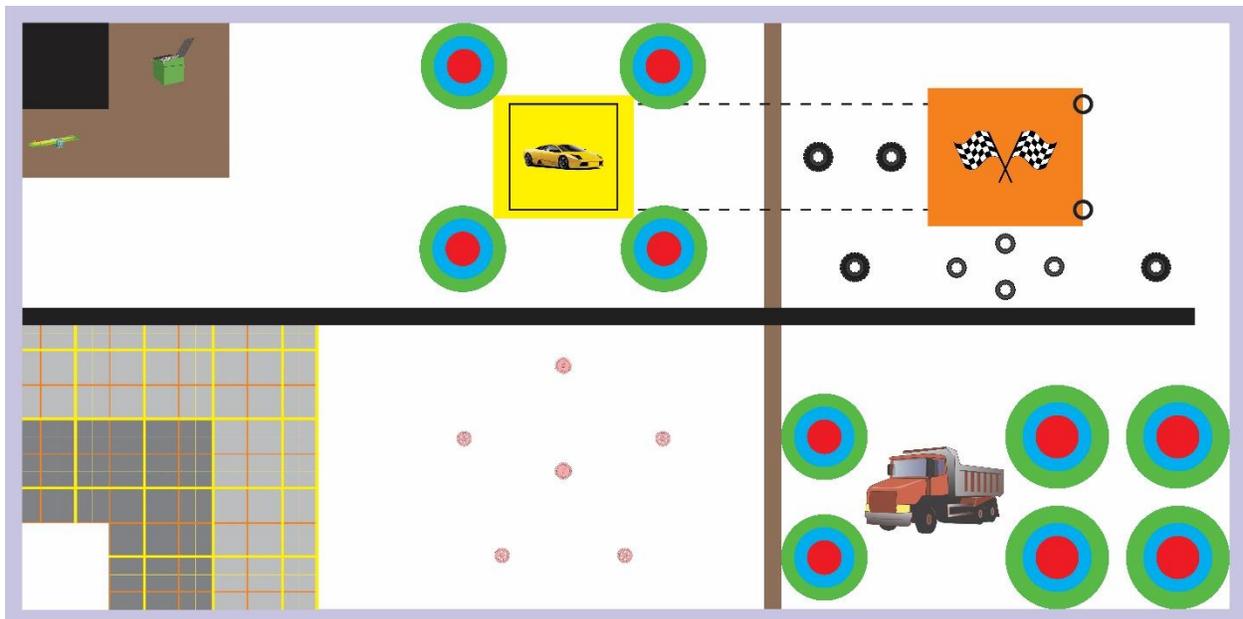
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- Interfering with the robot while it is completely inside the safe zone is allowed and is not considered a reset (it is a relaunch). This also applies if the robot is partially inside the safe zone and partially off the mat, without being on any other part of the mat.
- You can have a maximum of 5 resets in a given run. If you stop the robot again after 5 resets, the round ends prematurely at that time. Points are tallied as normal.
- Unsportsmanlike conduct (eg. using foul language, taunting other teams, sabotaging other teams, etc.) can result in either your entire team being disqualified or the offending team member being removed.

## FIELD SETUP:

This is the competition mat: (TO BE UPDATED)



- Safe Zone. The grey and white squares in the bottom left corner are your safe zone or Base.
  - This is where you launch your robot.



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- The grid is there to help you precisely position your robot.
- The Black square in the top left corner is the location of the **dumpster** ([construction instructions included](#)).
  - At the beginning of the match, the shortest wall of the dumpster faces the safe zone, and has 4 white trash pieces resting on it.
  - Trash placed inside the dumpster gains you points.
- The brown rectangle is the garbage zone.
  - Trash placed in the garbage zone gains you points. You get more points if the trash is actually inside the dumpster.
- Lever (**see-saw**) ([construction instructions included](#)).
  - At the beginning of the match the lever's raised side faces the safe zone.
  - The lowered side rests on the playing match and touches the side of the dumpster holding the trash.
  - You can use the Lever to help put trash into the dumpster.
- **Car**, Yellow. ([construction instructions included](#)).
  - The car begins inside the yellow starting area and pointed towards the orange area.
  - The car is positioned so that its rims are exactly inside the black rectangle inside the yellow starting area.
  - You get points if the car remains inside the starting area. But you get more points if the car ends up in the finishing area.
- Finishing Area, orange.
  - This is the most desirable area for your car to end up after the match.
- Tires, Black circles.
  - The tires begin the match in these exact spots.
  - There are 3 different types of tires used in the match. Each matches the symbols on the mat.
  - The object is to move the tyres from their starting positions to the various target zones.



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- Target zones, Red/Blue/Green circles.
  - The target zones are where you want to move the tyres to.
  - The closer you are to the middle of the target the higher the points given.
  - There are 2 different size targets.
  - You get bonus points for putting a matching pair of tyres on either side of a vehicle.
  
- Trash (pink circles).
  - The pieces of trash start off on the pink circles.
  - There are 2 different types of trash.
    - 4 white wide rims (which start on the dumpster wall).
    - 6 yellow small rims (which start on the pink circles).
  - All the pieces of trash are worth the same amount of points.
  - The objective is to move the trash from their starting positions to the garbage area or dumpster.



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**APPENDIX : RULES AND DEFINITIONS:  
GUIDING PRINCIPLES**

**GP2 – Interpretation**

- **If a detail isn't mentioned, then it doesn't matter.**
- Robot Game text means exactly and only what it plainly says.
- If a word isn't given a game definition, use its common conversational meaning.

**GP3 – Benefit of the Doubt** - If the Referee (Ref) feels something is a “very tough call,” and no one can point to strong text in any particular direction, you get the Benefit Of The Doubt. This good-faith courtesy is not to be used as a strategy.

**GP4 - Variability** - Our suppliers and volunteers try hard to make all Fields correct and identical, but you should always expect little defects and differences. Top teams design with these in mind. Examples include lighting changes and Field Mat wrinkles.

**DEFINITIONS**

**D01 - Match** - A Match is when a team plays on the competition matt and tries to complete the objectives.

- Your Robot **LAUNCHES** one or more times from Base and tries as many Objectives as possible.
- Matches last 3 minutes, and the timer never pauses.

**D02 - Mission** - A “Mission” is an opportunity for the Robot to earn points. Missions are written in the form of requirements.

- All **results** that must be visible to the Ref at the **end of the match**.

**D03 - Equipment** - “Equipment” is everything you bring to a Match for Mission-related activity.

**D04 - Robot** - Your “Robot” is your LEGO® MINDSTORMS® controller and all the Equipment you've combined with it by hand which is not intended to separate from it, except by hand.



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**D05 - Mission Model** - A “Mission Model” is any LEGO object already at the Field when you get there. Mission Models are not the same as “Equipment.”

**D06 - Field** - The “Field” is the Robot’s game environment, consisting of Mission Models on a Mat, without Border Walls, all on a Table. “Base” is part of the Field. For full details, see Field Setup: see the attached information and pictures.

**D07 - Base** - “Base” is the square space designated on the field. It is coloured grey and measures 18” by 18”.

**D08 - Launch** - Whenever you’re done handling the Robot and then you make it go, that’s a “Launch.”

**D09 - Interruption** - The next time you interact with the Robot after Launching it, that’s an “Interruption.”

**D10 - Transporting** - If the Robot is in contact with something for the obvious purpose of taking it, changing its location, or releasing it, the robot is “Transporting” it.

## **EQUIPMENT, SOFTWARE, AND PEOPLE**

**R01 - All Equipment** - All Equipment must be made of LEGO-made building parts in original factory condition.

Except: LEGO string and tubing may be cut shorter.

Except: Program reminders on paper are okay (off the Field).

Except: Marker may be used in hidden areas for identification.

**R02 - Controllers** - You are allowed only **one** individual controller in any particular Match.

- It must exactly match a type shown below (Except: Colour).
- All other controllers must be left in the Pit Area for that Match (off field).
- All remote control or data exchange with Robots (including Bluetooth) in the competition area is **illegal**.



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- This rule limits you to only **one individual Robot** in any particular Match.



**R03 - Motors** - You are allowed up to **four** individual motors in any particular Match.

- Each one must exactly match a type shown below.
- You may include more than one of a type, but again, your grand total may not be greater than FOUR.
- ALL other motors must be left in the Pit Area for that Match, **no exceptions**.



**R04 - External Sensors** - Use as many external sensors as you like.

- Each one must exactly match a type shown below.
- You may include more than one of each type.



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EV3 TOUCH GYRO/ANGLE



EV3 COLOR



EV3 ULTRASONIC



EV3



NXT TOUCH



NXT LIGHT



NXT COLOR



NXT ULTRASONIC



RCX TOUCH



RCX LIGHT



RCX ROTATION

**R05 - Other Electric/Electronic Things** - No other electric/electronic things are allowed in the competition area for Mission-related activity.

Except: LEGO wires and converter cables are allowed as needed.

Except: Allowable power sources are one controller's power pack or **six** AA batteries.

**R06 - Non-Electric Elements** - Use as many non-electric LEGO-made elements as you like, from any set.

Except: Factory-made wind-up/pull-back "motors" are not allowed. Except: Additional/duplicate Mission Models are not allowed.

**R07 - Software** - The Robot may only be programmed using LEGO MINDSTORMS RCX, NXT, EV3, or RoboLab software (any release). No other software is allowed. Patches, add-ons, and new versions of the allowable software from the manufacturers (LEGO and NI) are allowed, but tool kits, including the LabVIEW tool kit, are not allowed.



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### R08 - Technicians

- Only three team members, called “Technicians,” are allowed at the competition Field at once. Except: Others may step in for true emergency repairs during the Match, then step away.
- The rest of the team must stand back as directed by tournament officials, with the expectation of fresh Technicians being able to switch places with current Technicians at any time if desired.

### PLAY

**R09 - Before The Match Timer Starts** - After getting to the Field on time, you have at least one minute to prepare. During this special time only, you may also...

- Ask the Ref to be sure a Mission Model or setup is correct.
- Calibrate light/colour sensors anywhere you like.

### R10 - Handling During the Match

- You are not allowed to interact with any part of the Field that’s not COMPLETELY in Base. Except: You may Interrupt the Robot any time.  
Except: You may pick up Equipment that **broke** off the Robot **unintentionally**, anywhere, any time.
- You are not allowed to cause anything to move or extend over the Base line, even partly.  
Except: Of course, you may **Launch** the Robot.  
  
Except: If something accidentally crosses the Base line, just calmly take it back – no problem.
- Anything the Robot affects (good or bad!) or puts completely outside Base stays as is unless the Robot changes it. Nothing is ever repositioned so you can “try again.”

### R11 - Mission Model Handling

- You are not allowed to take Mission Models apart, even temporarily.
- If you combine a Mission Model with something (including the Robot), the combination must be loose enough that if asked to do so, you could pick the Mission Model up and nothing else would come with it.

### R12 - Storage

- Anything completely in Base may be moved within the base, and must stay in view of the Ref.

**R13 - Launching** - A proper Launch (or re-Launch) goes like this:



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- Ready Situation
  - Your Robot and everything in Base it's about to move or use is arranged by hand as you like, all fitting completely in **Base**.
  - The Ref can see that nothing on the Field is moving or being handled.
- Go!
  - Reach down and touch a button or signal a sensor to activate a program.

**First Launch of the Match** – Here, accurate fair timing is needed, so the exact time to Launch is the beginning of the last word/sound in the countdown, such as “Ready, set, **GO!**” or **BEEEEP!**

**R14 - Interrupting** - If you **Interrupt** the Robot, you must stop it immediately, \*then calmly pick it up for a re-Launch (\*if you intend one). Here's what happens to the Robot and any object it was Transporting, depending on where each was at the time:

- **Robot**

- Completely in Base: Re-Launch
- NOT completely in Base: Re-Launch + Penalty

- **Transported Object**

- Completely in Base: Keep it
- NOT completely in Base: Give it to the Ref

The “Penalty” is described with the [MISSIONS](#).

**R15 - Stranding** - If the **Uninterrupted** Robot loses something it was Transporting, that thing must be allowed to come to rest. Once it does, here's what happens to the Transported object, depending on its rest location...

- **Transported Object**

- Completely in Base: Keep it
- Partly in Base: Give it to the Ref
- Completely outside Base: Leave as is



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### R17 - Field Damage

- If the Robot separates breaks a Mission Model, Missions obviously made possible or easier by this damage or the action that caused it do not score.

**R18 - End of the Match** - As the Match ends, everything must be preserved exactly as-is...

- If your Robot is moving, stop it as soon as possible and leave it in place. (Changes after the end don't count.)
- After that, hands off everything until after the Ref has given the okay to reset the table.

### R19 - Scoring

- Scoresheet - The Ref discusses what happened and inspects the Field with you, Mission by Mission.
  - If you agree with everything, you sign the sheet, and the scoresheet is final.
  - If you don't agree with something, the Head Ref makes the final decision.
    - Impact - Only your **best** score from regular Match play counts toward awards/advancement. Playoffs, if held, are just for extra fun.
    - Ties - Ties are broken using second, then third best scores. If still not settled, tournament officials decide what to do.



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