



# Hio-Fuel Competition

presented by Ha-Dream Team 3075

# TOWER HEI<sup>ST</sup> HEI<sup>ST</sup>



**5782 Hio Fuel Robotics Competition**  
**Game manual**



# TOWER HEIST

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# TOWER HEIST

## 1. Introduction:

- 1.1 Hio-Fuel is HaDream Team 3075's inner competition. The game manual is created by team members and alumni.
- 1.2 The goal is to create a FRC like challenge, to simulate a competition season and train the team coping with challenges.
- 1.3 Just like Hio-Fuel-2019, in this year challenge the team will split into two sub-teams: the Juniors & Seniors Vs Sophomores & Mentors. This way the veteran students challenged to cope without their mentors, and the new students get additional experience.
  
- 1.4 In this year challenge, two pirate crews will simultaneously raid a captive ship and compete on collecting loot and singling the pirate's airship. The goal is collecting more gold than the other team!
- 1.5 **Hio-Fuel 5782 Tower Heist** is a game for two ROBOTS, which compete building TOWERS out of *PowerUp* CRATES filled with GOLD *Fuel* balls.



## 2. Field:

2.1 The field is divided to four zones: DRIVERS ZONE, GOLD DECK and two CRATE DECKS – one for each alliance.

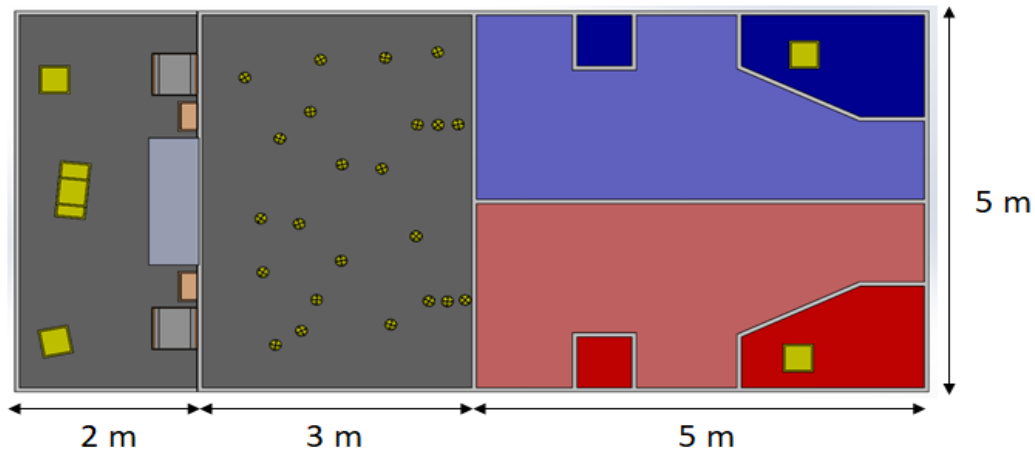


Figure 2.1.1 – Field schema

2.2 GOLD DECK – a 5X3 meter rectangle. This zone is neutral, and it contains the GOLD pieces. At the beginning of the match 16 GOLD pieces will be randomly scattered in the GOLD DECK. In addition, each TEAM will locate 3 GOLD pieces at the GOLD DECK.

2.3 CRATE DECK – a 2.5X5 meter rectangle. The deck is individual to each TEAM. The DECK contains two sub-zones: PICKUP AREA and SIGNAL AREA. These two sub-zones are SAFE ZONES, and located in the CRATE DECK as follow:

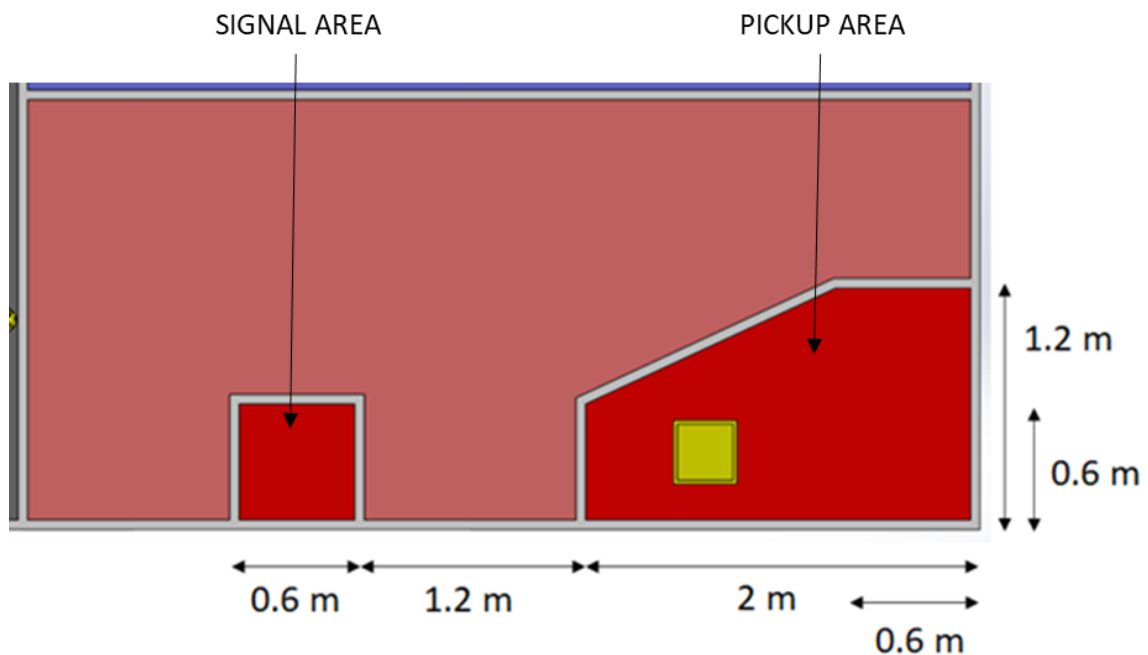


Figure 2.3.1 – CRATE DECK schema



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2.4 Before the match, each TEAM will locate their ROBOT in the CRATE DECK. The ROBOT may be preloaded with one CRATE. Another CRATE will be located by the TEAM in the PICKUP AREA.

2.5 DRIVERS ZONE – a 5X2 meter rectangle, contains the DRIVE TEAMS, GAME PIECES and FEEDERS. A single table with two DRIVER STATIONS will be located in the middle of the ALLIANCE WALL, and in each side will be located a FEEDER. Through the FEEDER CRATES and GOLD will enter the GOLD DECK, and it will be constructed by the TEAM as follows:

2.5.1 CRATES will be placed on guides and will be sliding into the GOLD DECK at height of 10 cm from the carpet.

2.5.2 GOLD will enter the field on a slope at height of 20 cm from the carpet.

2.5.3 Light reflecting strip will be located above the CRATE FEEDER (fig. 2.5.2).

2.6 CRATES and GOLD will be located behind the FEEDERS and the DRIVER STATIONS.

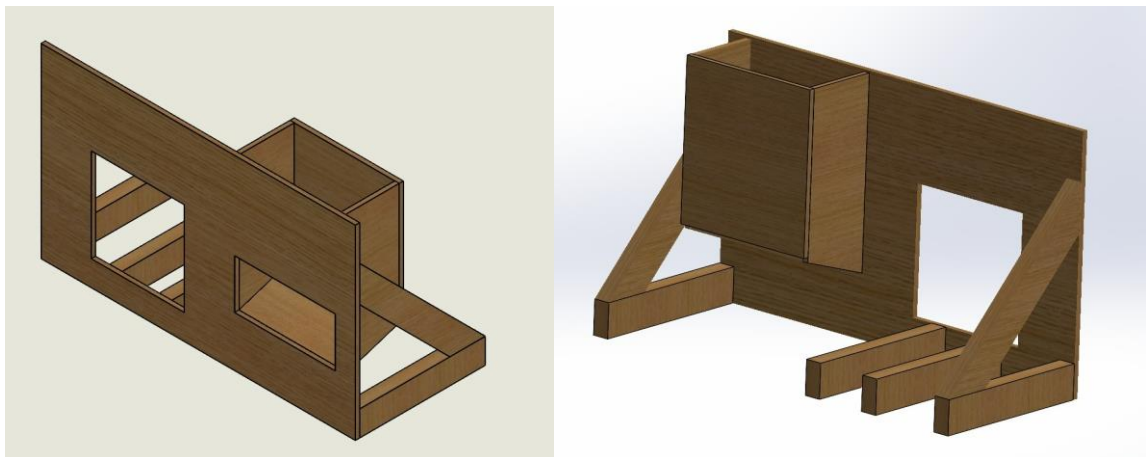


Figure 2.5.1 - FEEDER



Figure 2.5.2 – FEEDER's dimensions



## 3. Game Pieces:

3.1 The game is based on two GAME PIECES from previous FRC games:

- 3.1.1 GOLD is FUEL ball [as described at section 3.12.1 at 2017 manual](#)
- 3.1.2 CRATE is POWER CUBE [as described at section 3.8 at 2018 manual](#), but without the nylon cover.



Figure 3.1 - GAME PIECES

## 4. Scoring:

4.1 TEAMS will earn points by building TOWERS of CRATES filled with GOLD in the PICKUP AREA.

4.2 AUTONOMOUS PERIOD –

- 4.2.1 The first 15 seconds of the match will be played autonomously. At that period the DRIVE TEAM are not allowed to touch the controllers, computers or GAME PIECES.
- 4.2.2 If in this period a ROBOT will complete a two levels TOWER in the PICKUP AREA, the TEAM will gain 5 points + 5 points for each GOLD in the tower.

4.3 TELEOPERATED PERIOD – At the end of the AUTO PERIOD, the TELE PERIOD will be 105 seconds. During this period DRIVERS may operate ROBOTS remotely to collect GAME PIECES and build TOWERS.

4.4 TOWERS in the PICKUP AREA –

- 4.4.1 TEAMS will earn points by building TOWERS at the PICKUP AREA. TOWER score will be calculated as follows:
  - 4.4.1.1 Every ACTIVE LEVEL will be scored by multiplying the LEVEL height by the number of GOLDS at that LEVEL.
  - 4.4.1.2 A TOWER BONUS will be calculated by multiplying the number of ACTIVE LEVELS in the TOWER with the number of GOLDS on the ACTIVE LEVEL with the lowest number of GOLDS.



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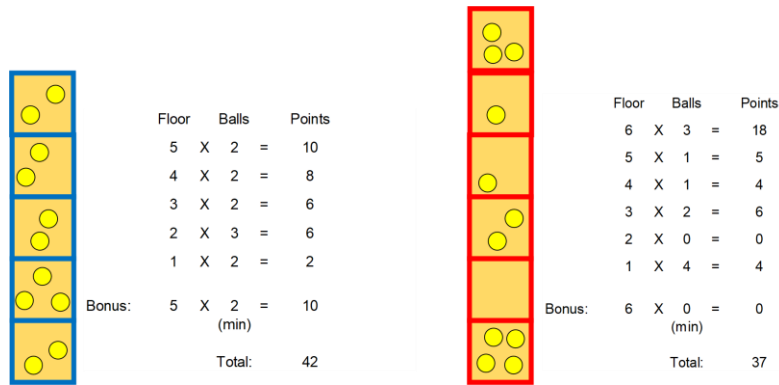


Figure 4.4.1 – TOWER score example

4.4.2 A three or more LEVELS TOWER will be CONSIDERED for score.

4.4.2.1 CRATES used to assemble a CONSIDERED TOWER cannot be used to build other buildings by that TEAM.

4.4.2.2 If a CONSIDERED TOWER has collapsed, the TOWER will be scored as it was before its last interaction with the ROBOT.

*For example, if a ROBOT attempt to place a 5<sup>th</sup> LEVEL CRATE but knock down the TOWER – the TOWER will be considered as 4 LEVELS TOWER with the GOLDS in it. The ROBOT cannot use these four CRATES for building new TOWERS. The opponent ROBOT may collect and use the CRATES if they are not in a SAFE ZONE.*

4.5 TOWERS in the SIGNAL AREA –

4.5.1 TEAMS may build a TOWER in the SIGNAL AREA. The TOWER height will be determined by the number of LEVELS containing GOLD in the highest TOWER in the SIGNAL AREA.

4.5.2 At the end of the match, the height difference will DEACTIVATE the TOP LEVELS of the TOWERS in the PICKUP AREA of the TEAM with lower SIGNAL TOWER.

4.5.3 The TOP LEVELS will be determined by the highest TOWER in the PICKUP AREA, and those LEVELS will be DEACTIVATED in all the TOWERS.

*For example, the BLUE SIGNAL TOWER has two more LEVELS, and the highest RED TOWER has 5 LEVELS – so the 4<sup>th</sup> and 5<sup>th</sup> LEVELS at all the RED TOWERS will not be considered for score and bonus.*





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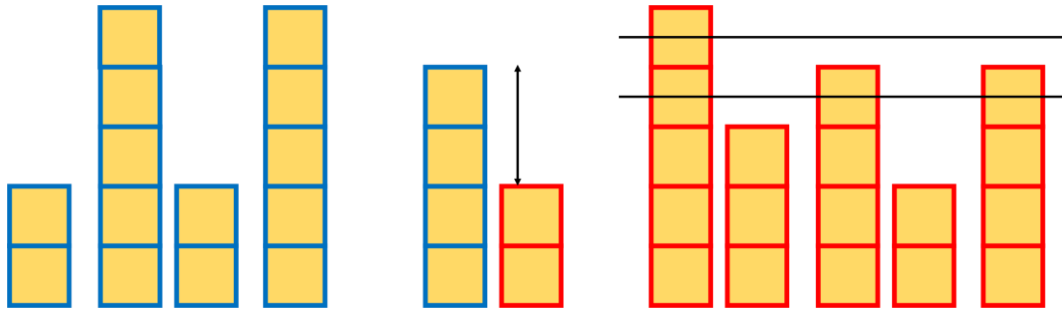


Figure 4.5.1 – Example of SIGNAL TOWER effect

4.5.4 A CONSIDERED TOWER with only one or two ACTIVE LEVELS will be scored.

## 5. Game Rules:

5.1 Construction rules:

- 5.1.1 ROBOT height – at the beginning of the match ROBOT height is limited to 1 meter. During the match a ROBOT may exceed this limitation when it is fully contained in its CRATE DECK.
- 5.1.2 FRAME PARAMETER – at the beginning of the match the ROBOT PARAMETER is limited to 3.5 meters. During the match the ROBOT may exceed its FRAME PARAMETER for a total of 50 cm from all faces.  
*That's meaning the sum of all face exceeding is limited.*

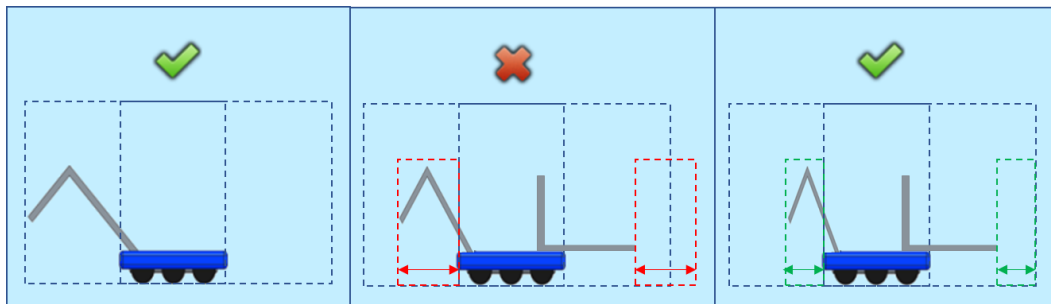


Figure 5.1.2 – PARAMETER limitation.

- 5.1.3 ROBOT weight is not limited. The limitation doesn't include the BATTERY and BUMPERS.
- 5.1.4 ROBOTS must have standard BUMPERS (see [FRC 2022 manual](#)).
- 5.1.5 ROBOT must be constructed from parts permitted in FRC games (see [FRC 2022 manual](#)).

5.2 ROBOT to ROBOT interaction:

- 5.2.1 **During AUTO, stay on your half!**  
ROBOT may not fully cross the mid-line of the field.





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ROBOT who interrupts its opponent AUTO movement will receive a warning and the match will be reset.

If ROBOT repeats the violation, the match will reset, and the TEAM will receive 10 pts foul and will be offline during AUTO.

## 5.2.2 This is not battlebots!

ROBOTS should try to avoid aggressive contact, especially within the CRATE DECKS.

## 5.2.3 Let them build!

ROBOT mustn't contact an opponent ROBOT who is fully or partly inside its SAFE ZONES, no matter who initiate the contact -5 pts foul.

## 5.2.4 Read the FRC manual!

General FRC rules will be considered in the match (Pining, stay outside opponent's frame parameter, etc.).

(see [FRC 2022 manual](#)).

## 5.3 ROBOT to GAME PIECES interaction:

### 5.3.1 Two CRATES limit!

Outside the SIGNAL and PICKUP AREAS, ROBOT may not control more than two CRATES.

Inside the SAFE ZONE, there is no limitation.

### 5.3.2 GOLD mining in the GOLD DECK!

Picking GOLD from the CARPET and filling CRATES with GOLD is only allowed if the ROBOT is partly inside the GOLD DECK.

Pushing or dragging of GOLD on the CARPET is allowed all over the FIELD.

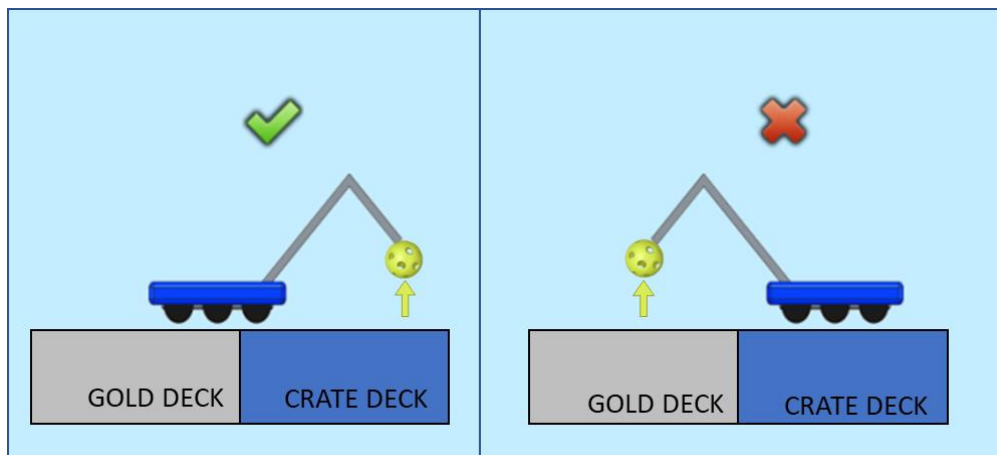


Figure 5.3.3.1 – GOLD DECK limitation

### 5.3.3 Don't wreck the TOWERS!

ROBOT may not contact CRATES fully contained in opponent SAFE ZONE - 5 pts foul.

An interaction with GAME PIECES or ROBOT who leads for a TOWER collapsing will penalize the TEAM with 20 pts. foul.

A tactic interaction will also penalize the TEAM with a yellow card and DRIVER substitution.



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## 5.3.4 Use **GAME PIECES** as intended!

Strategically locating or pushing **GAME PIECES** to the opponent's **SAFE ZONES** is forbidden.

## 5.3.5 **Don't shoot!**

**ROBOT** cannot shoot **GAME PIECES**.

## 5.3.6 **Don't destroy the **GAME PIECES!****

Be careful not to hurt or distort **GAME PIECES**.

Don't intentionally take out **GAME PIECES** outside the **FIELD**.

## 5.3.7 **Stay outside of the **FEEDER!****

**ROBOT** mustn't cross the **FEEDER** into the **DRIVER ZONE** with any part of the **ROBOT**.

## 5.4 Human rules

5.4.1 Each **TEAM** will have 3 students **DRIVE TEAM: DRIVER, HUMAN PLAYER** and **COACH**.

5.4.2 **DRIVER** is the only one allowed to touch the computer and controller.

5.4.3 **DRIVER** cannot be a student who have been part of the **DRIVE TEAM** in official and unofficial competitions during 2020-2022 seasons.

5.4.4 During the match, **HUMAN PLAYER** is the only one who allowed to touch the **GAME PIECES** and insert them to the **FIELD** through the **FEEDER**.

5.4.5 **HUMAN PLAYER** may insert a **CRATE** to the **FIELD** if:

5.4.5.1 Its **ROBOT** is fully inside the **GOLD DECK**.

And

5.4.5.2 The number of uncontrolled **CRATES** in the **GOLD DECK** is equal or less than 2.

5.4.6 **HUMAN PLAYER** may insert a **GOLD** to the **FIELD** if the number of uncontrolled **GOLDS** in the **GOLD DECK** is equal or less than 10.

5.4.6.1 During the match, **DRIVE TEAM** cannot exit the **DRIVER ZONE**. Especially, crossing the **FEEDER** while inserting **GAME PIECES** to the **FIELD**.

## 6. Competition rules -

6.1 The competition will take place in August. The exact date will be announced.

6.2 The competition will have five matches, and the **TEAM** wins most matches will be declared the winner!

Good luck!