FOOD FACTOR 2011 ROBOT GAMES - RULES

Read this first:
To maximize performance and eliminate surprises, the team must take the time to read and understand
FOUR documents:

:: FLL Field Setup Instructions
:: FLL Robot Game Missionen
:: FLL Rules
:: FLL Questions & Answers

1. Participation
A team consists of 5 to a maximum of 10 members, not including coaches and mentors. Each team is guided
by an adult coach. The allowable age of the team members is 10 to 16 years (team members deadline Sept
2nd 2011 when the FLL Challenge is released). At the tournament only 2 team members at a time are
allowed right up at the competition table except during repair emergencies. The rest of the team must stay
back from the table but close enough for different members to tag in or out as desired at any time. Specific
positioning is decided by the head officials running each tournament.

2. Equipment
This rule applies not only to the robot. It covers all of the attachments and strategic objects you bring to the
competition area. Everything you compete with must be made of LEGO elements in original factory
condition, except LEGO string and tubing, which you may cut to length.

Exceptions: You can reference a paper list of programs. Marker may be used for owner identification on
parts of the robot in hidden areas only. LEGO wires and converter cables are allowed as needed. There are
no restrictions on the quantities or sources of non-electric LEGO elements. Pneumatics are allowed. Wind-
up/pull-back "motors" are not allowed.

*Electric elements used must be the LEGO MINDSTORMS type and the total number of electric elements you
may use in one match is limited as follows:*

RCX-User
1 RCX

3 motors

8 sensors (from among light, rotation and touch sensors)

NXT-User

1 NXT

3 motors

6 sensors (combination from among LEGO touch, light and ultrasonic sensors)

For clarification: the team is allowed to bring a maximum of 3 motors to the competition area - this includes all motors on the robot as well as on further attachments and parts the team brings with it for use during the match. A fourth motor is not allowed in the competition area.

Spare/alternate electrical parts are only allowed in the pit area. The combined color/light sensor (9694) is not allowed. Computers are not allowed in the competition area. Objects functioning as remote controls are not allowed in the competition area. Stickers, paint, tape, glue, oil, etc. are not allowed. It is not allowed that teams share a robot during the tournament day. You are not allowed to use more than one robot in a single match, but it is okay to use a different robot in a different match. If a robot is in violation - of this rule or rule 3. "Software" - and cannot be corrected, the decision about exactly what to do rests with the head officials at the tournament, but that robot may not win FLL Awards.

3. Software

The robot may only be programmed using LEGO MINDSTORMS, RoboLab, or NXT software (any release). No other software is allowed. Patches, add-ons, and new versions are allowed. Tool kits, including the LabVIEW tool kit, are not allowed.

4. Mission

A mission is a result or action worth points. The more missions the robot fulfills, and the more valuable each one is, the higher your score. The team decides the order it wants to try missions in, and how many to try in each robot program. The team may re-try missions when that's possible; the field is not reset for that purpose.

5. Match

At a tournament, 2 playing fields are joined back to back, and each team is paired opposite another to compete in a match. There is a minimum of three matches and each one is a fresh chance for you to get your best score. A match lasts 2 1/2 minutes (150 sec) and the robot tries to get as many points as possible by achieving mission results.

A match processes as follows:

The match starts and the robot starts from Base. Once started, the robot is "active" and is understood to be working "autonomously" on missions. If you decide to touch the robot while it's active, no matter where it is, or what it's doing, that makes it "inactive," and it must immediately be carried to Base if it's not already there. While the inactive robot is in Base, it can be prepared for its next active period, and restart it. These steps repeat (often with music, an announcer, and cheering in the background!), until the match end signal sounds. The timer never pauses during a match. After the match, no one is allowed to touch anything on the field until the referee has recorded the condition of the field and come to agreement with the team (kids only) about what points were scored or missed and why. The points are marked at the referee sheet and confirmed by signatures of the team and the referee.

6. Round

The process of cycling all teams through one match each is called a round. Tournaments run at least three rounds. Between your match in one round and the next, you have time to go to the pit area and work on your robot and its programs as needed, but this time may be limited, depending on the schedule of other proceedings.

7. Base
Base is an imaginary box formed by vertical walls that rise from the perimeter of the Base area (including the inside surface of the border walls), and by an invisible ceiling 40 cm high. Base is a VOLUME - not an area. If there is a gap between the mat and a side border wall. Base includes this gap. Base is the place for the robot to be prepared, started from, and serviced, if needed. *Base: imaginery box with a height of 40 cm.*

8. FLL Playing Field
The field is where the robot game takes place. It consists of a field mat, with mission models arranged on top.The field mat and the LEGO pieces for building the mission models are part of your FLL Challenge Set such as a CD with instructions for building the mission models. *All other field setup instructions are on the 'Field Setup' page/document.*

9. Mission Models
Mission Models are defined as objects that are already on a competition field when you walk up to it. You may not bring duplicate mission models to the table. You may not take mission models apart from the playing field. Mission models must be separated from your team-supplied objects quickly after the match and put back to the playing field. You are limited as to how you may connect allowed material to a mission model. Gently flipping and/or shaking one (the heavier if the two are different) must allow gravity to completely separate them. The referee does not allow a start with an illegal connection. See

10. Cargo
Cargo is anything the robot has with it for transport. Cargo is not automatically part of the robot.

11. Autonomy
The FLL Robot Game is to be played by an "autonomous" robot. That means teams are not supposed to influence it while it's on its way on the playing field. Preparing the robot for its run is only allowed in Base. Most teams need to intercept the run of their robot once or more during the match, so you're allowed to do that, but this always forces a restart from Base, and sometimes, there's a penalty *(see* rule 17 "Touch Penalties"*).*

12. Active/Inactive Robot

At the moment the robot is started, it becomes "ACTIVE" (understood to be autonomous), and remains so until the next time you touch it or mission models/strategic objects it is controlling. At the moment of that touch, the robot becomes "INACTIVE" (understood to need help), and must be carried to Base unless it's already there and it might have further consequences *(see Rule 17. „Touch Penalties")*. The inactive robot in Base may then be handled/prepared and restarted, so it's active again.

13. Handling

Calibration - During your pre-match setup time only, you may calibrate your sensors outside Base.
Quality Control - During your pre-match setup time only, you may ask the referee to double-check that a particular setup is correct, but teams may not request any custom setup, in or out of the range specified in the setup instructions.
Changing Things Outside Base - Only the robot may make changes outside Base, including the addition and removal of objects. *See exceptions in rule 17 "Touch Penalties", rule 14 "Storage And Workspace", and rule 18 "Failure And Loss" rules*.
Playing Field Changes - If you or your robot cause illegal changes to the field other than mission model destruction, either by accident or on purpose, the action is "undone" as quickly and accurately as possible--- if possible. But if the pre-change condition is unknown, or the changes are too confusing or severe to undo, the changes are left as is.
Mission Model Destruction - If a mission model or its Dual Lock connection is defeat, by accident or not, the situation is left as-is.
Inactive Robot Handling - During setup, and whenever else the robot is inactive, teams may repair it, aim it, switch attachments, select programs, reset features, and load/unload cargo in Base.
Separated/Stored Objects - Teams may at any time, handle things in Base the robot is not currently touching or using, except as described in rule 15 "Start/Restart Procedure" .
Robot Aiming - You may use a device to aim the robot, but its use must be completely in Base at all times, and teams must let go of it prior to starting/restarting.
Staging - teams are allowed to place objects in the robot's path, completely in Base only.

14. Storage and Workspace

Once the referee inspects your equipment, teams may store things they need during the match or for the robot in 1 box to have everything ready for use when needed. Nothing is to be placed on the floor. The box can be held by one of the two team members at the competition table. Mission models and objects worth points in Base always need to stay in view of the referee.

15. Start/Restart Position

For the match start and all restarts, EVERY BIT of the robot, including its installed attachments, everything touching it, and any objects it is about to move or use, must ALL fit COMPLETELY in Base. The ROBOT MAY be touching objects it is about to move or use. Teams may NOT be touching objects the robot is about to move or use. Teams may NOT be touching objects the robot is touching. Everything must be motionless. There must not be any illegal connections. *See Rule 9 „Mission Models"*.

16. Start Procedure

When this is plain to see, and you say you're ready, the referee will signal your field's readiness to the announcer. As soon as the match begins, you can start the robot. There are certain possibilities to start the robot (at the exact start time), either touch a button, or signal a sensor, to start/resume the robot's program. You may not handle the robot, or anything it's about to move or use, during or after the countdown, except for the single action needed to get the program running. If you do, the referee has you restart. *START/RESTART PROCEDURE*

When it's obvious to the ref that starting position is correct…

For the first start of the match: The referee asks the team if it's ready, then signals the team's readiness to the announcer. As the countdown starts, the team reaches in with one hand, ready to either touch a button, or signal a sensor, to start or resume the robot's program. The team starts the robot. Teams may not handle the robot, or anything it's about to move or use, during the countdown, except for the single action needed to get the program running. If you do, the ref has you restart.

For restarts: The only exception to the first start is that there is no new start signal.

17. Touch Penalties

If you touch the active robot or anything it's touching while: the robot is outside Base, you lose one "touch penalty object" *(defined in the document "Field Setup & Placement")*.

A piece of CARGO is outside Base: you lose that piece of cargo, unless it was with the robot the last time the robot left Base.

NOTE: Cargo is not automatically in Base, if the robot is in Base. It is not automatically part of the robot and needs to be in Base itself. If the only part of the robot crossing into Base at the time of the touch is a cord, hose, wire, tube, chain string, or other feature obviously designed purely for extension, the robot is treated as if it were outside Base.

18. Failure and Loss

Anything done to your field by the active ROBOT outside Base STAYS that way, unless the active ROBOT changes it. Objects outside Base are not repaired, reset, recovered, or moved out of the way by hand. This means the robot can ruin its own opportunity to accomplish tasks, and it can even spoil previous progress/results. If the active robot (untouched by you) loses contact with cargo, the cargo stays where it comes to rest unless/until the active robot regains contact with it. It may not be recovered by hand. Anything that comes off the table is kept by the referee.

Exception: Parts not designed to separate from the robot, but which separate due to obviously accidental DAMAGE may be recovered by the teams, by hand, at any time – even if they have cargo (gift: teams keep any cargo in question).

19. Interference

The robot may not have any effect on the other team's robot, field, or strategy. If Robot X deliberately

blocks or un-scores Robot Y's progress/results, Robot X's mission(s) in that area are marked as incomplete, and Robot Y's are marked as complete. As a matter of luck, the competitive team might be able to out-perform the team in the shared area, or might fail to cooperate with the team there. This is not considered interference.

20. Word Definitions

„in"

A is "in", "into" or has "reached" area B if ANY BIT of A is OVER area B.

To be "in" an area is to penetrate the volume over that area. Barely "in" is considered "in" unless the phrase "completely in" is used. Base is a special case; *see Rule 6 „Base"*. Touching (direct contact) the mat/mission model isn't needed/doesn't matter when assessing if something is "in." Objects are ruled on independent of each other, and independent of their transports/containers.

"Touching" (for objects other than the robot)

A is "touching" B only if A is making direct contact with B.

Any amount of direct contact counts as touching.

21. Final Field Condition and Scoring

The score is determined at the end of the match, by the SNAPSHOT condition of the field at that EXACT time only. This means that points are not given for results the team's robot gets but then trashes before the match ends.

Rarely, a method is required as well as a result. In that case, the referee notes whether the required method is used.

22. After the Match

At the end of the match, the referee carefully examines the field to note the conditions and locations of objects. No one is allowed to touch anything on the field. The referee first needs time to record the condition of the field, and come to agreement with the team (kids only) about what points were scored or missed and

why. Data is marked on a sheet which the team and the referee finally sign. Finally, the referee gives the okay for field reset. The scores are tallied by computer, with ties being broken using 2nd, then 3rd highest scores. If more than one team gets a perfect score in all regular rounds, time is the crucial criteria.

23. Benefit of the doubt

The team gets the benefit of the doubt when: a split-second or the thickness of a (thin) line is a factor *or* a situation could "go either way" .

If the team (kids, not coach) disagrees with the referee and can respectfully raise sufficient doubt in their mind during your post-match chat, the referee meets with the head referee, and the resultant decision is final.

24. Data transmission (only for tournament day)

Downloading programs to robots may take place in the pits only. If downloading to an RCX controller, the teams must make sure that the process is shielded, and that there are no other RCX robots in range. RCX robots must be turned off when not in use. If downloading to an NXT controller, teams must use cable*.* Bluetooth must be switched off at all times.

25. Variability of tournament conditions

Please consider while constructing and programming that there can be variations between different tournaments depending on local conditions. Variations might occur in:

- Differentiations in the character of the field borders
- Lightning conditions
- Structure/irregularities of the field mat.

Questions according the local conditions at regional tournaments can be posed directly to the local organiser. Please find the contact details on the regional websites. The team gets the benefit of the doubt when:

26. Precedence

The order of precedence for the challenge documents is as follows:

1. FLL Questions & Answers,
2. FLL Robot Game Missions and FLL Field Setup & Placement,
3. FLL Rules

On all pages, videos and pictures are for guidance and example only. Often they cannot express complete information, and are therefore might be misleading. When there is conflict between pictures/videos and text, the text takes precedence!

The Referees have final authority during the tournament. Their decisions will not and cannot be changed. The head referee is not obligated to consider calls made at previous tournaments unless those calls have been added to the latest "Q&A" under www.hands-on-technology.de/en/firstlegoleague/saison2011/foodfactor/questions.

27. Challenge Support/ Questions & Answers

All parties (judges, referees and teams) obtain their information from the same documents and online sources under: www.hands-on-technology.de/en/firstlegoleague/saison2011/foodfactor.

For official answers to questions about the Challenge, including rules on special strategies or situations, email fll@hands-on-technology.de. Please state as subject "Food Factor" and tell us your roll within the team (member, coach, parents, mentor).

All questions will be answered. Important questions will be published online in the "Question and Answers" section for all teams.

ATTENTION: We do not answer questions how to built or program a robot.

28. Coaches' Meeting

If a question does come up right before the tournament, your last chance to ask it is at the "Coaches' Meeting" (if there is one) the morning of the tournament. The head referee and coaches meet to identify and settle any differences BEFORE the first match. For the rest of the day, the referee's calls are final when you leave the table.