# Capture the Flag

Overview

Two robots will face off on opposite sides of a playing surface. Somewhere in the middle will be a flag that the robots must try to find. The first robot to capture the flag and return to his home base wins.

Rules

The competition will take place on a standard-size FIRST LEGO League table, a 4 feet by 8 feet smooth white surface surrounded by two-by-four walls painted flat black. (The actual playable area is 93 inches by 45 inches.)
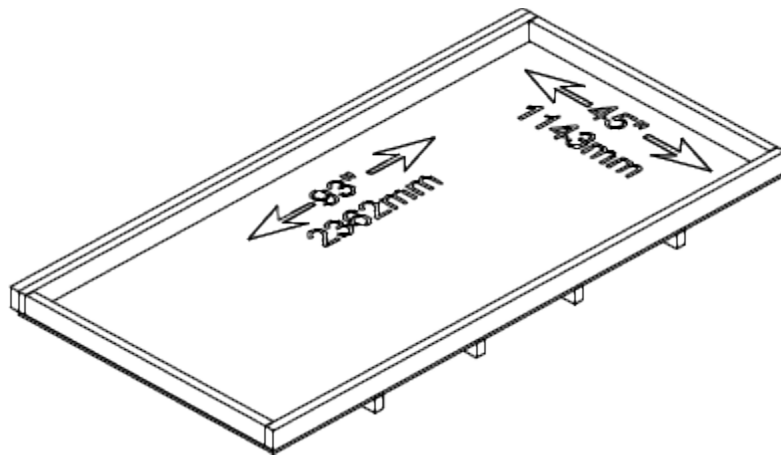
There will be two "home base" squares measuring 10 inches by 10 inches marked in opposite corners of the table using three-quarters-inch black electrical tape. Robots will start the competition within their home base and must fit entirely within the square at the beginning of the match.

The flag will be represented by a HiTechnic Infrared Electronic Ball, which is a plastic ball that emits infrared light to make it easier for MINDSTORMS robots to track. The ball is 75mm in diameter, or a little under 9.5 studs. For this competition, the ball will be set to emit infrared light in 600 Hz pulse modulated (AC) mode, similar to the RoboCup Jr requirements. This allows the ball to stand out better from ambient light.

The ball will be positioned atop a flag carrier robot which will start in the middle of the table. A competitor robot will need to locate the ball and take it away from the flag carrier robot in some manner, such as by grasping it or knocking it off. It must then return the ball to its home base.

The flag carrier robot (pictured below; a LEGO Digital Designer file is available on request) is a simple rover based on Ben Jackson's Rock Stupid Rover and W. Grey Walter's Machina Speculatrix. It wanders around in large circles, changing direction if it bumps into an obstacle. It has only limited mechanical intelligence and may help or hinder the other robots.
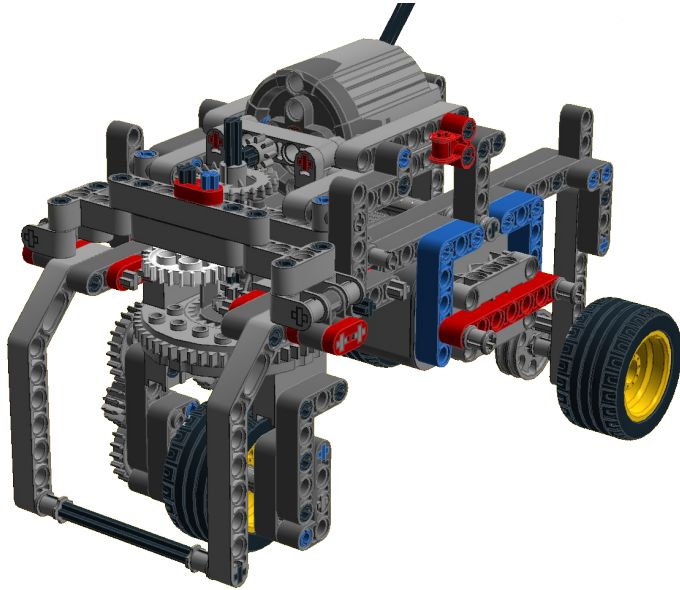
The infrared ball is carried in a holder that is 8 studs long, 8 studs wide, and 11 studs above the ground. At the rear of the robot, two beams extend two studs above the floor of the holder to keep the ball lightly tucked in place.

Robots are allowed to capture the flag at any time during the match, whether the flag is being held by the flag carrier or not. This means that a robot may steal the ball away from its opponent.

A win is scored when a robot returns to its own home base with the ball under its active control. Note that "active control" means that the robot must be carrying, pushing, or otherwise maneuvering the ball; it is not sufficient merely for the ball to roll into the base of its own accord, or when bumped from across the table.

A win for the opponent will not be scored if a robot happens to return to its opponent's home base with the ball. This allows a robot to find its way home by following the wall around the playing field, passing through its opponent's base if necessary. (Of course, this may increase the danger that its opponent will intercept the ball.) Robots are encouraged to use dead reckoning or active positioning (e.g. using the compass sensor) to find their way home, but this is not required.
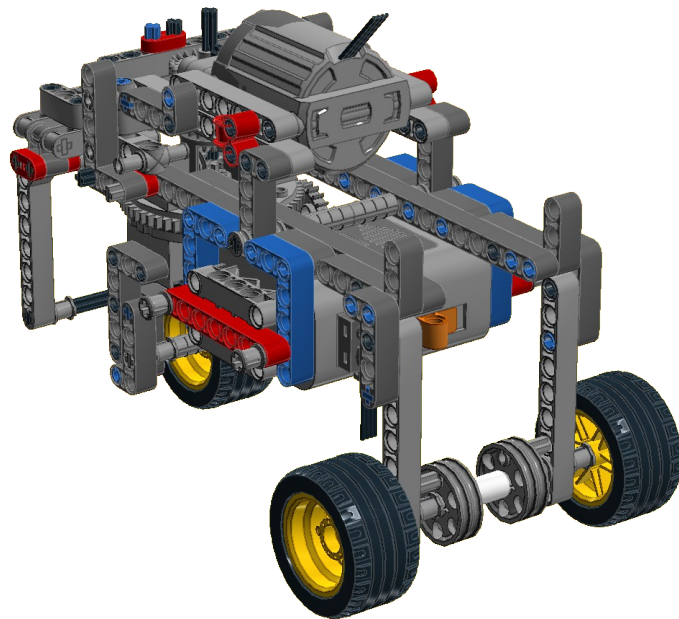
Robots may use any strategy they wish to locate the ball, but the HiTechnic IRSeeker sensor is recommended since it has been designed specifically for this purpose. Other possibilities include two light sensors positioned in a stereo pattern, or even a light sensor combined with an ultrasonic sensor.

Robots must be constructed of 100% LEGO-brand parts, with special exceptions allowed for string, rubber bands, batteries, and third-party sensors. No modification (melting,

glue, deformation, etc.) of the bricks is permitted. Contestants may use any type of intelligent brick (RCX, NXT, EV3, Cybermaster, Scout, etc.) and any number of sensors and motors.