Welcome to the IEEE First Annual Lego Robot Competition. In this document you will find the rules and regulations for the events for the Summer 2007 competition.

Overview:

The competition will consist of three parts, two antonymous and once manual control. These three parts will be referred to as Maze, Bowling, and Sumo. Each team will be given on Lego Mindstorm RCX v1.0 kit that they will use, with no other parts, to construct a robot to complete the Maze, Bowling, and Sumo events. Each event the robot will be able to have it's body reconfigured and its microcontroller reprogrammed. Each team will be given a minimum of five minutes between events reconfigure and reprogram their robots. We recommend showing up early so you can calibrate your sensors to the tables that are going to be used.

Scoring:

Each team will attempt to get a total of 100 points by competing in the Maze, Bowling, and Sumo events. The point break down can be found in each of the events corresponding rules below. Some events will have size restrictions which must be followed or the received score for that event will be cut in half for that team. In the event of a tie, after all events have been completed, the teams that have tied will face off in a short bracket of Sumo. The winner of this short bracket will be the over all winner.

Software:

For the software and instructions for programming the Lego Mindstorms RCX v1.0 robots please visit this events home page at http://ieeelego2007.webhop.org/

Measurements:

All field measurements are made to the tolerance of 1/2". All robot measurements will be made within a tolerance of 1/10"

What to bring to the event:

Please bring your robot to the event along with the white cardboard box and green box that contains the extra Legos to the event. Also it is important to note that you are responsible for the quality of your batteries. I am sorry but we do not have any extra batteries to lone you if yours run out. We will have a single laptop computer with all the software that you need to load your programs on to it. Because this will be a community computer you will be limited with the amount of time you are able to use it and thus we recommend that you bring your own computer if you have one.

Maze (35 Points):

The first event will be the Maze event. The Maze event will consist of a 6x6 square maze with both of the entrances and exits on the out side of the maze. The entrance will be on the bottom right square of the maze and the exit will be on the top left, see Figure 1 below. The exit will have each of it's non-walled sides denoted with 3/4" thick black electrical tape. Each block has a dimension of about 9.5", with each wall measuring 2" high and slightly more than 0.5" thick. The bottom of the maze is metal as well are the sides, please see Figure 2 below. If you would like to practice on this maze before hand, the maze is located in Bossone 214. Please note that the configuration of the maze will change for the competition but the entrance and exit will stay in the same location.
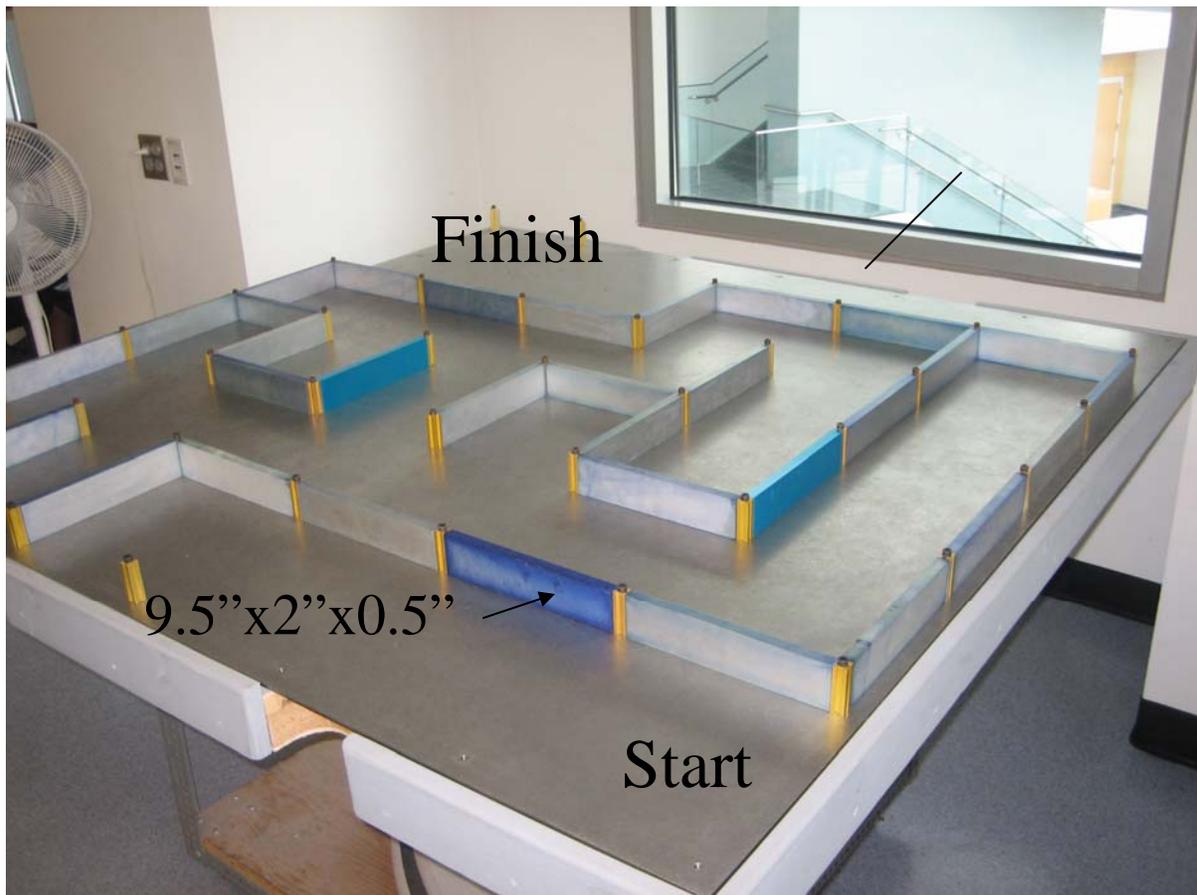

Figure 1

The goal of this event is to have your robot start in the block labeled start and autonomously find it's way to the end of the maze. Who ever runs the maze fastest will get the most points. The timer is stopped as soon as the robot crosses the 3/4" black line. A five (5) point bonus will be given to any team that when their robot finishes it automatically stops and plays the Eagles Fight Song (Fly Eagles Fly). Each team will get the option of running the maze twice. If a team wants to try the maze a second time, their first score will be erased and the score for their second run, no matter if it is better or worse, will be their score for the event. Each team will be required to give a short

explanation of what their exit strategy is directly before the event. Please see Table 1 below for the scoring breakdown for this event.

Please note that there is no size restriction for this event.

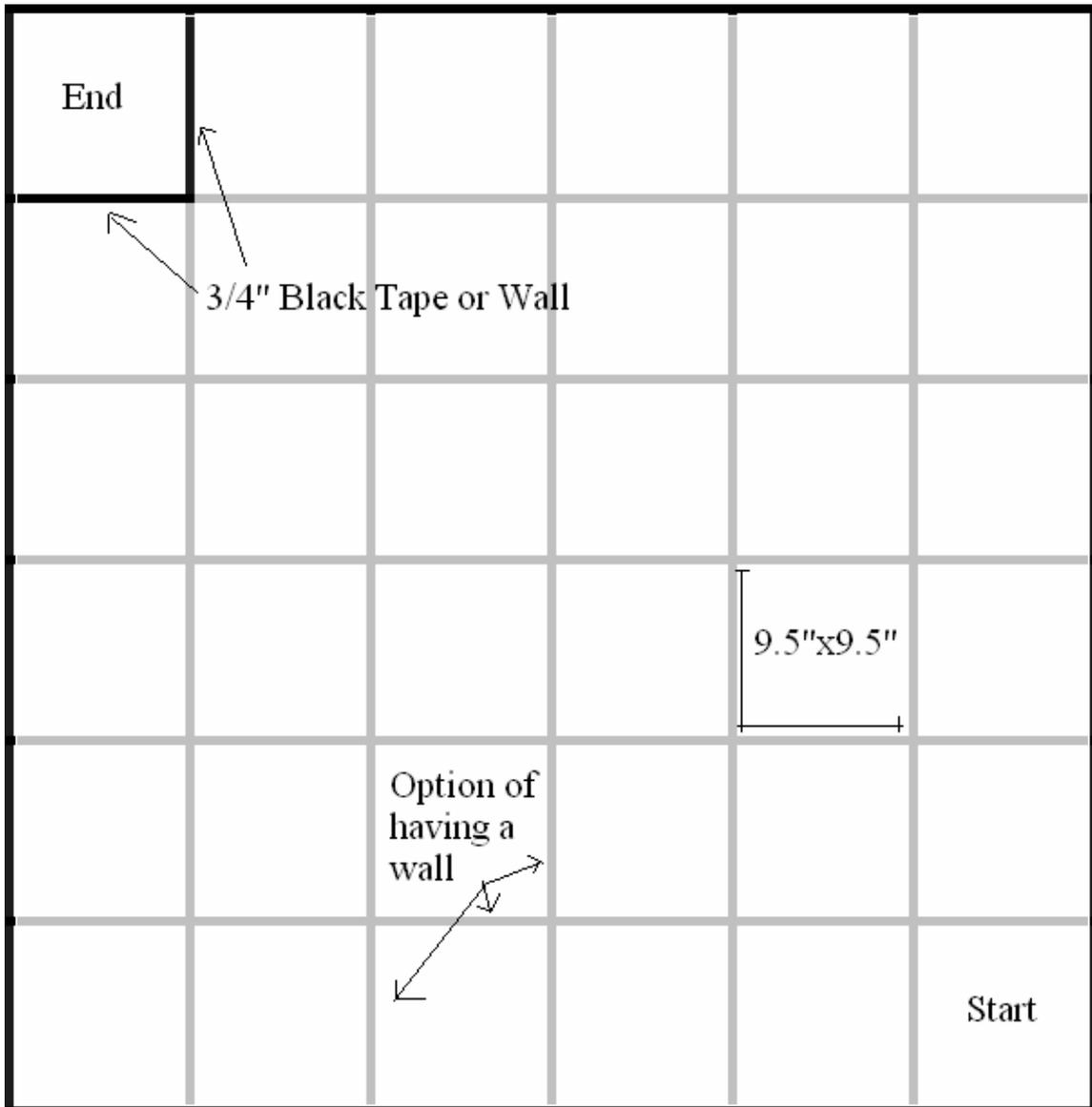| Time	Points			
Top 30%	30	Bonus =	+5 Points Extra	
Middle 50%	20			
Bottom 20%	10			
Did Not Finish	0			

Table 1

Figure 2

Bowling (35 Points):

This event will an antonymous robotic bowling event. The robot will be let loose in an almost fully closed 47.5" x 95" arena with three sets of 3/4" black electrical tape giving a path to the pins vicinity. The goal of the robot is to nock over as many pins as possible. There will be ten (10) pins, each pin is a toilet paper tube, setup in a 14" equal landrail triangle with a 3/4" black electrical tape edge. The area behind the pins will NOT be walled off.

Each team will get three runs. Each run the robot will have a maximum of 2 minutes to find the pins and nock them down. As soon as the robot touches the first pin the robot has a maximum of 10 more seconds in that run. Any pins that are knocked down more than 10 seconds after the first pin has been touched will not be counted towards the score. The round will end when the robot either runs out of time or leaves the playing field. After each round all 10 pins are setup again. Each pin knocked down is worth one (1) point towards your final score. The sum of all of the pins Knocked down will be your score for that round. If your robot knocks down one or more pin in each round and your robot does not leave the playing fiend in any of the rounds your team will receive 10 extra points.

Please note that this event does have a starting size restriction. No robot can have a length longer than 9" and a width wider than 7". Length is defined by the direction that is parallel with the primary direction of movement of the robot. Width is the direction that is perpendicular to the length and is no vertical. The height has no restrictions. After round has started the robot can change it's own shape to be outside the bounds of the starting size, but it MUST start within the starting size restrictions as listed above or you will be penalized by the penalty defined in the Scoring section. Also note that this penalty will be each individual round not for the whole event.

Please see Figure 3 below for the picture of the table that will be used for this event. This table is located in Bossone 214. Please note that this table is not setup the way it will be for this event. See Figure 4 below for a diagram of the table setup for this event. Please note that the dimensions of the obstructions and exact location of the pins have been purposely omitted.
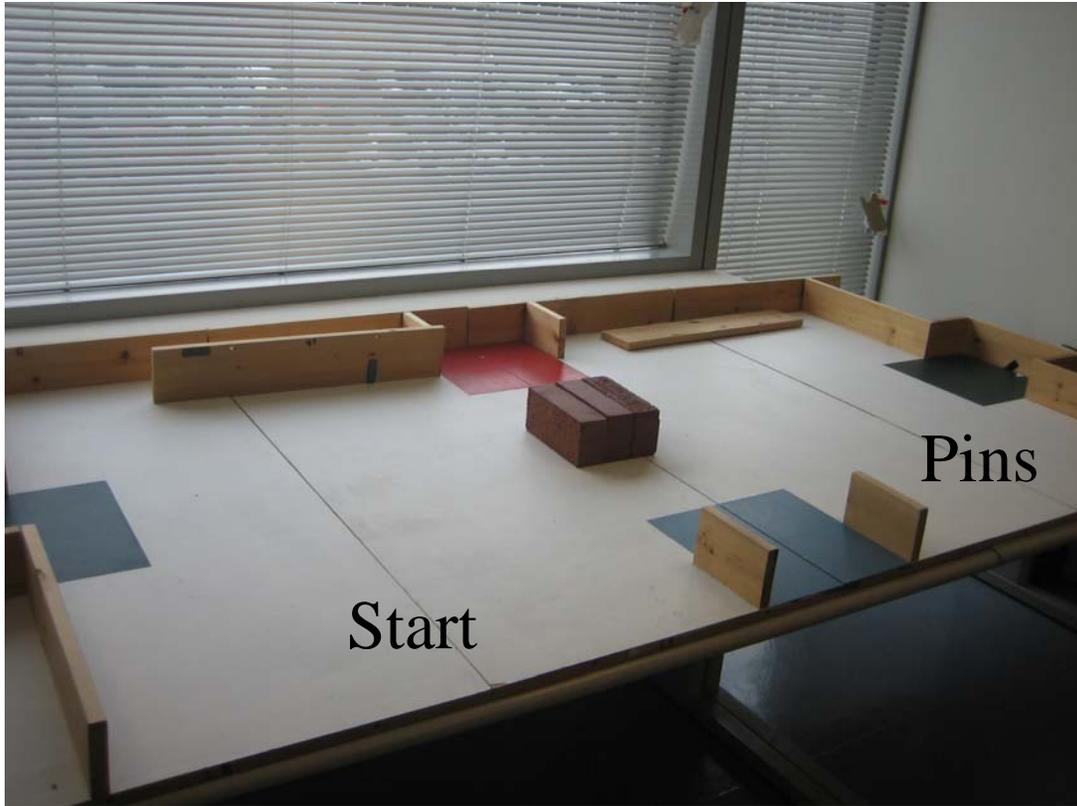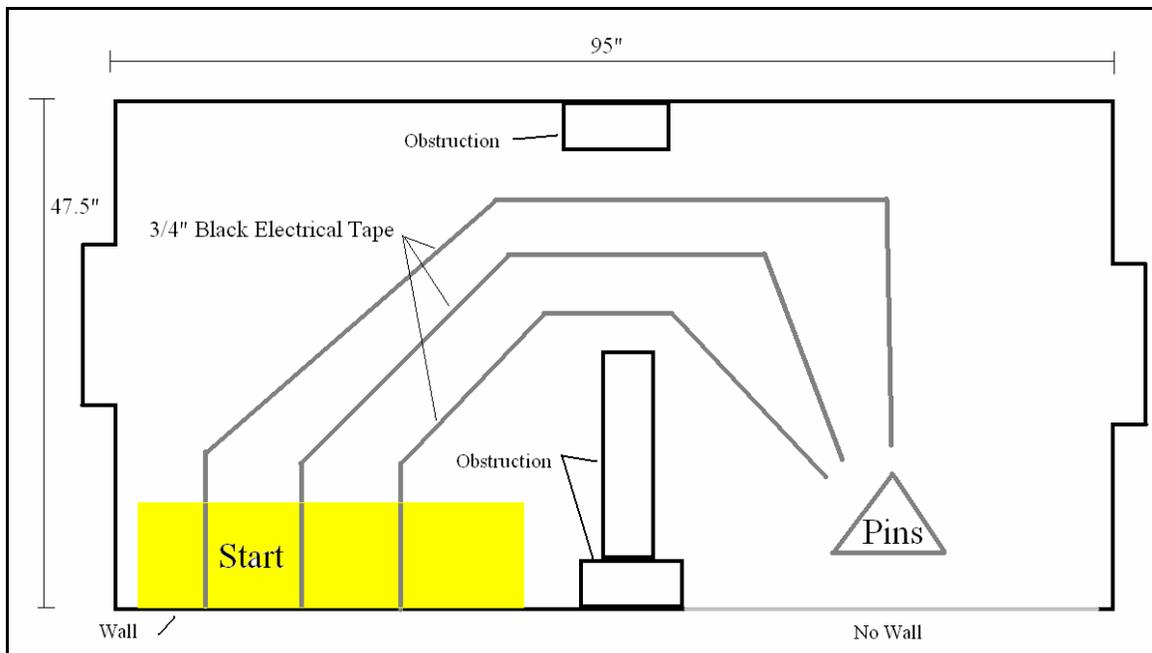
Figure 3

Figure 4

Sumo (30 Points):

This event will be a manually controlled robot sumo event. The goal of this event is to push the other robot out of the ring. A robot is pushed out of the ring once the whole of the robot is outside of the right. The ring will be on a table and outlined with 3/4" black electrical tape. The ring will have an internal area of no less than 7 ft^2.

Each round will last no longer than 2 minutes. If no robot is pushed out of the ring the winner will be determined by the referee who will take into account which robot based on effectiveness of the robots push out attempts and how many times each robot was "in control" of the sumo and how much damage the robot inflicted and took during the match. The referee's judgment is final.

The event will be an bracketed event, where the winner goes on to the next bracket. The placement of the teams in the bracket will be determined randomly by the referee. The scoring will consist of the first place will get 30 points, second place 25 points, the next bracket down gets 20 points, the next bracket down 15 points and so on.

In the event of there being three left in a bracket, the first two robots will face off against each other. The loosing robot will play the next robot. When a robot looses two games the robot is then disqualified. The winning robot of this "round robin" will go to the next round. If there is a round robin for the final round then the first one out will be third place, second one out will be second place and third one out will be third place.

Please note that this event does have a starting size restriction. No robot can have a length longer than 9" and a width wider than 9". Length is defined by the direction that is parallel with the primary direction of movement of the robot. Width is the direction that is perpendicular to the length and is no vertical. The height has no restrictions

In order to control the robot you will be given, at the event, a controller that hooks up to the 1,2, and 3 sensor inputs on your robot. The controller will consist of three buttons, one for each of the sensor inputs. The buttons will act as a touch sensor and will be normally open. The order of the buttons on the controller will be 1,2,3. Please see Figure 5 below for a diagram of what the controller will look like. Please note that this will be a wired and not wireless controller. Two controllers will be made and able to be used the week of July 16th by appointment.
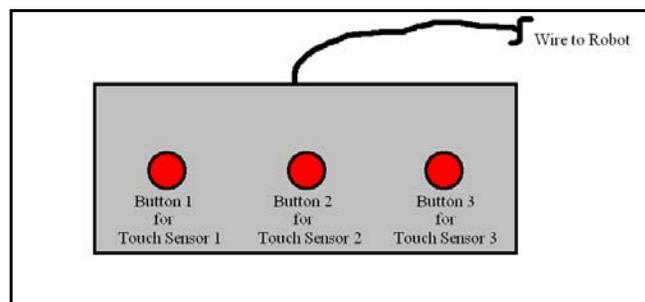

Figure 5