

The Triangle Tangle

BOTSIQ 2008 Task Game Outline

- 1 Game Description:**
 - Object of the Game
 - Goal
 - Scoring Rings
 - Rules
 - Game Field

- 2 General Safety Requirements**
 - Test Area
 - Pit Area
 - Driver Area

- 3 Team Description**
 - Driver or Drivers
 - Coach
 - Human Player

- 4 Robot Description**
 - General Description
 - Size and Weight Limits
 - Power Limits

- 5 Tech Regs**
 - R/C systems
 - Battery Requirements
 - Safety Requirements

- 6 Documentation**
 - Design notebook
 - Parts lists
 - Photo album
 - Research information

- 7 Pneumatics**
 - Special Safety Section about Pneumatics

Triangle Tangle

1 Game Description:

Object of the Game

The object of the Game is to score points by placing Scoring Rings on the Goal. The Goal is divided into 4 levels numbered 1 through 4 from the lowest level to the highest level. Level 1 is the 1 point level, level 2 is the 2 point level, level 3 is the 3 point level and level 4 is the 4 point level. The very top center is the point doubler. Points are scored at the end of each match. Each match is 3 minutes long. The color of the outermost ring determines the color of the points that count on each level. For example, if on level 2 there is only one red scoring ring, then the red team gets 2 points for that level. If on level 3 there is a Blue ring, a Yellow ring and the last 2 (farthest from the center) are Red rings, then the Red team gets 6 points for that level, the Blue team and the Yellow team get 0 points for that level. Any team that places their color scoring ring on the top center doubles their score for the lower levels. Each team will compete in at least 4 matches. The first place will be determined by the highest total points scored in their top 3 matches, second place is the second highest total points scored in their top 3 matches and third place will be the third highest points scored in their top 3 matches. No matter how many matches a team plays the total points of their highest 3 matches count towards the final placement.

Game Field

The Game Field is best described as being in the shape of the letter **Y**. There are 3 legs to the game field that meet in the middle. The center is a triangle with each of the 3 sides being 4 feet long (equilateral triangle). The 3 sides of the triangle are connected to 4 foot by 8 foot long plywood boards. At the ends farthest from the center of the triangle are the starting locations for the robots and the loading area ramp.

Loading Area

The LOADING AREA will be located next to the starting position for the robots. It will be 32 inches long by 16 wide and be 1.5 inches high. There will be a ramp 10 inches wide leading up to the LOADING AREA. ROBOTS can

only be loaded by the HUMAN PLAYER when the ROBOT is completely in the LOADING AREA.

Scoring Goal

The SCORING GOAL is made from Schedule 40 PVC tubing $\frac{3}{4}$ " ID. It is mounted on small turntable which allows it to be turned if pushed by the robots. Its overall height from the game field is 24 inches. There are four scoring level arms and the top center post. The scoring level arms stick out from the center and are progressive in length, the lowest arm is the longest and the highest arm is the shortest. Each arm sticks out at a 90 degree angle from the center and each level is offset 90 degrees from the next arm. The end of each arm is covered with a PVC cap. At the beginning of each match the SCORING GOAL will be given a spin so that at the beginning of the match the SCORING GOAL will be in a random position.

Scoring Rings

The SCORING RINGS are soft foam gasket material. They are toilet tank to bowl seals. There will be 45 rings total: 15 with a red band, 15 with a blue band and 15 with a yellow band. The SCORING RINGS will be placed on the playing field with the flat side down and the tapered side up. The SCORING RINGS will be located to the right of the ROBOT starting position in a line of 10 RINGS. The 10 rings will consist of 5 of one opponents and 5 of the other opponents in alternating order. Any SCORING RINGS that go out of the GAME FIELD are 'OUT OF PLAY" until the next match. SCORING RINGS that are brought to the HUMAN PLAYER by the ROBOT can be removed from the GAME FIELD by the HUMAN PLAYER. The HUMAN PLAYER can only handle SCORING RINGS for his own team. The HUMAN PLAYER cannot touch any SCORING RINGS belonging to an opposing team.

Rules

The ROBOTS will begin each match in their designated colored starting square, which is located at the farthest end from the center of each leg of the Y. The DRIVER (S) will be positioned directly behind his teams ROBOT and next to him will be the teams HUMAN PLAYER with 5 of his teams SCORING RINGS in front of him. The team COACH will be behind both the DRIVER(S) and the HUMAN PLAYER. On the playing field along the right side of the length will be 5 of one opponents SCORING RINGS and 5 of the other opponents SCORING RINGS. For example, the RED team will have 5 BLUE and 5 YELLOW SCORING RINGS on their side of the field, plus the RED team's HUMAN PLAYER will have 5 RED SCORING RINGS. The RED team's ROBOT

must move across to their opponent's side of the GAME field to gather their teams RED SCORING RINGS. The same applies for the 2 opposing teams. Each ROBOT has to move into their opponents area to gather their SCORING RINGS. Before any ROBOT can be loaded by its teams HUMAN PLAYER the ROBOT MUST first make its way to the SCORING GOAL area and return to the LOADING AREA. The ROBOT is not allowed to go straight from the STARTING SQUARE into the LOADING AREA at the beginning of the match.

Pushing and shoving.

The purpose of this type of competition is to build a robot capable of performing a specific task. Robots designed to do harm or intentionally break the opponents robots will NOT be allowed to participate. Robots should be built sturdy enough that they can handle some pushing and shoving around the goal area (the center triangle). The only area where incidental contact can occur is the center triangle. Pinning a robot is not allowed and if a robot is inadvertently pinned by another robot the Driver will be given 10 seconds to unpin and move away or face disqualification. It is not expected that there would be pushing and shoving outside the scoring triangle. If a robot is tipped over as a result of contact in the scoring triangle they will be left in the tipped position until the end of the match. The tipped robot may be gently pushed (not rammed) out of the way by another robot.

Robots may be designed to grip or grab and hold the scoring tree, but they cannot be attached to the scoring tree at the end of the match.

Robots should not be able to intentionally remove the scoring rings from the playing field. If scoring rings accidentally come out of the playing field they will be out of play and not be returned to the playing field until the next match

Sudden Death for Final Scoring Ties

First team to place 3 Scoring rings on the Goal at any level wins the Sudden Death Match. This will be done without the aid of the Human player.

Triangle Tangle

2 General Safety Requirements

Test Area

A test area will be available for testing and practice. Other than the competition game field, this is the only area allowed for driving the robots. Due to possible radio interference each team that needs to use the testing area needs to clear with the radio management personnel. All safety precautions must be taken in the test area.

Pit Area Safety Rules

Safety Glasses will be worn at all times in the Pit Area

Aisles in the Pit Area must be kept clear for passage.

Pit tables should be kept clean.

NO grinding in the Pit Area.

NO welding in the Pit Area.

NO running in the Pit Area.

3 Team Description

Driver.

The Driver is the person responsible for controlling the actions of the robot. He/she will be operating the robot via remote control and will be responsible for starting and stopping the robot at the correct time.

Coach.

The Coach is positioned behind the Driver and the Human Player. He is there to offer guidance and instructions to the Driver and the Human Player regarding the game strategy.

Human Player.

The Human Player is the only person allowed to physically interact with their team's robot. He is not allowed to touch another team's robot. He will start off each match with 5 of the scoring rings in close proximity to him. When the team robot is in the loading area directly in front of the Human Player, the Human Player may place scoring rings on the robot or reposition scoring rings on the robot. He can only touch his teams scoring rings. If there are opponents scoring rings on the robot, he cannot remove them. He is also allowed to toss scoring rings at the scoring tree for the purpose of scoring points.

Triangle Tangle

4 Robot Description

General Description:

The robot should be built with the idea of being able to pick up or move the scoring rings and be able to place the scoring rings on the different levels of the scoring tree. The robots should be robust enough that they can be able to handle the inevitable pushing and shoving that might take place around the scoring tree. Robots cannot have active or passive systems that can intentionally do damage to the other robots or possibly do damage to the playing field. If the judges feel that a robot is designed or built for aggressive actions, that robot will not be allowed to compete until it is modified (if possible) to comply with the spirit of the game rules.

Size and Weight Limits:

The maximum weight of the robot cannot exceed 20 pounds. The maximum physical dimensions of the robots are as follows: Length from front of robot to back of robot will be no more than 16 inches. Width from the right to the left of the robot will be no more than 16 inches. Height from the floor to the topmost part of the robot is no more than 24 inches. The size limitations apply to the robots at the beginning of each match. For example, if the robot is designed to change any of its dimensions as part of the process of playing the game, that will be allowed as long as at the beginning of each match the robot is able to meet all the size limitations.

Power Limits:

The robots will be power electrically using batteries and motors.
The maximum speed allowed for the robots will be 4 feet per second.
Internal combustion engines are not allowed.
Maximum battery voltage is 24 volts nominal.
Maximum Amp/hour rating is 4 amp/hr.
All robot electrical must be protected by either fuses or circuit breakers.
*Pneumatic systems cannot be pressurized any more than 200 psi.
Hydraulic systems are not allowed.

Triangle Tangle

5 Tech Regs

R/C systems:

The following type of Radio Control Systems will be allowed for the task oriented game:

AM type radio control systems*

FM type radio control systems of the 75 MHz range (Ground frequencies)*

2.8 Gigahertz Systems.*

IFI systems.

* If your radio system has removable channel crystals, remember to bring at least one set of extra crystals of a different frequency.

Battery Requirements:

Batteries must be of spill-proof or leak-proof design.

For example:

Sealed Lead Acid (SLA)

Nickel Cadmium

Nickel Metal Hydride

Lithium Poly

Lithium Ion

Maximum voltage should be 24volts (nominal) or less.

Rated Amp/hour capacity cannot be more than 4 Amp/hours.

Batteries on the robots should have short circuit protection, fuses or circuit breakers.

Batteries need to be securely mounted and protected inside the robots.

Safety Requirements:

All electrical connections on the robot must covered to prevent short circuits.

Wiring should be of sufficient capacity to prevent melting of insulation.

All wiring must be protected from contacting the game field or causing entanglements with other robots.

There should be no sharp edges on the exterior of the robot.

Triangle Tangle

Documentation

Design notebook:

There should be a design notebook made for each robot built. A 3 ring binder with sketches and drawings of ideas for the robot is required. The notebook should contain design sketches from conception to finished product. It should also contain engineering type drawings of any parts that needed to be made for the robot. Any game playing strategy ideas should also be in the notebook.

Parts lists:

The "Parts Lists" can be handwritten or a printout of an EXCEL spreadsheet. The list needs to contain information about where the parts of the robot were purchased from as well as how much was spent on the robot. It can also include the weight of the parts.

Photo album:

Several pictures of the students working on the robot or parts for the robot as well as team meetings or driving practice should be included in the photo album

Research information:

A one page essay about what research was done for the process of building the robot to compete in the competition. It can be about how the team determined what kind of batteries to use or what kind of motors or what kind of materials are going into the robot.

Triangle Tangle

***Pneumatics**

Special Safety Section about Pneumatics:

Pneumatic Systems can be a very powerful and dangerous method of operating mechanisms. Very precise control can be achieved using pneumatics, but at the same time working with high pressure air or any gas can be dangerous.

Extreme precautions must be taken with Pneumatic Systems. **Safety_glasses** must be worn any time operating or testing the pneumatic system. The maximum pressures must be observed.

The Pneumatic system must have a combination Flow/Purge control valve directly after the storage cylinder or pump.

Pressures cannot exceed 200 psi.

There must be a method or valve to safely and completely drain the system after each match.

The system must have an adjustable pressure regulator installed directly after the Flow/Purge Valve.

All tubing and/or hoses and fittings must meet the maximum pressure requirements.