



6th Annual Robotics Competition - 2013

Designed by the WTCS Electronics Based Program Team

IRONBOT 2013 – Feats of Strength

April 27, 2013

Start Time: 9:00 am

Fox Valley Technical College

Appleton, WI

Each Wisconsin Technical College is encouraged to participate. Be sure to contact the Electronics department at your college as the Electronics instructors are serving as advisors for our respective colleges.

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Feats of Strength Events:

Timed line tracking course

Pulling strength test

Hill climbing test

Wall climbing test

Scoring:

50 Points maximum

Oz of your pull

Maximum degrees x 0.8

Inches you climbed the course 48 maximum

Specific details and scoring rubric for each event are described elsewhere in this document. In case of a tie, the best time for the timed line tracking course will be used to determine the tie break.

The right combination of speed and agility will not be enough to lead your team to victory. A great design will never become a marketable product if no one knows about it. Therefore, each team will create a poster outlining their design and give a 9 - 15 minute presentation on their design. Along with their presentation, each team will also turn in their design documentation.

Points awarded:

Feats of Strength: As noted above

Poster Board: 40 points

Presentation: 35 points

Design Documentation: 25 points

General Rules:

No compressed gas or liquid is allowed, nor is any combustible material allowed. No liquid or solid fuel engines are allowed. Eye protection is required for all events.

- All contestants must be students of a Wisconsin Technical College.
- All teams must have at least one student from the electronics or industrial program at their respective WTCS college. Inclusion of students from other programs is highly encouraged.
- Teams will be comprised of 2 to 8 members.
- Each team will have between 1 and 3 advisors. The advisors should be connected to the college. (teacher, advisory committee member, administrator)
- The bots must be autonomous. The operator may initiate the program at the beginning of the event, but cannot touch or otherwise remotely control their bot after that point in time.
- The overall investment must be less than \$500 per team. Receipts must be provided. This includes donated material. Any donated items or material must include a receipt for the "like new" value of the item. **The intent of this rule is not to have a team spend \$500 on their bot. Rather it is to set an upper limit on spending. Teams are encouraged to build their bots in the most economical manner possible.**
- **Maximum Dimensions of the bot are 12" W x 15" L x 12" in height.**
- Maximum weight is **12** lbs. **(Please note: This limit has been increased from 10 lbs.)**
- Poster Board size for the presentation cannot exceed 36 x 48 inches.
- When the team arrives, they will have one last opportunity to verify their bot is in top working order. Then they will give it to the judges for final inspection. Once the judges have inspected it, the bot will be placed on the display table with the other bots. The bot and the controller will remain on the table any time it is not directly in competition. The table will be in plain view of all the students, but not accessible by them. The bots will be inspected between events.

General Rules Continued:

- Each team is encouraged to create a 4 x 6 foot banner to cheer on or support their team. Obscenities or innuendo will not be allowed. The general rule of thumb is: if you would be proud to show it to your mom, it will be acceptable at the competition.
- The judges will decide on what repairs can and will be made. If granted, the repairs must be made within 30 minutes or the bot must withdraw from the competition. If they have to withdraw, they will keep their current standings in any competitions already completed.
- There will a single NO contact switch provided that in the off position resets the bot and in the on position starts the bot. Once the bot has been started, the switch can not be touched until the event is over. If multiple attempts are permitted, the team will place the switch into reset and then to the start position when the next attempt is permitted.
- No portable electric devices allowed in the building during competition.
- Only two members of the team are allowed on the activity floor during the competition. These members can be different for the four competitions.
- The judges do reserve the right to call a false start and make a call to restart the event.
- The robots must fit within a 12 wide by 15 inch x 12" tall box when they are checked in. No mechanical or electrical reconfiguration of the bot will take place after the bot has been cleared for competition. The only exception to this is a safety device will inhibit the launch of the grappling hook used for one event. Prior to the start of the wall climb the safety device will be removed. A rear eye hook is required for the pull test to fasten the line onto the bot.
- If you have any questions concerning your robots eligibility, please feel free to contact Craig Hemken hemken@fvtc.edu . Please include in the subject field the line "Robotic Competition Question", I will be happy to inform you if the robot is legal or not!
- If a team fails to meet the entry requirements for size, weight or dollar limit for their bot, they will be disqualified.
- Teams must compete in all four events.
- All disputes must be reported immediately to the rules committee. The rules committee has final judgment over all disputes.

"IRON BOT 2013"

The Robot can only employ a single program which must be used for all phases of the competition.

1. The 1 Lap Precision Line Tracking Timed Run:

A closed loop track consisting of 3M black taped line on a white painted plywood base consisting of curved/Square/Triangular sections will be set up and the robot will run 1 lap. The time will be logged. Each robot will be given 3 attempts to complete the line tracking 1 lap course. The recorded time will be the first successful attempt at the course. The track will be constructed as close as possible to the drawing provided.

2. The Pull Test:

A straight and level section of white painted plywood and 3M black electrical tape will be constructed to perform a pulling strength test. Digital Instrumentation will be used to determine the pulling force of the bot. Only the wheels of the bot can be used for the method to move the bot. No more than 4 points of contact between the track and the bot will be permitted. The force will be logged 5 seconds after the line coupling the bot to the gauge is tight. The first successful run out of 3 attempts (if needed) will be used for the score. The bot must track the line at all times.

3. The Hill Climb:

A straight section of white painted plywood base and a line made out of 3M black electrical tape will be set at an incline (adjustable). The angle of the incline will be adjusted to determine the maximum angle the bot can track and climb on a 4 foot section of the track. The team will set the attempted angle. Each team has three attempts to climb the track. The team should know where the bots angle should be set to before the event to ensure at least one successful attempt before continuing the other 2 tries for a maximum angle.

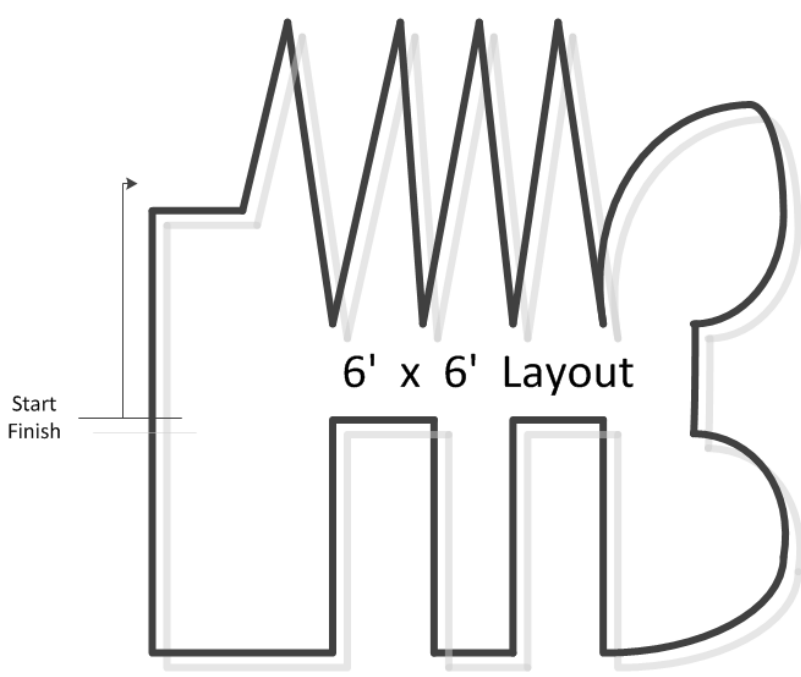
4. The Wall Climb:

A 90 degree wall is constructed by attaching 2 pieces of $\frac{3}{4}$ " x 2' x 4' plywood at a right angle. The plywood is painted white and the horizontal piece has an electrical tape line centered on it for line tracking. The bot will be started and will line track until it touches the vertical wall. The bot will spring launch a grappling hook and climbs the wall by pulling on the string. The maximum distance that the whole bot clears the horizontal piece of plywood is recorded. The bot is allowed 3 attempts. The distance of the first successful run is the recorded distance.

Successful is defined as:

- A. Grappling hook catches on the top of the vertical wall.
- B. Bot clears the horizontal plywood track by at least 1"

The One Lap Precision Line Tracking Timed Run:



Start
Finish

6' x 6' Layout

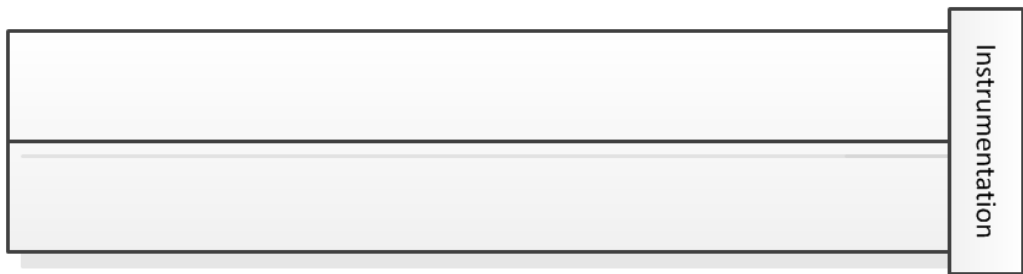
The course will be constructed of $\frac{1}{4}$ " pressboard underlayment painted white with the line made out of 3M black electrical tape. Bots must line track the whole course

Scoring: The shortest time to complete the course receives 50 points and the time is recorded as "X"
The remainder of the contestant's score is calculated by Multiplying 50 by the ratio of (X / their time).

If the bot fails to line track the full run, up to 3 attempts will be permitted.

Example Team 1 completed the course in 100 seconds. They were the best score so they receive 50 points.
Team 2 completed the course in 120 seconds. $50 * (100 / 120) = 42$ points (rounded up).

The Pull Test:



12' Wide x 8' long x horizontal pressboard painted white with a centered black electrical tape line for tracking.

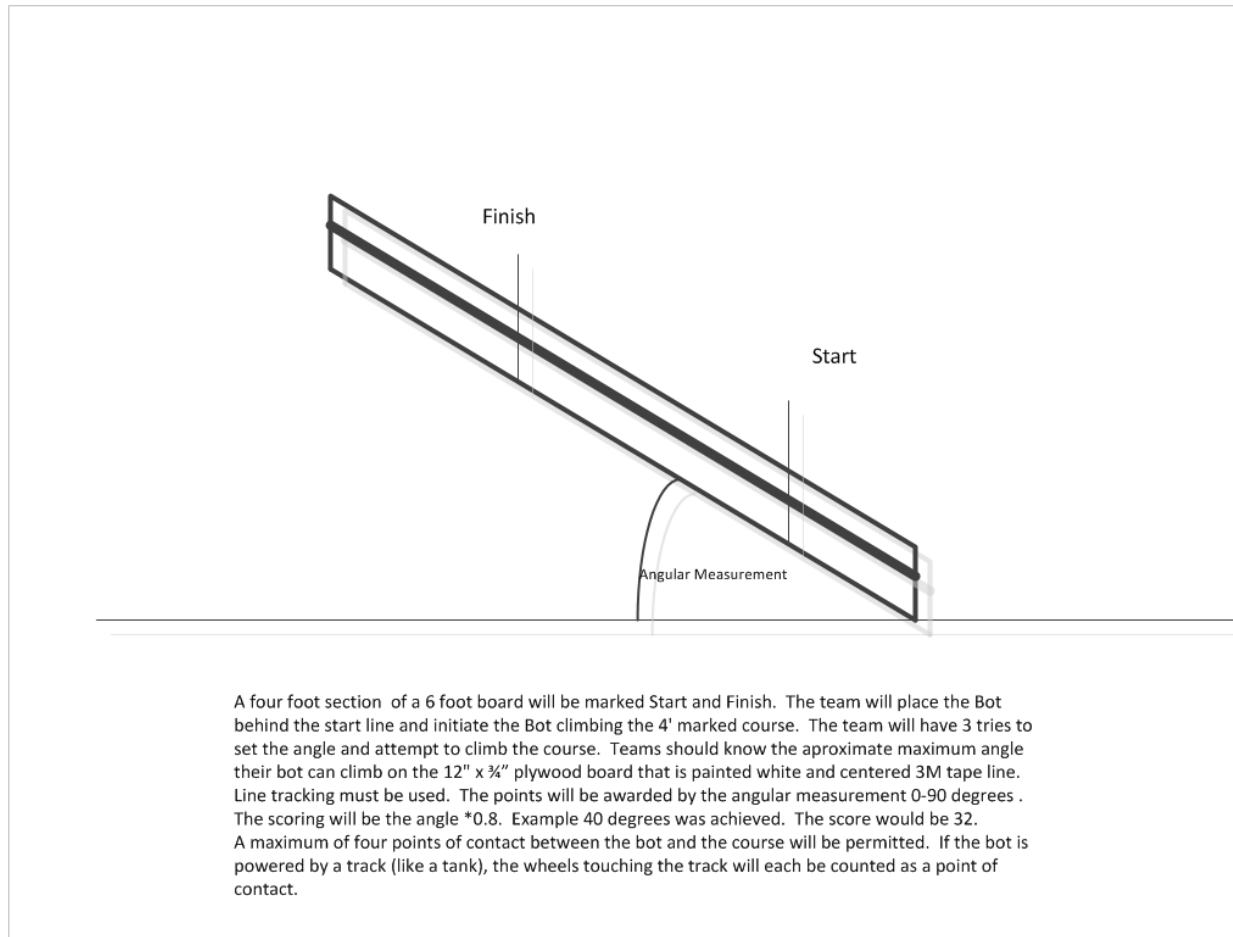
Load cell is connected to bot with a 12" piece of string.

Must line track.

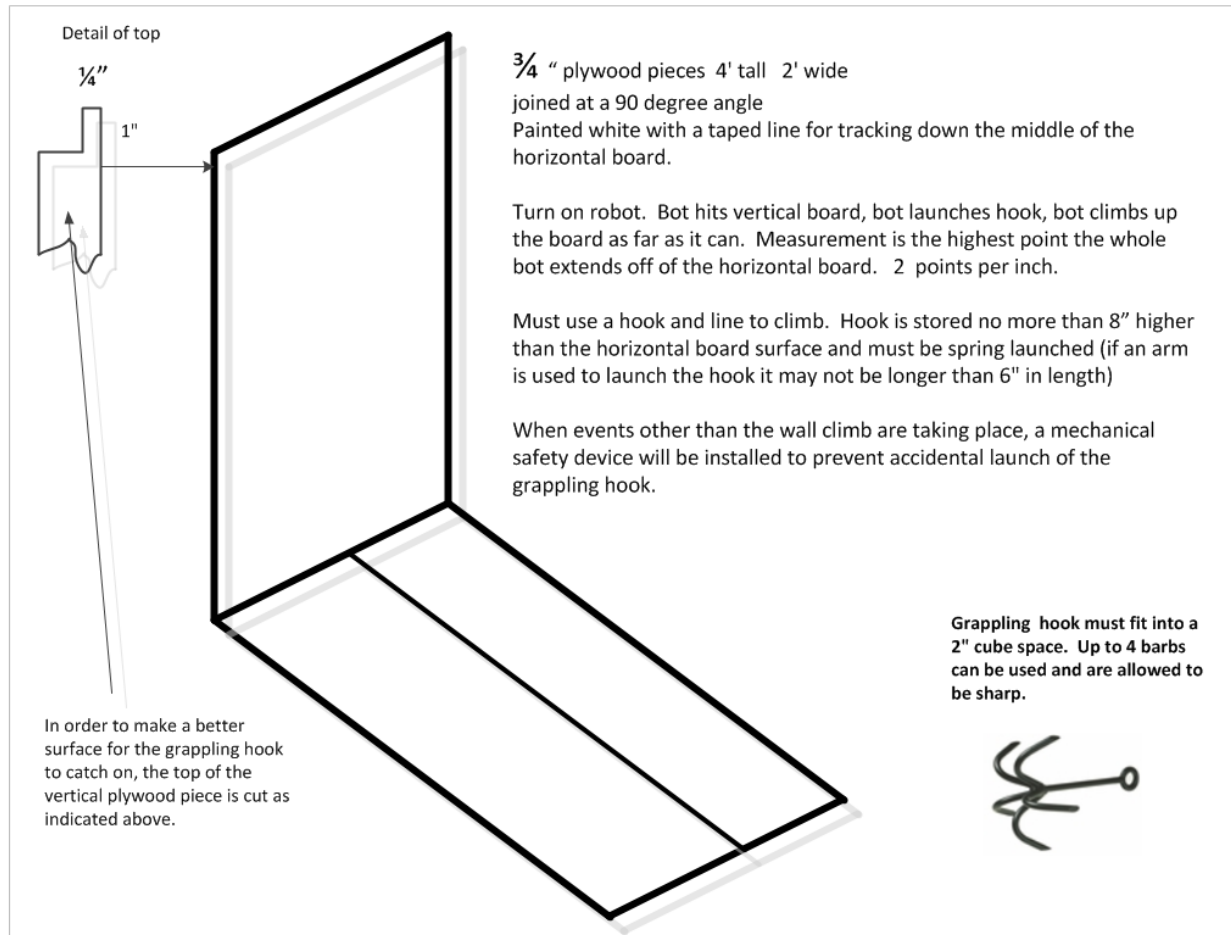
Maximum pounds of force is recorded 5 seconds after string is tight.

Each team will have 3 attempts. The first successful attempt will be scored. Ounces measured x 1 = your score.

The Hill Climb:



The Wall Climb:



Presentation Rubric: The right combination of speed, and agility will not be enough to lead your team to victory. A great design will never become a marketable product if no one knows about it. Therefore, each team will create a poster outlining their design and give a 9-15 minute presentation on their design and submit their Design Documentation.

The presentation will answer the question: Why is this good design?

The engineering documentation will answer the question: How was the robot designed?

Poster Design Rubric

The foam board can not exceed 36 x 48 inches	1 (Needs work)	2	3 (Ok)	4	5 (Excellent)
General Appearance					
Proper use of fonts for readability					
Spelling					
Grammar					
Punctuation					
Graphics					
Technical Content					
Factual in nature					
Comprehensive					
Interesting					

Presentation Rubric

	1 (Needs work)	2	3 (Ok)	4	5 (Excellent)
General Appearance of Presenters					
Good posture					
Professional attitude					
Eye Contact					
Delivery					
Adherence to time allotment					
Technical Content					
Overall knowledge of the design					
Use of the poster as support material					

Design Documentation Rubric

	1 (Needs work)	2	3 (Ok)	4	5 (Excellent)
General Appearance of Documentation					
Easy to follow					
Shows progression of project					
Coherent thought process					
Technical Content					
Answers the question: How was the robot designed?					
Did the whole team share in the design process?					

2013 Wisconsin Technical College System Robotics Competition

Publicity Release Form - All participants must fill out and return.

"I give the Wisconsin Technical College System permission to utilize photographs and/or video images/pictures containing my voice, image and/or image of my original work. I understand that the photographs/images/voice may be utilized in print publication and/or digital publication promoting the college via newspaper, magazine, newsletter, mailer, brochure, billboard, website, cable/television broadcast, and/or radio broadcast, or any additional formats for the sole purpose of promoting the college via publicity and advertising."

This release is given pursuant to the provisions of Section 895.50 of the Wisconsin Statutes.

Name (please print) _____

Address _____

City _____ State _____ ZIP _____

Phone number (home) _____

Phone number (work) _____

Signature* _____ Date _____

*If the individual signing is a minor, it is necessary for the
Individual's parent or legal guardian to sign this release.

2013 Wisconsin Technical College System Robotics Competition Registration Form

Please print legibly and send or scan and email to hemken@fvtc.edu.

Fax 920-735-2473

Fox Valley Technical College

1825 N. Bluemound Drive

Appleton, WI 54912

Attn: Craig Hemken - Electronics department mail stop

School: _____	
Teacher/Advisor _____	
Phone Number _____	

Team Name # _____	
Team Participants (2-8 members)	<div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border-bottom: 1px solid black;"></div> <div style="width: 45%; border-bottom: 1px solid black;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border-bottom: 1px solid black;"></div> <div style="width: 45%; border-bottom: 1px solid black;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border-bottom: 1px solid black;"></div> <div style="width: 45%; border-bottom: 1px solid black;"></div> </div> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%; border-bottom: 1px solid black;"></div> <div style="width: 45%; border-bottom: 1px solid black;"></div> </div>
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Number of Additional Staff _____	Name(s)
1) _____	3) _____
2) _____	4) _____
Number of Additional Students as Spectators _____	