

Teachers' Training

IEEE Women in Engineering
Robot Challenge NJ

Robot Challenge Event Day Video



Agenda

- **Introductions**
- **Robot Challenge**
 - when
 - where
- **Student Requirements**
 - what
- **Teacher Training & Hints**
 - how

Robot Challenge Event

- For current dates for the NJ Robot Challenge, see the website at:
http://ewh.ieee.org/r2/southern_nj/wie/
 - Start time is 9:00 AM
 - Generally finishes by 1:00 PM
- Three judged events:
 - Fabrication review of robot
 - Track Event
 - Oral Presentation
- Written report due earlier (early April)

Robot Challenge Event

- Ensure students have transportation with backups
- Teachers have driver contact information in case of emergency
- Event held in old aircraft hangar w/out heat or ac
- All team members must be ready and available when called for the fabrication review, track event, and the oral presentation
- Bring lunch, or \$ for snacks and/or box lunch
- Team picture will be taken



The Pit

- There will be a repair pit for emergency repairs and/or assistance
- Experienced robot builders will be on hand to help



Scoring the Challenge

Reports	Percentage
Written Report	15-25 %
Fabrication Review	20-30 %
Track Event (Race)	25-35 %
Oral Presentation	15-25 %

Winners - Prizes & Awards

Results, pictures, and event article posted on WIE webpage

http://ewh.ieee.org/r2/southern_nj/wie

We use scoring rubrics for each event to ensure consistency in judging

Written Report

- Written reports are due 2-3 weeks prior to the Robot Challenge Event – must be sent by email
- Each report is scored by 2 judges and all reports are reviewed by oversight panel
- Report requirements are listed in the manual (TOC, references used, etc.)
 - Reports must be neat and have a cover
 - Minimum of 6 pages of text and 4 pages of general description including sketches, pictures, diagrams, etc. and **the log**
 - Documents/discusses problems encountered and how they were overcome

Three Judged Events on Robot Challenge Day

- **Fabrication review of robot**
- Track Event
- Oral Presentation



Fabrication Review

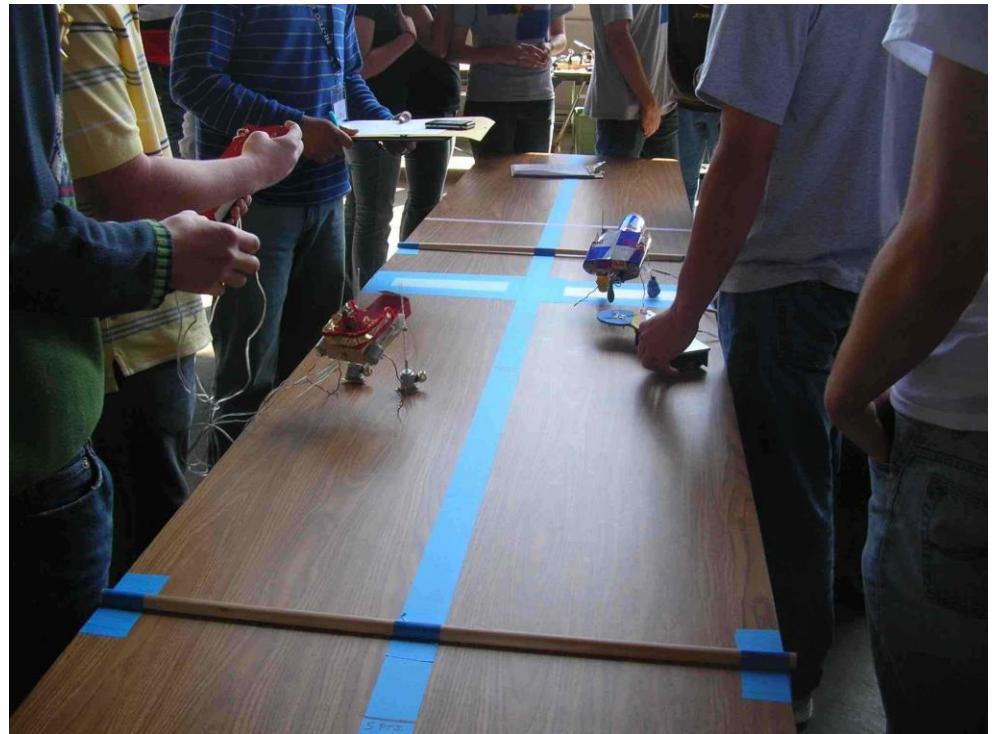
- 2 judges
- The robot must be fabricated using parts provided in the kit: substitutions are not allowed, but additions are permitted.
- Instructions for robot design are provided in the manual supplied to the students/schools.
- Robot body must have a removable cover so the team can show its operation to the judges.
- Robot storage/travel container is judged for theme and durability

Fabrication Review (cont'd)

- Discuss quality and workmanship, problems and solutions
- Points awarded for creativity, originality, and neat housing of power unit
- Decoration of robot is expected
- Robot must meet the design criteria and walk or it will be sent to the pit for repair
- If robot walks – team put into the track queue

Three Judged Events on Robot Challenge Day

- Fabrication review of robot
- **Track Event**
- Oral Presentation



Track Event

- 25-35% of score
- Goal – robot walks along a 6' course on a table over two 1/2" obstacles placed at 1' and 5' on the track. There is a maximum of 20-minutes for this timed exercise.
 - Each leg is operated by one student
- At the Challenge, points will be awarded for the time taken, the distance travelled, and the coordination of the operating team
- Penalties are added for handling robot after start of race

Track Event (cont'd)

- Two tracks are on each table
- Team will be called to track
- One judge for each team, two judges at each table
- The rules will be explained

Track Event Video



Three Judged Events on Robot Challenge Day

- Fabrication review of robot
- Track Event
- **Oral Presentation**



Oral Presentation

- All team members attend and participate
- ONLY students and judges are present
- 20-minute limit (bring any presentation equipment)
- Judges may ask questions

Agenda

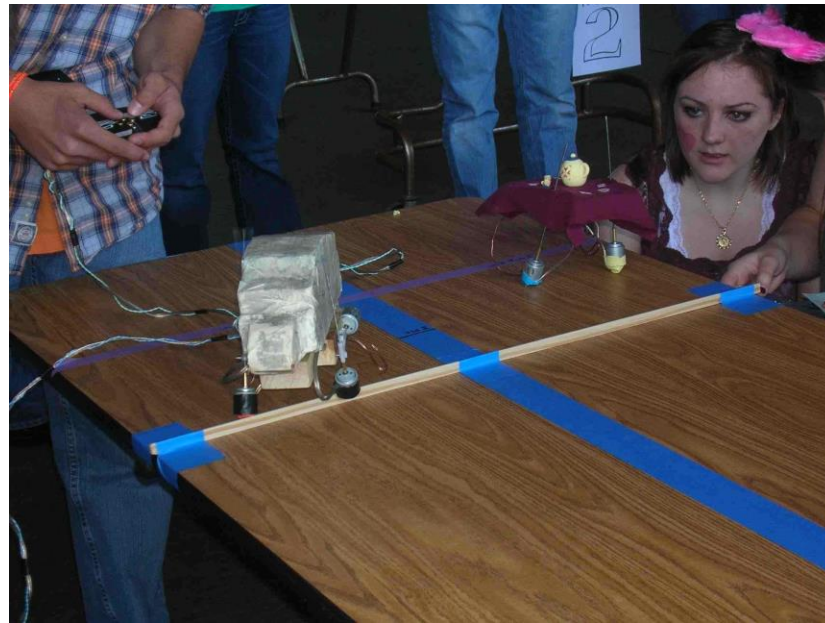
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Student Requirements

- Each Team (2 – 5 students)
 - Build the robot
 - Maintain a log of activity (pics and diagrams too)
 - Prepare written report (send by email in early April)
 - Design and implement
 - Robot body covering
 - traveling container
 - team identification – name & flag
 - Demonstrate the robot operability (@ challenge)
 - Present the project results orally (@ challenge)

Student Teams

- Have a theme for robot, robot covering and storage/travel container and team with team flag
- Be aware that the covering may affect the robot's center of gravity
- Body covering must be removable!
- Beware of fabrics (for example, felt or fur) with fibers that can affect mechanism
- **Read the manual ... repeat often**



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Teacher Training Workshop

In the teachers' workshop a robot kit will be displayed and a manual will be available, and presenter(s) will show parts from the kit.

- All parts should be placed back in the box after the session is over. If a school receives a free kit, this kit will be left at the school.
- WIE website has robot challenge info
 - http://ewh.ieee.org/r2/southern_nj/wie/
- Baltimore IEEE website has lots of helpful info
 - <http://www.robotchallenge.com/>
- Our WIE blog on our robot building journey 2011
 - <https://sites.google.com/site/wiebuildarobot/home>

Mentoring – You are not alone!

- A WIE mentor will be provided for each team
- Students will email the Robot Challenge at:
robotchallengenj@gmail.com

Building the Robot Video



Tools

Required	Optional – but recommended
Wood & jig saws	Dremel tool – threaded rods
Electric drill	Drill press
Needle-nose pliers	Miter box
Screw drivers	Multi-meter
Sharp knife (exacto)	Battery tester
Wood & metal sand paper	Extra D cell batteries (kit needs 8)
25 W soldering iron	Patience 😊
Flux solder	
Small vise	
Wire cutter & striper	
Safety goggles	

Robot Kit

- Robots are to be built with **two legs**
- Assembly time is **approximately three months**.

Safety:

- Use safety glasses at all times when drilling and/or cutting
- Protect desk or work surface
- If using lead-based solder, wash hands after use

Teacher Hints

- The manual requires close reading and problem solving skills
- Decide how much to share with students and what they should discover for themselves.
- **Have students log everything and take pictures of progress.** For things that go wrong include the problem and a description of attempts to solve the problem, including failures, in the written report.
- Bring the robot even if it is not working
- **Allow plenty of time to practice walking the robot.**

Building the Robot – Tell Students

- Verify the parts from the materials list in the Manual
- Most spare parts can be obtained through your WIE POC
- **Read the manual ... repeat often**
- NO deviations from the design of the Power Unit and Control Unit (to ensure level playing field)
- Gadgets to add personality are ok, but cannot change basic mechanism of the robot
- NO added wheels or gears can be in contact with table. Additions are for decorative purposes only.

Hints

- For angled drills use team of 3 – 2 holding drill (to line up angles) and spotter
- Most of holes can be drilled using a drill press
- Ensure that all holes are drilled completely
- Some hints are in the manual or on websites



Hints

- Measure twice, cut once
- Use caution when drilling, cutting, soldering, etc.
- Metal rods bend **easily** – protect them
 - Threads of rods can be crushed by metal tools
- Plastic parts have threads that are easily damaged
- Measure from one side



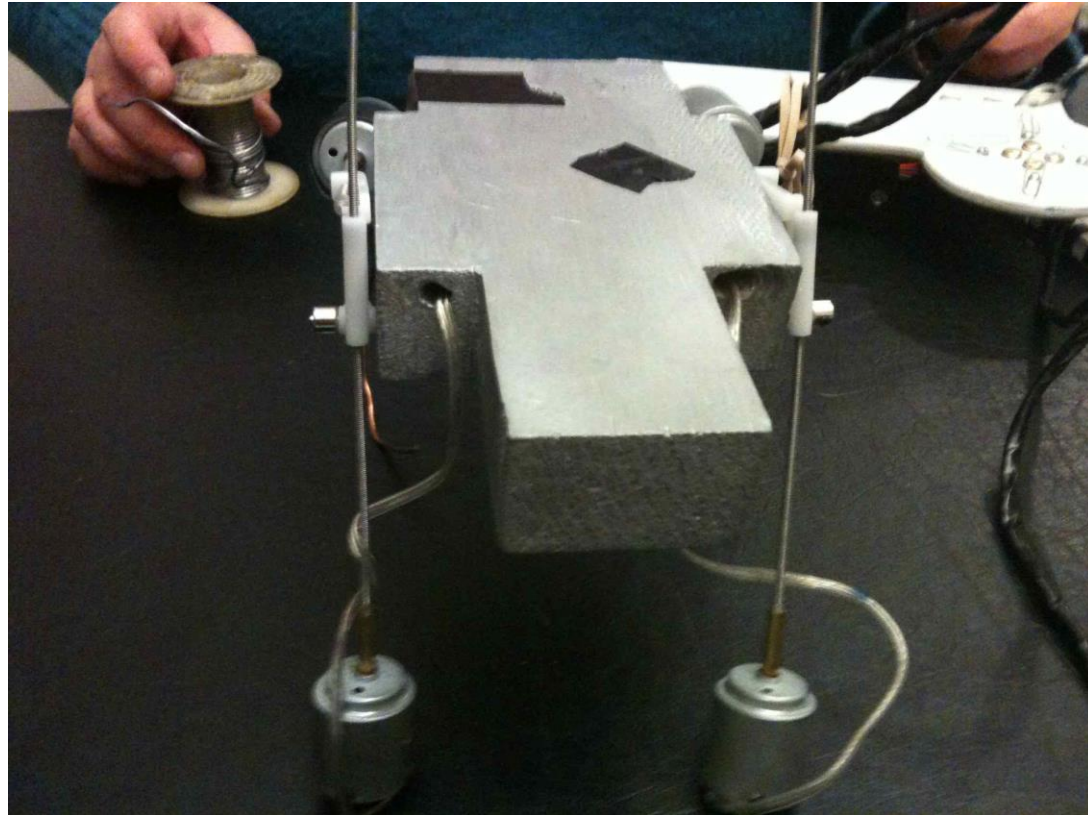
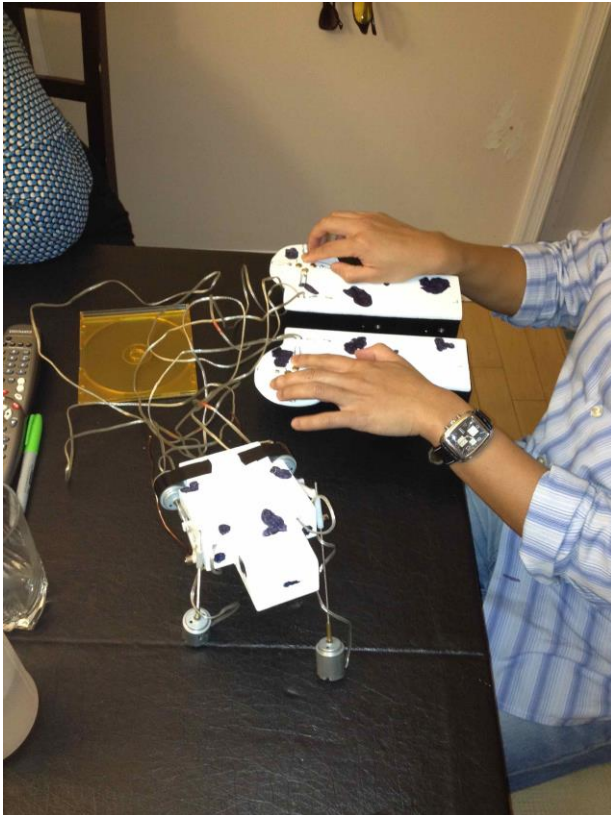
Hints continued

- To increase contact surface, make shallow channel for motor
- On 001 drawing, section marked “ up to 2” “ is not necessary for the robot body and can be removed
- Recommended -- Dremel tool to cut threaded rod. [then file smooth]
- Don't epoxy motors until end. Use electrical tape so it makes it easier to line up drive motor (straight .. not bent)



Show & Tell

- Our Robots



Walking the Robot Hints

- Rotational Movement of Leg is:
UP -> FORWARD -> DOWN -> BACK
- Center of gravity shifts with movement
- Center of gravity is affected by cover
- Use tape, hairspray or rubber cement on skids for traction – or traction “booties”

Troubleshooting

- If leg action jams:
 - Make sure the rods are straight
 - Top rod – shorten back stop or use controller to take smaller/shorter steps
 - If end stops move, use one drop of superglue (liquid, not viscous) on threaded rod, then clean and reassemble. (Imperfections are uncorrectable!)

Questions

- Contact WIE Robot Challenge
 - email: robotchallengenj@gmail.com
 - Christina Young: 609-485-5086
 - Mentors will be provided for student teams, students can email mentors at: robotchallengenj@gmail.com