



Maryland Engineering Challenges™
2011
Robot Guide

Supported By:

Institute of Electronic and Electrical Engineers

Level:

High School—Grades 9 to 12

Important Dates:

Coaches' Training Session

Thursday, November 11, 2010

4:00 pm – 7:00 pm

Registration required. Email mcane@thebmi.org by 10/8/10



Coaches' Hands-On Workshop:

Saturday, January 29, 2011

10:00 am – 2:00 pm (lunch provided)

Registration required, information available at November training

Registration Deadline:

Saturday, March 12, 2011

Written Report Due:

Friday, April 15, 2011

4:00 pm

Competition Dates:

Saturday, April 30, 2011

9:00 a.m. – 1:00 p.m.

Sunday, May 1, 2011

12:30 p.m. – 3:00 p.m.



**** Robot kits will be available in November 2010 or earlier by special request. Teams ordering kits are required to participate in the Robot Challenge competition date. ****

All Robot activities will be held at:

Baltimore Museum of Industry, 1415 Key Highway, Baltimore MD 21230

For questions about Robot specifications or kits, contact the organizers at 410-653-4176.

For registration information or general questions about the Maryland Engineering Challenges, contact Melinda Cané at mcane@thebmi.org. Detailed information about the competition event will be sent to Coaches after the registration deadline.

To register a team, adult Coaches should FIRST contact the organizers at 410-653-4176 and request their kit(s). THEN, adult Coaches should register their teams by going to <http://tp1.clearlearning.com/hshealey/EC.tp4> Please note there is a \$5 PER COACH registration fee. Only one Coach is needed per team, although a team may have as many adult helpers as needed.

Written reports must be submitted AS HARD COPIES, either by mail or in person, to:
BMI, 1415 Key Highway, Baltimore MD 21230

The Challenge:

Design and build a motor-powered robot that walks under direction. The robot can have any form, 2 or 4 legs, and have the ability to go over uneven terrain. Each leg shall be controlled by one student using two independent motors; the control and co-ordination of the motors, and the smoothness and speed of the robot, will be factors considered by the judges. Manual control of the robot is a basic requirement, but extra credit (up to 15 points) will be given for any form of add-on automation that furthers the above goals.

Engineering Team Requirement:

Each team may consist of 2-8 students (with a minimum of 4 students for a 4-leg robot team).

Specifications and Supplies:

The competition involves four main components, a written report, the construction of the entry, the robot's performance on a course in competition with other entries, and an oral presentation (including an optional video presentation). The Institute of Electrical and Electronic Engineers (IEEE) will supply the parts for the power unit and the control unit, and provide instructions, drawings, training materials, and mentors for the basic electrical equipment. Each team will be responsible for creating the robot body and building the power units and control units, and should contact their mentors by e-mail at defined intervals. They will need to provide the D-cell batteries and learn to coordinate the operation of the motors (learn to walk) as a team.

If the registration form is received prior to October 15, the design data package and the parts will be sent out in November (earlier by special request). After that date they will be sent in January. No entries accepted after March 12. For the 2010-2011 school year, a kit for a 2-leg robot will be provided at NO CHARGE for each school. A team that has successfully competed one year is eligible to receive a 2-leg automation kit the following year at NO CHARGE—limit one per school. Additional kits available as below.

NOTE: A 4-leg robot is twice as much work, and is more challenging to operate. Extra charge for the 4-leg kit is \$39. The cost for additional 2-leg kits is \$49. Additional 4-leg kits are \$88. Automation kits: \$89 for 2-leg, \$118 for 4-leg robots.

For more information, please call the organizers on 410-653-4176.

Judging Guidelines:

I. DESIGN DEVELOPMENT AND FABRICATION

The team must use the parts provided in the kit, substitutions are not allowed, but additions are permitted. Wheels (if used) may not touch the table or be visible. The robot body must be designed such that the team can fully expose all mechanism for inspection by the judges.

II. WRITTEN REPORT

Competition value: 25 points

Points will be awarded for creativity, originality, sketches, and the neat housing of the power unit.

III. PERFORMANCE DEMONSTRATION

Competition value: 40 points

The course will have 2 tracks on an 8 foot table, with the start and finish lines 6 feet apart. Two half-inch high hurdles will have to be climbed over. The robots will first race two at a time in manual mode, and team members (one per leg) must stay at their side of the table. Points will be awarded for the time taken, the smoothness of the robot's movements, and the coordination of the operating team. In the event that some degree of automation has been added, the robot shall run a second time in that mode for bonus points.

IV. ORAL PRESENTATION TO JUDGES

Competition value: 15 points

REVIEW OF FABRICATION

Competition value: 20 points

GOOD LUCK TO YOUR TEAM!