

Amazing Mechatronics Division B 2018 Trial Event Rules
North Carolina Science Olympiad

1. **DESCRIPTION:** Teams of students will develop a deep fundamental understanding of mechatronics, which is a multidisciplinary field of engineering at the intersection of mechanical engineering, electrical engineering and programming. On the day of the event, teams will demonstrate their knowledge and understanding of mechatronics by debugging and fixing applications on Raspberry Pis and using Scratch to program certain tasks.

A TEAM OF UP TO: 2 **EYE PROTECTION:** None **APPROXIMATE TIME:** 50 minutes

2. **EVENT PARAMETERS:**
 - a. Teams must bring a writing instrument. Teams may also bring two 8.5" x 11" sheets of paper, which may contain only hand-written information on both sides of each sheet from any source.
 - b. Event supervisors will provide all Raspberry Pis, LED lights, screens, and other objects needed for stations.
 - c. Participants are asked to bring their Raspberry Pis as backup for the event.

3. **THE COMPETITION:**

Part I: Troubleshooting Raspberry Pi Computers

- a. The competition will focus on teams evaluating and troubleshooting Raspberry Pi computers in a series of stations or a sit-down test.
- b. Each team will be presented with a Scratch program and/or electronics attached to a Raspberry Pi computer that does not work as intended.
 - i. Teams will have to troubleshoot the problem(s) and provide a solution in a given amount of time.
 - ii. The solutions can be both software and hardware in nature.
 - iii. Teams must NOT change any of the hardware or code at the station. Altering the hardware or code in any way will result in disqualification of the team.
- c. The competition will consist of troubleshooting from each of the following areas:
 - i. Basic programming fundamentals including sequence, loops and Boolean logic
 - ii. Scratch programming language
 - iii. Raspberry Pi microcomputer
 - iv. Simple electronic components including LEDs, resistors and button switches

Part 2: Create A Mechatronic Whatchamacallit (*At the State Competition Only*)

- a. Suggested time is 25 minutes.
- b. Teams will be presented with a list of possible programming projects.
- c. Teams will complete as many projects in the allotted time as possible.
- d. The projects will cover the same range of topics outlined in 3.b. and 3.c. above.

4. **SCORING:**

- a. Points will be awarded for correct answers.
- b. Ties will be broken by predetermined questions.

Recommended Resources:

www.sciencenc.com/event-help/amazingmechatronics.php - sign up on the webpage for the webinar series that will be offered in Dec and Jan.
www.youngengineersoftoday.com
[www.Raspberry Pi.cc/](http://www.RaspberryPi.cc/)
Scratch.mit.edu
www.sparkfun.com
www.code.org
<http://123d.circuits.io/>