

Amazing Mechatronics – Div B & C

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 creating virtual mechatronic projects which include electronic circuits, programming and microcontrollers using Arduinos simulator called TinkerCircuit using a Scratch-like program to program tasks and operate circuits.

2. **TEAM OF UP TO:** 2 **EYE PROTECTION:** None **APPROX. TIME:** 50 min

3. **EVENT PARAMETERS:**

Teams must bring a writing instrument. Teams may also bring two 8.5” x 11” sheets of paper, which must contain only handwritten information on both sides of each sheet from any source.

4. **THE COMPETITION:**

The competition will focus on teams evaluating and troubleshooting Arduino microcontrollers in a series of stations or a sit-down test.

Part 1:

- a. Each team will be presented with a Tinker Circuit (Scratch-like program) and/or diagrams of an Arduino microcontroller that does not work as intended.
 1. Teams will have to troubleshoot the problem(s) and provide a solution in a given amount of time.
 2. The solutions can be both software and hardware in nature.
- b. The competition will consist of troubleshooting from each of the following areas:
 1. Basic programming fundamentals including sequence, loops and Boolean logic
 2. Scratch-like Tinkercircuit programming language
 3. Virtual Arduino microcontroller
 4. Simple electronic components including LEDs, resistors and button switches

Part 2: Create A Mechatronic Whatchamacallit.

Teams will be presented with a list of possible programming projects. Teams will complete as many projects as possible the allotted time in Tinkercircuits. The projects will cover the same range of topics outlined in a & b above.

5. **SCORING:**

Points will be awarded for correct answers; ties will be broken by projects completed, then Part 1 score, time to complete 1st task.

6. **EVENT RESOURCES:**

<https://www.sciencenc.com/resources/middle-school/amazing-mechatronics/>
www.youngengineersoftoday.com
www.tinkercircuits.com