Amazing Mechatronics – Div 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 fixing applications on Arduinos and using laptop Arduino IDEs to program certain tasks.

   TEAM OF UP TO: 2 **EYE PROTECTION:** -**YES** **APPROX. TIME:** 50 min

2. **EVENT PARAMETERS:**
   a. Teams must bring a writing instrument. Teams may also bring two 8.5" x 11" sheets of paper, which must contain only hand written information on both sides of each sheet from any source. Students are asked to bring their Arduinos and LEDs as backup for the event.
   b. Event leaders will provide all Arduinos, breadboards, LED lights, and other objects needed for stations, as well as laptops with the Arduino IDE already installed.

3. **THE COMPETITION:** This event will have two parts.
   a. Part 1: The competition will focus on teams evaluating and troubleshooting Arduino microcontrollers in a series of stations or a sit down test. Suggested time is 25 minutes.
      i. Teams will be given a robot or microcontroller that describes a situation 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 hardware software and hardware in nature.
         3. 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.
      ii. The competition must consist of troubleshooting from each of the following areas:
         1. Basic Arduino Microcontroller
         2. Basic digital components (LEDS, Resistors, & Potentiometer)
         3. Basic sensors (Photo resistor & momentary switch)
         4. Basic outputs (electric motor & servo)
         5. Basic programming with the Arduino Language (text-based language based on C)
         6. Basic programming fundamentals including sequence, loops and Boolean logic

   b. Part 2: Create A Mechatronic Whatchamacallit. Suggested time is 25 minutes.
      i. Teams will be presented with a list of possible programming projects. Teams will complete as many projects in the allotted time. The projects will cover the same range of topics outlined in a.ii.

      ***Depending on locations, teams may be asked to used actual physical components or use a simulation program - Tinkercad Circuits. This will be listed either way on the regional webpage by Dec 15.**

4. **SCORING:**
   a. The score on Part 1 and Part 2 will each count for 50% of the total test score.
   b. Points will be awarded for correct answers; ties will be broken first by the better score on Part 2, then by predetermined questions from Part 1.

5. EVENT RESOURCES:

See the Amazing Mechatronics Event Resource Page at www.sciencenc.com - sign up on the webpage for the webinar series that will be offered in Dec and Jan.
www.youngengineersoftoday.com
www.arduino.cc/
www.sparkfun.com
https://www.tinkercad.com/circuits
www.code.org