1. **DESCRIPTION:** Prior to the competition, the contestants will design and build a mechathlete, mechanical athlete, capable of performing **3 physical tasks.**

   A TEAM OF UP TO: 2   **IMPOUND:** No   **APPROXIMATE TIME:** 35 minutes

2. **CONSTRUCTION PARAMETERS:**

   a. The mechathlete may be made of any material, have a mass not to exceed 1.5 kg, and fit into a box with inside dimensions of 30 cm x 30 cm x 30 cm at the start of each task. The mechathlete must not modify or damage the event surface.

   b. Commercial batteries, not exceeding 14.4 volts as labeled, may be used to energize each of the mechathlete electrical circuits. Multiple batteries may be connected in series or parallel as long as the expected voltage output across any points does not exceed 14.4 volts as calculated using their labeled voltage. Teams must be able to show the Event Supervisors the labeled voltage. While batteries containing lithium or lead are prohibited, NiCad and NiMH batteries which may contain small amounts of lithium are still permitted for use. Battery use must follow the Battery Policy at www.soinc.org.

   c. Brushless motors, unless they are an integral part of or embedded into commercially available fans used for cooling electronics or computers, and compressed air are not permitted as components of the mechathlete.

   d. Components may be purchased or made by the team members. Electronic components are allowed.

   e. Modifications or adjustments may be made to the mechathletes between different tasks. Components and functions of the mechathlete may be disconnected, or disabled, for tasks in which they are not used; however, no parts may be physical removed or taken off the mechathlete. Additionally, no parts maybe be added to the mechathlete. All parts of the mechathlete present at Impound must be present as the mechathlete completes all tasks.

   f. The mechathlete may not be remote, or externally, controlled. Microcontrollers (i.e. TI Innovator, Raspberry Pi, Arduino, LEGO® Brick), are permitted but mechathlete size and weight requirements still apply. The device maybe connected to a laptop, or other handheld device, powered by battery that functions as a display or programming interface device

   g. The mechathlete, and any associated elements, must function on an independent power supply. No element can be plugged into an electrical outlet at any time during the competition.

   h. The participants must initiate each task by actuating some sort of switch/release mechanism on the mechathlete in a manner that does not contribute energy to assist in performing the task. Relying on inserting batteries or twisting wires together to start is not allowed. A stopping system is recommended.

3. **THE COMPETITION:**

   a. The Tasks required to be performed by the mechathlete are:

      i. **Weight Lift:** The mechathlete must lift a 500-gm weight to height of between 50 cm and 80 cm and hold it for at least 5 seconds but no longer than 10 seconds. The mechathlete must then return the mass safely to the ground. The places will be awarded based on the maximum height and duration of the lift.

      ii. **Sprint:** The mechathlete from a standing start must travel down a 10 m long and 2 m wide track in the shortest time possible. Additionally, the mechathlete must on its own come to a complete and full stop within 5 m of the 10-m end line. The places will be determined based on the shortest timed run.

      iii. **Shot Putt:** The mechathlete must use an elastic solid to propel a standard racquet ball supplied by the event supervisor as far as possible. The places will be determined by the distanced traveled by the shot.

   b. **The tasks may be attempted in any order. Each team will have 2 runs within 15-minute time slots per task. Teams will need to sign up for time slots for each event. Time slots will be 15 minutes apart – 2 minutes for mechathletes set up, 3 minutes for the task attempt #1, 2 minutes for**

mechathlete set up, 2 minutes for task attempt #2, and 5 minutes for scoring, removal of mechathelete, and set up of the task area for the next team.

c. Teams may leave the competition area between events, but their mechathlete must remain in the area once they have started to compete.

4. **<u>SCORING</u>:**

a. Task Scoring: Teams will be awarded points for each task equal to their place in that task. Each team's place in the task will be determined by their best run. Teams that are tied for a task will receive points equal to the place for which they are tied and the next places will be skipped. If a mechathlete attempts, but is unable to complete a task, the team will be awarded points equal to the number of teams that attempted the task plus 1. Teams that do not attempt a task will receive points equal to the number of teams that participated in the event plus 1.

b. Event Scoring: The teams overall score for the event will be the sum of the scores for the individual tasks. The lowest score wins. Ties will be broken by comparing the individual task scores. The team with more 1sts, then 2nds etc. will win the tie. If any ties still exist the task scores will be compared in the order in which they are listed above.

c. **Penalties:**

   i. **Teams will receive an additional 1 point as penalty for any parts of the mechathlete coming off and an additional 2 points for any destruction to the competition area or other mechathletes.**

   ii. **Teams not adhering to the start of time slots and time points within (i.e. setup, removal) will receive an additional 1 point penalty for each violation.**

d. **Teams with construction violations will not be able to attempt tasks.**