



## ***A High School Robotics Competition***

### ***Science, Technology, Engineering, & Math***

## **1 Scoring**

The following is the overall scoring guidelines tailored specifically to the Southern Indiana Challenge. In the event of any conflict between material listed on the Sea Air Land Challenge website and this document, this document takes precedence.

## **2 Overall Rubric**

All three challenges will be scored according to the rubric below:

<b>Criteria</b>	<b>Points</b>
<b>PDR</b>	10
<b>Competition Criteria</b>	40
<b>System Cost</b>	10
<b>Innovation</b>	10
<b>Prototype Quality</b>	10
<b>Durability</b>	10
<b>Systems Engineering</b>	10
<b>Stretch Goals (Sea Only)</b>	10

### 3 Common Criteria Breakdown

The below table describes the scoring process for each criterion. Judge’s ruling on all scores is final. Judge’s reserve the right to award more or less points based on their discretion and any outstanding strengths or weaknesses that are not reflected in the below point descriptions.

Criterion \ Points	0	1-2	3-4	5-6	7-8	9-10
<b>PDR</b> (see PDR template for prompts/required information)	No submission	No understanding of Challenge; format not followed; minimal information submitted	Lacks complete understanding of Challenge; significant information missing	Moderate understanding of Challenge; PDR is missing minimal information	Thorough understanding of Challenge; PDR contains all required information	Exceptional understanding of Challenge; PDR exceeds required information.
<b>Competition Criteria</b>	See Table in Section 4, below.					
<b>System Cost</b> (cost breakdown to be submitted to judges on Challenge Day)	Greatly exceeded budget OR cost breakdown not submitted		Slightly exceeded budget; errors in cost breakdown or missing information	At or under budget; errors in cost breakdown or missing information <sup>1</sup>	Slightly exceeded budget; detailed and accurate cost breakdown provided <sup>1</sup>	At or under budget; detailed and accurate cost breakdown provided
<b>Innovation</b> (to be assessed by judges on Challenge Day; students can justify innovation and creative thinking)	No attempt to improve on out-of-box design	System based on “Kit Bot” with minimal changes	Student designed, but lack of designing to requirements	Custom, student designed system with elements from multiple off-the-shelf systems	Custom student design with evidence of purposeful design with requirements in mind	Exceptionally unique, requirements-driven design

<sup>1</sup> The intent of the judging description for these two sections of System Cost (5-6 and 7-8) is to reward teams for complete and accurate information over being under budget. It is in the teams’ best interest to be complete and accurate with their pricing information.

Criterion \ Points	0	1-2	3-4	5-6	7-8	9-10
<b>Prototype Quality</b> (to be assessed by Judges on Challenge Day)	System does not operate at time of Challenge Trial, and fixes not possible by 2 <sup>nd</sup> round	Multiple operational issues (cameras/sensors do not work, controls stop responding, wheel falls off)	Some operational issues; visual inspection raises concerns (loose nuts/bolts, exposed wires)	No or minimal operational issues during Challenge; OR visual inspection raises concerns	No operational issues during Challenge; minimal concerns from visual inspection	No operational issues during Challenge; assembly is neat and tidy
<b>Systems Engineering</b> (to be assessed by Judges on Challenge Day; justification by students is expected, see below)	No signs of systems engineering processes are evident	Team addresses (1) of the below Systems Engineering Elements	Team addresses (2) of the below Systems Engineering Elements	Team addresses (3) of the below Systems Engineering elements; evidence of students' use of engineering notebooks	Team addresses all Systems Engineering elements; evidence of students' use of engineering notebooks	Team addresses all System Engineering elements thoroughly and completely. Exceeds Expectations; evidence of students' use of engineering notebooks
<b>Stretch Goals (Sea Only)</b>	Autonomous objective not attempted	<b>ANY</b> meaningful attempt to complete autonomous objective	Partial completion of autonomous lawnmower pattern objective.			Complete execution of lawnmower pattern

## **Systems Engineering Elements**

Systems Engineering will be scored based on the team's ability to address elements outlined below. Teams are expected to justify how they addressed each element. Presentation media is up to the discretion of a team as long as the material is well presented. Presentation media can include, but is not limited to oral presentations, handouts, posters, video, etc.

- Schedule provided in PDR was followed accurately, or deviations properly justified and explained by students.
- Test plan provided in PDR was followed and documented; quantitative test data is available for review by Judges. Some evidence or examples of lessons learned from testing.
- Final system build meets requirements identified in the PDR.
- Deviations from PDR elements (including but not limited to design, schedule, cost, testing, and requirements verification) are documented and provided to judges.

## 4 Challenge-Specific Competition Criteria Breakdown

The Competition Criteria for each Challenge is listed below. There are 4 actions that each system can perform in order to score points. There are no partial points for each action. The Judge's ruling on completion of each action is final.

Challenge \ Points	10	10	10	10
<b>Sea Challenge</b>	The system locates Object 1 (5) and acquires Object 1 (5) (System must be in control of object)	System delivers Object 1 to drop point.	The system locates Object 2 (5) and acquires Object 2 (5) (System must be in control of object)	System delivers Object 2 to drop point.
<b>Land Challenge</b>	The system locates Object 1 (5) and acquires Object 1 (5) (System must be in control of object)	System delivers Object 1 to drop point.	The system locates Object 2 (5) and acquires Object 2 (5) (System must be in control of object)	System delivers Object 2 to drop point.
<b>Air Challenge</b>	The system successfully hits Drop Zone 1 with payload (5) points for landing on the tarp; (10) points for landing on the bull's-eye	The system successfully hits Drop Zone 2 with payload(5) points for landing on the tarp; (10) points for landing on the bull's-eye	The system successfully identifies the object in Area of Interest 1	The system successfully identifies the object in Area of Interest 2