

# Autonomous Snowplow Competition



**DUNWOODY**  
COLLEGE OF TECHNOLOGY



**ION North Star Section  
Outreach Program**

**Autonomous Snowplow Committee**

**Preliminary Design Review  
Presentation Information & Outline  
2021 Competitors**

**January 2021**

# PDR Presentation Rules

- PDR Objectives
  - Demonstrate to ASC Judge single vehicle design, collaborative vehicle design, and how the snowplow vehicles will plow the Single “I” and Triple “I” snowfields
- PDR presentation slides must follow the provided outline
  - Standardize judging for all Teams
- PDR presentation slides held in confidence throughout Competition
  - PDR slides will not be made public
  - Collaborative Teams can work together on collaborative PDR sections but each team must present these sections during their own PDR time
- PDR presentation slides submission deadline: *final* version
  - Videos do not have to be sent with the final version of the slides
  - **No Later Than: 9 pm (Central Time); 14 February 2021**
  - Email submission to Vibhor and Suneel:  
[vibhor.bageshwar@honeywell.com](mailto:vibhor.bageshwar@honeywell.com) & [sheikh@asterlabs.com](mailto:sheikh@asterlabs.com)
  - ***Please submit a PDF version of the presentation to minimize file size***



# PDR Presentation Rules

- PDR presentation days: 16-18 February 2021
  - Presentation medium: Zoom Meeting (Video Conference)
    - ASC Committee will set up a Zoom Meeting for each Team
    - **ASC Committee request all participants turn their cameras on!**
  - ASC Committee will call in to Zoom Meeting 2-minutes before the PDR presentation time
  - **Teams will be provided with a Zoom Meeting invite by 12 February 2021**
- PDR presentation time: each Team is allotted 40 minutes
  - **Teams provide their 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> choices of time slots starting 8 February 2021 (please see slide 7)**
    - Collaborative Teams are **encouraged** to select consecutive time slots
    - Email time selections: [vibhor.bageshwar@honeywell.com](mailto:vibhor.bageshwar@honeywell.com)
    - ASC Committee will make every effort to assign Teams with their first choice
  - First PDR presentation begins on February 16 at 5:00 pm (Central Time)

# PDR Presentation Rules

- 40 minute presentation time breakdown
  - Student presentation: 25 minutes maximum
  - Q&A with Judges: 6 minutes maximum
  - Judges internal discussion: 3 minutes maximum
  - Team feedback: 6 minutes maximum
- Team scoring and reviews
  - Team scoring will be returned to Team contacts: 22 February 2021
  - Team scores will be updated on website in March 2021

**Feedback to Teams will be provided by the Judges  
during the 40 minute PDR**



# PDR Presentation Rules

- PDR Presentation Outline: ASC Committee Hints
  - Judge's scoring form follows the outline exactly
    - Slide titles should match outline titles
    - Follow the slide outline order
  - Address each section of the outline using at least one separate slide
    - Teams will not score points if sections of the given outline are not addressed
  - PDR sections on collaborative operation
    - Teams can collaborate on these PDR sections
    - Teams must interpret the collaboration objectives and requirements and then demonstrate how these objectives and requirements affect the design of their own snowplow vehicle
  - Use Figures and Tables to convey information to ASC Judges
    - Minimize the use of detailed text where possible!!
    - Verbally present and discuss slide content instead

# PDR Summary: Actions

Date (2021)	Actions
8 February	<ol style="list-style-type: none"><li>1. Select 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> PDR times (see slide 7)</li><li>2. Email time selections to Vibhor</li></ol>
12 February	Zoom Meeting information sent to Teams with final confirmation of PDR time slot
14 February	Email final versions of PDR slides to Vibhor and Suneel by 9 pm (Central Time)
16-18 February	PDR!
22 February	PDR scores sent to Team contacts
March	Website updated with PDR scores

# PDR Presentation Schedule

## PDR Session February 16

Team	PDR Time (central)
	5:00 pm
	5:45 pm
PDR Judges: 20 minute break	
	6:45 pm
	7:30 pm

## PDR Session February 17

Team	PDR Time (central)
	5:00 pm
	5:45 pm
PDR Judges: 20 minute break	
	6:45 pm
	7:30 pm

## PDR Session February 18

Team	PDR Time (central)
	5:00 pm
	5:45 pm
PDR Judges: 20 minute break	
	6:45 pm
	7:30 pm

# PDR Presentation Scoring

- PDR presentation scoring
  - 20% of the total Competition score for 2021

Category	Scoring
Quality of Presentation Slides / Technical Presentation	80
Ability to Engage Audience	20
<b>Total Points</b>	<b>100</b>

# PDR Presentation Outline: 1/3

Slide Title	Suggested Format	Minimum # of Slides
Team Slide*		1
Objectives	Only slide with a lot of text	1
Team Composition & Collaborative Team Composition		1

()\*: Title slide;



# PDR Presentation Outline: 2/3

Slide Title	Suggested Format**	Minimum # of Slides
Own Team Snowplow		
Top-Level Requirements	Table	1
Plowing Strategy: Single "I" Snowfield	Figure	1
Snowplow Vehicle Design	Figure	1
Navigation System Design	Figure	1
Guidance System Design	Figure	1
Processor & Software Design	Figure	1
Safety Systems	Figure	1
Test Plans	Table	1
Failure Modes & Recovery Actions	Table	1
Overall Risk Assessment Summary	Table	1
Vehicle Design Challenges	Table	1

(\*\*): Include additional text outside figure/table as necessary

# PDR Presentation Outline: 3/3

Slide Title	Suggested Format**	Minimum # of Slides
Collaborative (2 Team) Snowplows		
Top-Level Requirements	Table	1
Plowing Strategy: Triple "I" Snowfield	Figure	1
Joint Communication System Design	Figure	1
Joint Safety Systems	Figure	1

()\*\*: Include additional text outside figure/table as necessary



# PDR Presentation Details 1/5

- Title Slide (1 slide)
  - Team university/name/logo
- Objectives (1 slide)
  - Team objectives
    - Single “I” snowfield
    - Collaboration and the Triple “I” snowfield
- Team Composition (1 slide)
  - Own Team composition
  - Collaborative Team (Squad) composition

# PDR Presentation Details 2/5

## Own Team Snowplow (Single “I” snowfield)

- Top-Level Requirements (1 slide)
  - Hint: a requirement is a number that indicates when a design satisfies an objective
  - Hint: during the presentation, the Team doesn't need to go through every requirement; instead highlight the important requirements for the Judges
- Snowplow vehicle plowing strategy (minimum 1 slide)
  - Single “I” snowfield
  - Hint: address vehicle strategy to plow snow, minimize plowing time, maximize snow removal, avoid obstacles, and return to garage
- Snowplow Vehicle Design (minimum 1 slide)
  - Snowplow vehicle and blade designs
    - Hint: include physical dimensions (size and weight)
    - Hint: consider the amount of snow that needs to be plowed at any time and consider the vehicle design required to plow (at least) that amount of snow
  - Sensor + processor component housing
    - Hint: address temperature control

# PDR Presentation Details 3/5

## Own Team Snowplow (Single “I” snowfield)

- Navigation System Design (minimum 1 slide)
  - Concept and sensors
  - Navigation augmentation system
    - Location of navigation aids in competition field
- Guidance System Design (minimum 1 slide)
  - Way-point selection concept
    - Hint: describe how snowplow vehicle will generate its plowing path, avoid obstacles, and perform its functions
- Processor & Software design (minimum 1 slide)
  - Processor selection and operating system
  - Timing and action sequence flowchart
- Safety System (1 slide)
  - System description; Emergency shut-off options (physical and remote)
  - Stopping distance from maximum speed (identify surface)
  - Figure: show how power is interrupted by emergency shut-off options
- Test Plans (1 slide)
  - Select system; identify test for that system; identify inputs; identify expected outputs (Hint: 4 columns)
    - Hint: describe test that would show a system to be operational

# PDR Presentation Details 4/5

## Own Team Snowplow (Single “I” snowfield)

- Failure Modes and Recovery Actions (1 slide)
  - Identify failure modes and recovery actions
    - Hint: consider operational problems and how the snowplow vehicle would recover
- Overall Risk Assessment Summary (1 slide)
  - Evaluate major subsystems – identify the risk of subsystem issues on snowplow vehicle performance
- Vehicle Design Challenges (1 slide)
  - Highlight vehicle or system design changes from the existing designs
    - Indicate whether the vehicle or its systems are pre-existing or newly designed
  - Highlight the design challenges the Team will face adapting the vehicle and its systems to this year’s Competition and weather conditions
    - Hint: first year Teams should identify major design decisions
    - Hint: returning Teams should highlight the design challenges the Team faced adapting the vehicle and its systems to this year’s competition

# PDR Presentation Details 5/5

## Collaborative (Squad) Snowplow

- Top-Level Requirements (1 slide)
  - Hint: identify requirements that both vehicles would have to each satisfy to plow the triple “I”
- Snowplow vehicle plowing strategy (minimum 1 slide)
  - Triple “I” Snowfield
  - Hint: address joint vehicle strategy to plow snow, minimize plowing time, maximize snow removal, avoid obstacles, and return to garage
- Joint Communication System Design (minimum 1 slide)
  - Outline methodology of inter-vehicle communication and equipment
  - Equipment mounting position on own vehicle
- Joint Safety System Design (minimum 1 slide)
  - Identify scenarios
  - Inter-vehicle safety scheme
  - One vehicle failure effect on other vehicle: actions taken