

# Autonomous Snowplow Competition



**ION North Star Section  
Outreach Program**

**Autonomous Snowplow Committee**



**Preliminary Design Review  
Presentation Information & Outline  
2017 Competitors**

**November 2016**

# PDR Presentation Rules

- PDR presentation slides must follow the provided outline
  - Standardize judging for all Teams
  - *ASC Committee Hints: match slide titles to the outline titles and follow the given slide order*
- PDR presentation slides held in confidence throughout Competition
  - PDR slides will not be made public
- PDR presentation slides submission deadline: final version
  - *9 pm (central); 10 November 2016 (Thursday)*
  - 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 day: 12 November 2016 (Saturday)
  - Presentation medium: conference call
  - ASC Committee will call each Team 2 minutes before your PDR presentation time
  - Teams provide a call-in number by 10 November 2016
    - Email call-in number: [vibhor.bageshwar@honeywell.com](mailto:vibhor.bageshwar@honeywell.com)
- PDR presentation time: each Team is allotted 28 minutes
  - Teams provide their 1<sup>st</sup>, 2<sup>nd</sup>, and 3<sup>rd</sup> choices of time slots starting 8 November 2016 (please see slide 9)
    - 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 12 November 2016 at 8:45 am (central)

*Feedback to Teams will be provided by the Judges during the 28 minute PDR*

# PDR Presentation Rules

- 28 minute presentation time breakdown
  - Student presentation: 16 minutes maximum
  - Q&A with Judges: 4 minutes maximum
  - Judges internal discussion: 2 minutes maximum
  - Team feedback: 6 minutes maximum
- Team scoring and reviews
  - Team scoring will be returned to Team contacts: 21 November 2016
  - Team scores will be updated on website in December 2016

[www.autosnowplow.com](http://www.autosnowplow.com)

- PDR Presentation Outline: ASC Committee Hints
  - Judge's scoring form follows the outline exactly
    - If a particular Section is not addressed, then the Team will not score any points for that Section
  - *Use Figures and Tables to convey requirements, strategy, and designs*

# PDR Presentation Outline

Slide Title	Suggested Format**	Minimum # of Slides
Team Slide*		1
Objectives & Team Composition		1
Top-Level Requirements	Table	1
Plowing Strategy	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
Failure Modes & Recovery Actions	Table	1
Overall Risk Assessment Summary	Table	1
Design Challenges	Table	1

()\*: title slide; ()\*\*: include additional text outside figure/table as necessary

# PDR Presentation Outline

- Title Slide (1 slide)
  - Team university/name/logo
- Objectives (1 slide)
  - Team objectives
  - Team composition
- Snowplow Vehicle Program Top-Level Requirements (1 slide)
  - Hint: a requirement is a metric that indicates when a design satisfies an objective
    - Ex: Vehicle heading angle accuracy:  $0.50^\circ$
- Snowplow vehicle plowing strategy (minimum 1 slide)
  - Single “I”; Triple “I”
  - Hint: address vehicle strategy to plow snow, minimize plowing time, maximize snow removal, avoid obstacles, and return to garage

# PDR Presentation Outline

- 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
- 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)
  - Timing and action sequence flowchart

# PDR Presentation Outline

- 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*
- Failure Modes and Recovery Actions (1 slide)
  - Identify failure modes and recovery actions
    - *Hint: consider vehicle operational problems and how the Team would recover*
- Overall Risk Assessment Summary (1 slide)
  - Evaluate major subsystems – identify the risk of subsystem issues on snowplow vehicle performance
- Snowplow 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



# PDR Presentation Schedule

## Morning PDR Session

Team	PDR Time (central)
	8:45 am
	9:15 am
	9:45 am
<b>PDR Judges: 15 minute break</b>	
	10:30 am
	11:00 am
	11:30 am

## Afternoon PDR Session

Team	PDR Time (central)
	12:45 pm
	1:15 pm
	1:45 pm
<b>PDR Judges: 15 minute break</b>	
	2:30 pm
	3:00 pm
	3:30 pm

# PDR Presentation Scoring

- PDR presentation scoring: 10% of the total Competition score

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

# PDR Summary: Actions

Date	Actions
8 November 2016	<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 8)</li><li>2. Email time selections to Vibhor</li></ol>
10 November 2016	<ol style="list-style-type: none"><li>1. Email PDR call-in phone number to Vibhor</li><li>2. Call-in phone number: (local) number the PDR Judges should call to hear a Team's presentation</li></ol>
10 November 2016	Email Final versions of PDR to Vibhor and Suneel by 9 pm (central)
12 November 2016	PDR!
21 November 2016	PDR scores sent to Team contacts
December 2016	Website updated with PDR scores