Autonomous Snow Plow Competition

KICKOFF MEETING

November 16, 2020

Introductions

- E.J. Daigle
  - 2021-2022 Competition Host
  - Dunwoody College of Technology
- Suneel Sheikh
  - ASC Marshal
  - ASTER Labs, Inc.
- ASC Committee Members
- Schools and Team members

Competition Teams

12 Teams This Year!!

Case Western Reserve University
Dunwoody College 1
Dunwoody College 2
Iowa State University
Lake Area Tech 1
Lake Area Tech 2
Laval University – Quebec
Minnesota State University
North Dakota State University
University of Michigan – Dearborn
University of Minnesota
University of Ottawa

Two Year Event

First Year
2020-2021
Virtual Event

Two Cooperating Robots plowing together

Focus on vehicle design and inter-vehicle communication with

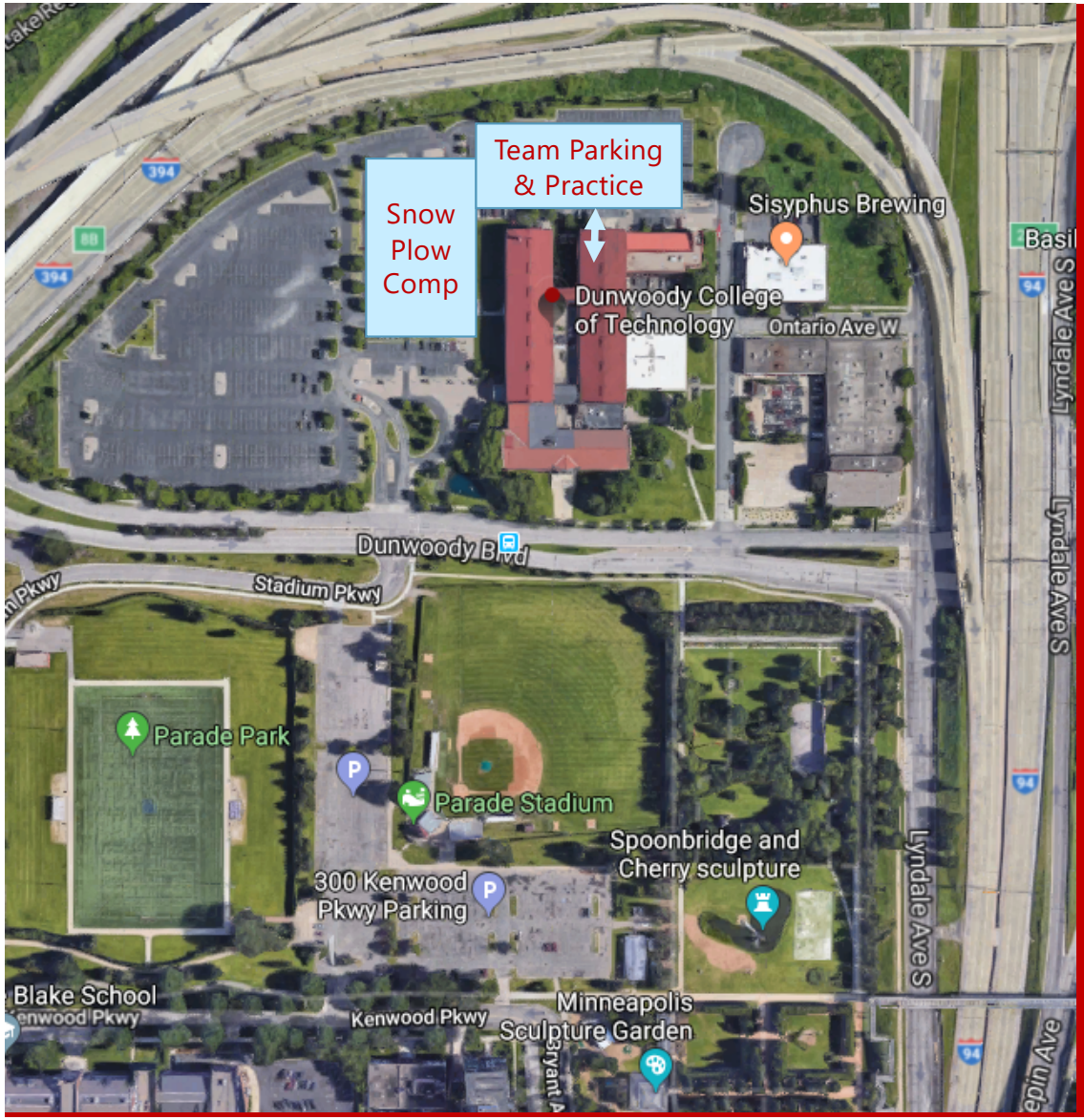
Second Year
2021-2022
In-Person Dynamic Event

Two run options:
Single-I Field with one Robot

Triple-I Field with two Robots

2021 Collaborative Virtual Event

- Schools will pair up to design a collaborative plowing solution
- Two vehicles must communicate and collaborate to plow snow field
- Present final solution in February 2021
- Teams continue to collaborate leading up to dynamic event in February 2022



2022 Dynamic Venue

Dunwoody College
818 Dunwoody Blvd
Minneapolis, MN

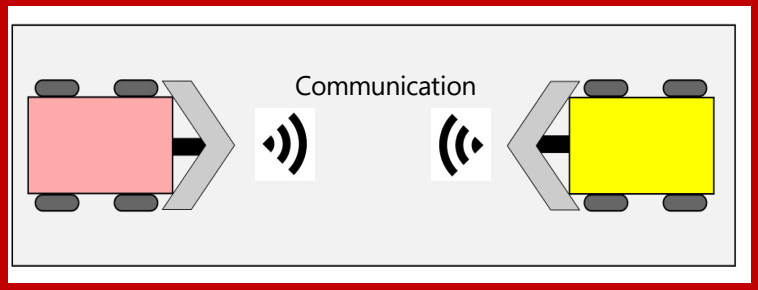
Dates TBD
Jan-Feb, 2022

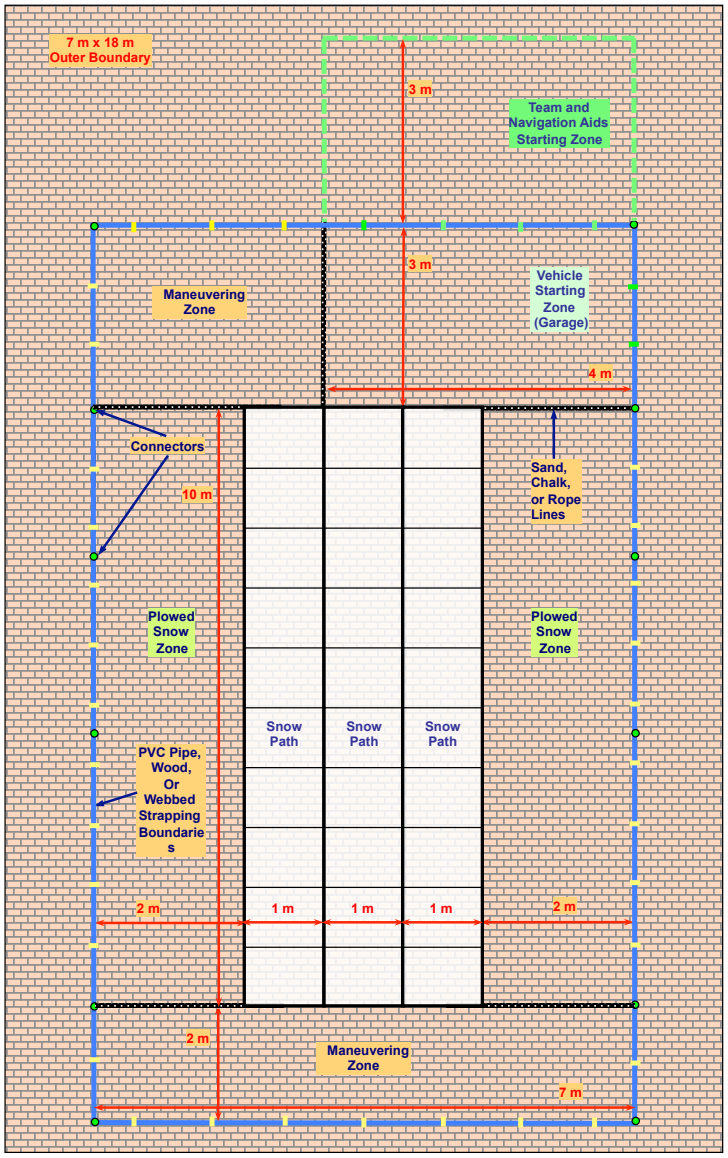
Some Basic Rules

- Each Team must have at least one active student
- Vehicles must start and return to garage
- Goal is to clear as much snow from snowfield as possible
- 20 minute run time – includes setting up navigation aids
- Penalties for hitting boundaries, obstacles, and/or restarts
- No items can be expelled from vehicle (sand, water, fire, etc.)
- Scoring algorithm takes into account; snow removed, time to plow and penalties, with two runs each Team

Inter-Vehicle Communication

- In First Year, team with a partner and define method of communication
- Share data between vehicle to cooperatively clear snow from the path
- Show Judges how method works at Virtual Event
- Continue to work with the same team for Second Year Events

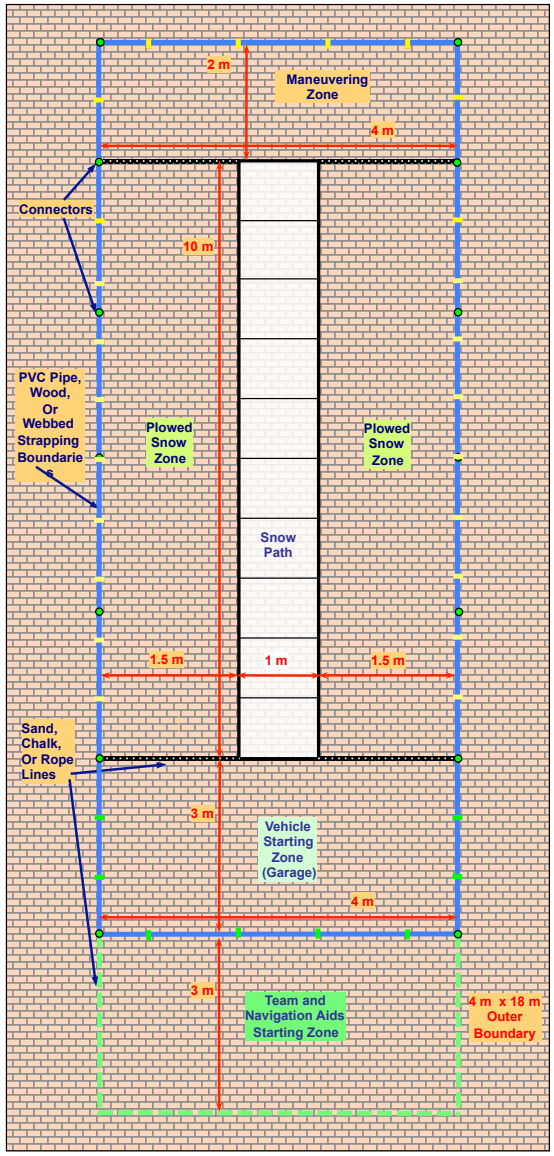




Competition Fields

Collaborative Triple-I

Varying snow depth
Stationary Obstacles



Competition Fields

Individual Single-I

Varying snow depth

Stationary Obstacles

Design & Build Constraints

Final Qualification Review
Vehicle Demonstration and Safety Inspection
Checklist

Team: _____

Category	Initial Inspection	Additional Inspection
Snowplow Vehicle Physical Dimensions		
Length: ≤ 2 m		
Width: ≤ 2 m		
Height: ≤ 2 m		
Snowplow Vehicle: Tires		
Tires: rubber; plastic or rubber augmentations		
Snowplow Vehicle Speed Limit		
Software review (printout): ≤ 2 m/s		
Snowplow Vehicle Power & Ground		
Power Source: combustible fuel and/or batteries		
Electrical Ground		
Snowplow Vehicle Safety: Physical Kill Switch		
Color: red		
Diameter: ≥ 40 mm		
No protruding objects within 30 cm of Switch		
Vehicle Stop: ≤ 3 m from Switch activation		
No Single Point of Failure: demonstrate Switch routing to motor power cut-off		
Snowplow Vehicle Safety: Wireless Kill Switch		
Range: ≥ 50 m		
Vehicle stop: ≤ 3 m from Switch activation		
No Single Point of Failure: demonstrate Switch routing to motor power cut-off		
Snowplow Vehicle Safety: Navigation Sensors		
Sensors: lasers eye-safe (Class 1)		
Laser Harness: lasers safely mounted and secured		
Laser Boresight: points towards ground; angle at or below the local horizontal plane of device		
Navigation Aiding Sources: Operation		
Fluids or objects expelled by aiding source		
Navigation Aiding Sources: Power & Ground		
Power Source: batteries		
Electrical Ground		
Navigation Aiding Sources: Navigation Sensors		
Sensors: lasers eye-safe (Class 1)		
Laser Harness: lasers safely mounted and secured		
Laser Boresight: points towards ground; angle at or below the local horizontal plane of device		
Vehicle Operation		
Autonomous Operation		
Fluids or objects expelled by vehicle		

Important Dates

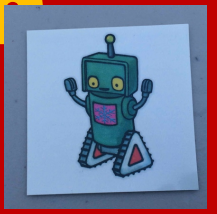
16 Nov 2020	Competition Kickoff
20 Nov 2020	Team Pairings Due
Dec 2020	Committee Check-In Meetings
Jan 2021	Committee Check-In Meetings
8-12 Feb 2021	Virtual Final Presentations
Mar 2021 – Jan 2022	Continue Build & Check-ins
Feb 2022	Dynamic Competition

Remember the Good Through Life's Challenges

















Questions