

# Draper Terrain Relative and Vision-Aided Navigation Research Interests

## University Programs Point of Contact

Dr. Brenan McCarragher, CTO  
617.692.0932  
[education@draper.com](mailto:education@draper.com)

## Technical Point of Contact

Ann Dietrich  
857.331.3670  
[adietrich@draper.com](mailto:adietrich@draper.com)

## Introduction

Draper's vision-aided navigation (VAN) and terrain relative navigation (TRN). Methods are used for terrestrial (air and ground), undersea, space-based orbital and landing applications, and wearable technology. The challenges faced with advancing this technology is using TRN in lighting-constrained environments, increasing the robustness of the system, and continue developing it for space-based applications.

### *About Draper Laboratory ([www.draper.com](http://www.draper.com))*

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## Research Interests

1. ***Autonomy and Robustness of TRN and VAN***
  - a. Sensitivity to different lighting conditions for vision-based navigation, and develop methods to improve VAN robustness to changes in lighting conditions and seasonal terrain.
  - b. Increased autonomy for TRN onboard vehicles including optimized database search methods, optimized feature detection, and reduced processing power
2. ***Terrain-relative measurements that are independent of lighting conditions***
  - a. Explore other measurements that do not rely on optical and visual sensors, such as IR and LIDAR measurements.
  - b. Focus on developing these measurements in shadowed or low-light scenarios, such as at night terrestrially, undersea, in high-contrasting shadows such as at the moon, and at small bodies.
3. ***Wearable sensors and surface navigation***
  - a. Expand our TRN technology to navigate on the surface of Earth or another planetary body such as the Moon and Mars. Focus on wearable tech for humans and rovers.

We would target Masters and PhD students. As an example, Masters students can perform design sensitivity studies, and PhD students can develop novel algorithm approaches.