

# Henry J. Nelson

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## EDUCATION

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**University of Minnesota** Minneapolis, MN  
PhD in Computer Science

*August 2017 - Present*

**Grinnell College** Grinnell, IA  
BA in Physics

*August 2013 - May 2017*

## RESEARCH EXPERIENCE

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**Center for Distributed Robotics**  
*Graduate Research Assistant*

University of Minnesota  
*May-August 2018, January 2020-present*

Various projects including point cloud segmentation, 3D model learning, non-ridged 3D reconstructions from agricultural fields and endoscopic videos, and species identification of weeds in aerial crop imagery. (PI: Nikolaos Papanikolopoulos, PhD)

**Electronic Detector Group**  
*Student Collaborator*

Brookhaven National Laboratory  
*May 2016-August 2016*

Characterization and measurement of quantum yield for novel scintillating liquids to evaluate their effectiveness as a detection medium for large scale detectors. (PIs: David Jaffe, PhD. Lindsey Bignell, PhD)

**Scientific Computing Lab**  
*Research Assistant*

University of Minnesota  
*May-August 2014 and 2015*

Development and testing of novel machine learning algorithms for pattern recognition in images using wavelets, estimation of large matrix properties, and graph-based dimension reduction methods in an academic research lab. (PI: Yousef Saad, PhD)

**Rehabilitation Engineering Research Lab**  
*Research Assistant*

Minneapolis VA Hospital  
*July-August 2014*

Software development for interfacing with medical equipment as well as prototype medical device development, eye-tracking systems development, virtual reality graphics programming, and Android app development. (PI: John E. Ferguson, PhD)

## INDUSTRY EXPERIENCE

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**Sentera**  
*Computer Vision Engineer*

*May 2019-present*

Deep learning infrastructure and model development and deployment. Algorithm development for automatic analysis and interpretation of drone imagery for applications in precision agriculture. Using both traditional computer vision (3D geometry and image processing) and machine learning approaches.

## LANGUAGE AND FRAMEWORK PROFICIENCY

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Fluent with Python, C/C++, and MATLAB. Extensive experience with Git, OpenCV, Point Cloud Library (PCL), Tensorflow, and PyTorch. Working knowledge of Julia, Docker, and AWS (S3, Sagemaker).

## TEACHING EXPERIENCE

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### **Department of Computer Science**

*Teaching Assistant*

University of Minnesota

*August 2017-December 2019*

Preparing and giving weekly lectures, managing other TAs, grading, and office hours. For both undergraduate and graduate level courses. Courses: Automata and Formal Languages; Computer Vision; Artificial Intelligence; and Algorithms and Data Structures.

### **Department of Computer Science, Department of Physics**

*Teaching Assistant*

Grinnell College

*August 2015-May 2017*

Instruction of introductory, intermediate, and upper level students in course content, lab preparation, experiment execution, and data analysis in classroom, tutoring, and laboratory settings Courses: Automata, Formal Languages, and Computational Complexity; Mechanics; and Introduction to Electrostatics.

## AWARDS AND LEADERSHIP

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<b>H. George Apostle Prize in Physics</b>	Grinnell College Department of Physics	<i>May 2017</i>
<b>Phi-Beta-Kappa</b>	Grinnell College	<i>May 2017</i>
<b>President of Drone Club</b>	Grinnell College	<i>2016-2017</i>

## REFeree SERVICE

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IEEE International Conference on Robotics and Automation	<i>2019-2021</i>
IEEE Transactions on Intelligent Transportation Systems	<i>2019-2021</i>
IEEE/RSJ International Conference on Intelligent Robots and Systems	<i>2019-2022</i>

## PUBLICATIONS

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**View Planning Using Discrete Optimization for 3D Reconstruction of Row Crops**

*Athanasios Bacharis, Henry J. Nelson and Nikolaos Papanikolopoulos*

*IROS 2022*

**Scalable Methods for Pre-Clustering Point Clouds of Crop Fields**

*Henry J. Nelson, and Nikolaos Papanikolopoulos*

*Submitted*

[arXiv](#) and [Github](#)

**Learning Continuous Object Representations from Point Cloud Data**

*Henry J. Nelson, and Nikolaos Papanikolopoulos*

*IROS 2020*

DOI: [10.1109/IROS45743.2020.9341765](https://doi.org/10.1109/IROS45743.2020.9341765)

**A Methodology for the Detection of Nitrogen Deficiency in Corn Fields Using High Resolution RGB Imagery**

*Dimitris Zermas, Henry J. Nelson, Panagiotis Stanitsas, Vassilios Morellas, David J. Mulla, and Nikolaos Papanikolopoulos*

*IEEE TASE*

DOI: [10.1109/TASE.2020.3022868](https://doi.org/10.1109/TASE.2020.3022868)

**Weed Detection and Classification in High Altitude Aerial Images for Robot-Based Precision Agriculture**

*Karthik Buddha, Henry J. Nelson, Dimitris Zermas, and Nikolaos Papanikolopoulos*

*MED 2019*

DOI: [10.1109/MED.2019.8798582](https://doi.org/10.1109/MED.2019.8798582)

## TALKS AND PRESENTATIONS

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**A Methodology for the Detection of Nitrogen Deficiency in Corn Fields Using High Resolution RGB Imagery**

August 2021

*Dimitris Zermas, Henry J. Nelson, Panagiotis Stanitsas, Vassilios Morellas, David J. Mulla, and Nikolaos Papanikolopoulos*

*CASE 2021*

**Learning Continuous Object Representations from Point Cloud Data**

October 2020

*Henry Nelson, Nikolaos Papanikolopoulos*

*IROS 2020*

**Herbicide-Resistant Weed Identification and Classification**

November 2018

*Henry Nelson, Karthik Buddha*

*IUCRC ROSEHUB Philadelphia*

**Weed Identification in Aerial Images of Corn Fields**

April 2018

*Henry Nelson*

*IUCRC ROSEHUB Minneapolis*