Henry J. Nelson

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EDUCATION

University of Minnesota Minneapolis, MN   *August 2017 - Present*
PhD in Computer Science
Focus on 3d reconstruction, sparse shape completion, segmentation, modeling, and phenotyping of agricultural fields.

Grinnell College Grinnell, IA   *August 2013 - May 2017*
BA in Physics

RESEARCH EXPERIENCE

Center for Distributed Robotics   University of Minnesota
Graduate Research Assistant   *May-August 2018, January 2020-present*

Various projects including neural implicit representation, sparse shape completion, point cloud segmentation, 3D shape learning, and 3D reconstruction. (PI: Nikolaos Papanikolopoulos, PhD)

Electronic Detector Group   Brookhaven National Laboratory
Student Collaborator   *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   University of Minnesota
Research Assistant   *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   Minneapolis VA Hospital
Research Assistant   *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

Sentera
Computer Vision Engineer   *May 2019-present*

Deep learning infrastructure and model development, training, 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

Fluent with Python, C/C++, and MATLAB. Extensive experience with Git, PyTorch, Tensorflow, Open3D, OpenCV, NumPy, Numba, and Point Cloud Library (PCL). Working knowledge of Julia, Docker, and AWS (S3, Sagemaker, Batch).

TEACHING EXPERIENCE

Department of Computer Science   University of Minnesota
Teaching Assistant   *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   Grinnell College
Teaching Assistant   *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

H. George Apostle Prize in Physics	Grinnell College Department of Physics	*May 2017*
Phi-Beta-Kappa	Grinnell College	*May 2017*
President of Drone Club	Grinnell College	*2016-2017*

REFEREE SERVICE

IEEE International Conference on Robotics and Automation	*2019-2022*
IEEE Transactions on Intelligent Transportation Systems	*2019-2022*
IEEE/RSJ International Conference on Intelligent Robots and Systems	*2019-2022*

PUBLICATIONS

Robust Plant Localization and Phenotyping in Dense 3D Point Clouds for Precision Agriculture

Henry J. Nelson, Christopher E. Smith, Athanasios Bacharis, and Nikolaos Papanikolopoulos Submitted

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

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   *TASE 2020*

DOI: 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

TALKS AND PRESENTATIONS

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*