

Henry J. Nelson

henrynel17@gmail.com \diamond henryjnelson.com

EDUCATION

University of Minnesota Minneapolis, MN
PhD in Computer Science

August 2017 - Present

Grinnell College Grinnell, IA
BA in Physics

August 2013 - May 2017

CURRENT RESEARCH INTERESTS

Leveraging 2D deep learning techniques for 3D information

We live in a 3D world but most of the recent advancements in deep learning apply only to 2D images. The advancements in the image domain cannot be ignored and we must find a way to leverage them for 3D information if we wish them to be more applicable. I want to create methods that leverage the strength in the image domain and use it to produce actionable 3D information.

Developing novel reconstruction and segmentation techniques for 3D data

Current 3D reconstruction and segmentation techniques work well in niche applications or with extremely densely sampled data. In more general instances, dense data is very difficult to obtain and as a result current algorithms are inadequate for a general case. I hope to explore new ways of accurately reconstructing a scene with segmentation in mind and leveraging both processes to benefit the other.

RESEARCH EXPERIENCE

Center for Distributed Robotics
Graduate Research Assistant

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

Various projects including non-ridged 3D reconstructions from endoscopy videos and species identification of weeds in aerial images of agricultural fields. (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)

TEACHING EXPERIENCE

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 2016-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 Physics 2 (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

IEEE Transactions on Intelligent Transportation Systems

2019

IEEE/RSJ International Conference on Intelligent Robots and Systems

2019

PUBLICATIONS

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

MED 2019

Karthik Buddha, Henry Nelson, Dimitris Zermas, and Nikolaos Papanikolopoulos

Published

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

TASE

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

Submitted

TALKS AND PRESENTATIONS

Weed Identification in Aerial Images of Corn Fields

IUCRC ROSEHUB, Minneapolis

April 2018

Henry Nelson

Imperfect Segmentation Labels: How Much Do They Matter?

Institute for Engineering in Medicine Conference

September 24, 2018

Nicholas Heller, Joshua Dean, Nikolaos Papanikolopoulos

Herbicide-Resistant Weed Identification and Classification

IUCRC ROSEHUB, Philadelphia

November 2018

Henry Nelson, Karthik Buddha