Noelle T. Law

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RESEARCH INTERESTS

My current research focuses on leveraging uncertainty estimation, generative AI, visualization, human-machine interaction, and test and evaluation to develop safer and more robust systems. I am particularly interested in developing more interpretable and trustworthy machine learning models for applications in healthcare and sustainability.

EDUCATION & COURSES

Stanford Online Fall 2024
Coursework: Transforming the Grid: AI, Renewables, Storage, EVs and Prosumers.

New York University Tandon School of Engineering | GPA: 3.93/4.0 May 2023
Master of Science, Summa Cum Laude, Computer Science
Thesis: Beyond the Closed Set: Vision Language Models for Open Vocabulary Semantic Segmentation of Autonomous Driving Datasets.
Selected Coursework: Artificial Intelligence, Machine Learning, Deep Learning, Robot Localization & Navigation

University of Virginia | GPA: 3.57/4.0 May 2021
Bachelor of Science with Distinction, Computer Engineering (Minor: Design Integration)
Thesis: The Robotany: A Cybernetic Plant and the Impact of Autonomous Technology on the Workforce.
Selected Coursework: Autonomous Mobile Robots, Robotics for Software Engineers, Embedded Computing & Robotics

PROFESSIONAL & RESEARCH EXPERIENCE

Machine Learning & Perception Engineer | JHU Applied Physics Lab Summer 2023 – Current
- Designed and developed advanced algorithms and innovative analysis techniques to enhance the interpretability and trustworthiness of machine learning systems, with a particular emphasis on vision (multispectral) and language modalities. Notable projects include the DARPA Triage Challenge, where our APL team earned the prestigious "AK" Award for outstanding contributions, recognized by the DARPA Biotechnologies Office.
- Principal Investigator for Conformal Autoregressive Generation for Large Language Models, in which a multi-hypothesis-based approach is leveraged to better quantify model uncertainty.

Research Assistant | NYU DICE Lab Fall 2022 – Summer 2023
- Pursued a master's thesis in the Data, Intelligence, and Computational Engineering lab under Prof. Chinmay Hegde with a focus on vision-language (VL) models for open-vocabulary semantic segmentation of autonomous driving datasets. A meta-analysis was performed to identify impact of training dataset, common model bottlenecks, and model-accuracy-throughput trade-ff when applied in a zero-shot setting.
- A new visualization technique, Triangles, was implemented to more efficiently analyze model results.
- A context-aware region-classification architecture was designed for open-vocabulary segmentation based on issues identified in the meta-analysis.

Research & Advanced Engineering Intern | Ford Motor Company, Greenfield Labs Summer 2022
- Explored use of machine learning for robotic grasping operations through use of 6-DoF deep object pose estimation, in which a one-shot deep fully convolutional neural network was used as a part of a larger system.
- Developed synthetic data pipeline and simulations of 3D depth cameras in ROS and NVIDIA Omniverse, including the development, training, and testing of datasets for 4 YCB objects and for a Ford custom object.
- Completed an ablation study of a ViT-based architecture for deep object pose estimation during Fall 2022.

Software Engineering Intern | ASML Summer 2020
- Created a hardware simulator for the embedded systems of the Extreme UV lithography light source using MATLAB, C, C++, and company-specific languages to enable more efficient feature development.
- Tested simulator and communication interfaces using Python scripting, gtest, and gmock.
- Contributed to all aspects of the build, test, and release cycle and presented accomplishments to 40+ team, project, and group members and leads.

Software Developer Intern | ASML Summer 2019

- Implemented hardware stubs and an image generation library using Python, OpenCV and C++.

PUBLICATIONS

A. Anjum, Y. Li, **N. Law**, M. Charity, J. Togelius, "The Ink Splotch Effect: A Case Study on ChatGPT as a Co-Creative Game Designer", FDG 2024.

G. Glaubit*, K. Kleeman*, **N. Law***, J. Thomas*, S. Gao, R. Peddi, E. Yel, N. Bezzo, "Fast, Safe, and Proactive Runtime Planning and Control of Autonomous Ground Vehicles Changing Environments", IEEE Systems and Information Engineering Design Symposium, 2021.

PRESENTATIONS

N. Law, Conformal Autoregressive Generation for Language Models. The 8th Annual Air Force Research Lab AI/ML Tech Exchange Meeting, November 2024. (Oral).

N. Law, Conformal Autoregressive Generation for Language Models. The Intelligent Systems Symposium (ISS) at JHU Applied Physics Lab, October 2024. (Poster).

N. Law*, E. Tang*, J. Bernstein, C. Hurley, A. Hennig. VISIONN: Visibility, Identification, and Sensing using IR Optics and Neural Nets. APL Building Leaders, Accelerating Science and Technology (BLAST) Final Presentations, August 2024. (Oral).

N. Law*, R. Mosier*, N. Suscello, B. Skerritt-Davis. DARPA Triage Challenge. Leading Data and AI-Enabled Organizations Workshop in collaboration with the Department of Defense's Chief Digital Artificial Intelligence Office (CDAO) and Johns Hopkins University. July 2024. (Poster).

RELEVANT PROJECTS

The Robotany Fall 2020

- Created a cybernetic plant to track moisture levels, monitor growth, and move based on its lighting needs.
- Implemented a control algorithm in C using an ISR task scheduler to integrate light sensors, bump switches, cliff sensors, and the plant's bioelectrochemical signals.
- Designed a CV algorithm with TensorFlow, OpenCV, and Python to isolate the plant from a user background, remove glare, and determine the growth levels of the plant for electrode placement and harvesting.
- Transmitted plant data via a WiFi module to be displayed on a user application.

HONORS & AWARDS

City of Tomorrow High Achiever Award | Ford Motor Company Summer 2022

Louis T. Radar Chairperson's Award for Best Capstone | University of Virginia Spring 2021

VA-NC Academic Achievement Award | VA-NC Alliance Spring 2020

VA-NC Academic Achievement Award | VA-NC Alliance Spring 2020

TEACHING EXPERIENCE

Graduate Foundations of Robotics TA | New York University Fall 2022

Embedded Computing & Robotics TA and Course Developer | University of Virginia Spring 2020 – Spring 2021

Computer Architecture and Design TA | University of Virginia Spring 2021

Introduction to Engineering TA | University of Virginia — Fall 2018 to Winter 2019

General Physics for Engineers I, Workshop TA | University of Virginia — Summer 2018 to Winter 2019

SERVICE & COMMUNITY OUTREACH

Fashion Industry and Healthcare Specialist Volunteer | Net Zero Tracker — Fall 2024 – Current

Co-Instructor, Python for Girls I & II | JHU APL STEM Academy — Spring 2024 – Current

Mentor, ASPIRE Program | JHU APL ASPIRE — Summer 2024

Waste Management Volunteer | JHU Applied Physics Lab — Winter 2023 – Current

WiML @ NeurIPS '23 Volunteer | Women in Machine Learning — Winter 2023

Computers4Kids Clubhouse Volunteer | C4K — Fall 2018 – Spring 2019

Furniture Team Volunteer | Club Dust — Winter 2013 – Current

PROFESSIONAL ORGANIZATIONS

Society of Women Engineers, 2018 – Current