NATHAN LOUIS

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EDUCATION

University of Michigan, Ann Arbor, MI Expected Spring 2022
Ph.D., Electrical Engineering
Advisor: Dr. Jason J. Corso

University of Michigan, Ann Arbor, MI Spring 2020
M.S., Electrical and Computer Engineering
Research Area: Computer Vision

Kennesaw State University, Marietta, GA Summer 2017
B.S., Electrical Engineering

SKILLS AND INTERESTS

Research Interests	Pose estimation and tracking, Object detection and tracking, Video language grounding
Skills	Python, PyTorch, MatLab, Java & Android programming, ControlLogix
Platforms	OS X, Windows, Ubuntu

RESEARCH AND WORK EXPERIENCE

Graduate Research Assistant September 2017 - Present
COG Lab - University of Michigan *Ann Arbor, MI*

· My roles include identifying problems in computer vision literature, developing new ideas, and designing experiments to publish in conference and journal articles

Summer Undergraduate Research in Engineering/Sciences May 2016 - Aug 2016
Georgia Institute of Technology *Atlanta, GA*

· I completed a research project with Dr. Patricio Vela, as part of an NSF REU summer program, titled *Improving the Computer Vision Pipeline Through the Application of a Damped Gradient Energy.*
· This was a process that aimed to reduce the amount of information necessary to produce feature vectors for some computer vision algorithms that utilize gradients. I presented our findings at the SURE symposium.

Louis Stokes Alliance For Minority Participation Summer Research May 2013 - August 2013
Kennesaw State University *Marietta, GA*

· I completed a project with Dr. Dan Lo titled *Smart Sensor Design & Development* as part of an NSF program.
· My team and I designed an embedded system to read data from sensors and transmit it over Bluetooth to an Android device. The sensors used were medical device sensors and a dust sensor, and visually displayed data in graphical or numerical form. We presented this at the PLSAMP fall symposium.

RELEVANT PROJECTS

Temporally Guided Articulated Hand Pose Tracking in Intraoperative Videos 2020
COG Lab - University of Michigan *Ann Arbor, MI*

· *Pending manuscript submission*
· In this work, we propose a new hand pose estimation model that improves its tracking accuracy by incorporating a prior into its pose prediction. Additionally, we collect the first dataset, *Surgical Hands*, that provides multiple articulated hand pose annotations for videos.

Explorative 3D Reconstruction 2020
EECS 598 - University of Michigan *Ann Arbor, MI*

- In this work, we explore the problem of multi-view 3D mesh reconstruction with a limited set of viewpoints. Analogous to an intelligent agent, we learn to select the next best view by predicting the regions of high uncertainty using low-cost silhouette reconstruction from a set of canonical viewpoints.

ViP: Video Platform for PyTorch
COG Lab - University of Michigan 2019
Ann Arbor, MI

- We developed a deep learning-based framework we call the Video Platform for PyTorch (ViP). We designed it as a way to rapidly prototype and benchmark computer vision models in the video domain.

Learning Motion Models for Robust Visual Object Tracking
COG Lab - University of Michigan 2019
Ann Arbor, MI

- I investigated using state estimation theory in combination with a deep learning framework to produce robust tracking coordinate positions. I used a Siamese CNN to encode my observations followed by a recurrent neural network that can approximate a motion model and covariance estimates for Kalman filter updates.

Weakly-Supervised Video Object Grounding from Text by Loss Weighting and Object Interaction
2018
COG Lab - University of Michigan *Ann Arbor, MI*

- We studied weakly-supervised video object grounding: given a video segment and a corresponding descriptive sentence, the goal is to localize objects that are mentioned from the sentence in the video. Our model is evaluated on the newly- collected benchmark YouCook2-BoundingBox and show improvements over competitive baselines.

PUBLICATIONS

N Louis, L Zhou, SJ Yule, RD Dias, M Manojlovich, FD Pagani, DS Likosky, JJ Corso. *Temporally Guided Articulated Hand Pose Tracking in Surgical Videos.* arXiv preprint, 2021

MR Ganesh, E Hofesmann, **N Louis**, JJ Corso. *ViP: Video Platform for PyTorch.* arXiv preprint, 2019.

L Zhou, **N Louis**, JJ Corso. *Weakly-Supervised Video Object Grounding from Text by Loss Weighting and Object Interaction.* BMVC, 2018

TECHNICAL PRESENTATIONS

The Use of AI & Computer Vision to Assess Human Performance
Brigham and Women's Health Hospital, Harvard University July 2020
Virtual

- Invited talk by The Human Factors and Cognitive Engineering Lab as part of their STRATUS research seminar series.

Weakly-Supervised Video Obj. Grounding from Text by Loss Weighting and Obj. Inter. Fall 2018
University of Michigan *Ann Arbor, MI*

- Presented at the Engineering Graduate Symposium in October 2018
- Presented at the Michigan AI Symposium in November 2018

VOLUNTEER SERVICE

AI4ALL
University of Michigan July 2019
Ann Arbor, MI

- AI4ALL is a nonprofit with a focus on increasing diversity and inclusion in the field of Artificial Intelligence. During a two-week period and for 30+ high school students, I taught linear and non-linear regression techniques, Python coding basics, and guided a team into completing a group project.

STEMulation
University of Michigan March 2019
Ann Arbor, MI

· Graduate Society of Black Engineers and Scientists invited high school students to campus to learn about college, engineering, and to participate in fun engineering/science activities. I participated as one of the volunteers in the planning and execution of this event.

College of Engineering Xplore Workshop June 2018
Lights, Pinholes, and Cameras *Ann Arbor, MI*

· Engineering workshops held for middle school students over two days. I presented on the importance of light and lenses from rudimentary to complex vision systems. The students all took home hand crafted pinhole cameras.

PSLSAMP Outreach Fall 2015
Marietta Middle School *Marietta, GA*

· Twice a week, I worked as a classroom assistant and helped students complete various science projects.

AWARDS AND ACHIVEMENTS

Recipient, Rackham Merit Fellowship Fall 2017

Dean's List, School of Engineering Fall 2012 - Spring 2017

Awarded PSLSAMP Stipend Spring 2013, Fall 2013, Spring 2014, Spring 2015, Fall 2015

Recipient, Shaw Industries Scholarship: Fall 2013, Spring 2014