Chris Morse

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Early career professional with specialized knowledge at the intersection of software engineering, machine learning, and robotics. Experienced problem solver with an M.S. in Computer Science, seeking role in software or data science.

EDUCATION	**Master of Science**, *Computer Science,* University of Virginia — Charlottesville, VA

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Master of Science, *Computer Science,* University of Virginia
Charlottesville, VA
Thesis: *A Spatial Relation Inference Generator for Robot Systems*
May 2023
Advisor: Prof. Sebastian Elbaum, GPA: 4.00 / 4.00

Bachelor of Arts, *Computer Science,* University of Minnesota
Minneapolis, MN
GPA: 3.91 / 4.00, *Music Minor*
May 2021

LANGUAGES

Python *(strong proficiency)* – C++ *(high proficiency)* – C/Java/SQL *(adequate proficiency)*

SKILLS

Machine Learning – Object-Oriented Programming – Computer Vision – Software Analysis – Git – Docker

WORK EXPERIENCE

Research Assistant, *LESS Laboratory*
Aug. 2021 – Dec. 2022
University of Virginia
- Created a novel, highly modular system to infer safety specifications from spatial data.
- Utilized PyTorch-based panoptic segmentation to establish coverage metrics over rich scene graphs.
- Performed simulations to generate data and develop complex robot algorithms (Unity, Gazebo, CARLA).
- Published open-source tool at an international robotics conference (github.com/less-lab-uva/SpRInG).

Research Assistant, *Interactive Robotics and Vision Laboratory*
Jan. 2020 – Jan. 2021
University of Minnesota – Twin Cities
- Compiled the first dataset of semantically segmented underwater images to enhance AUV perception.
- Performed dataset analyses to resolve training imbalances in object detection models.
- Created an image processing pipeline (OpenCV) to generate synthetic image pairs for facial recognition.
- Used modern development practices for software testing (C++, Python) and version control (Git).

Research Assistant, *Intelligent Unmanned Systems Laboratory*
June 2019 – Aug. 2019
NSF REU Program, University of Nebraska – Lincoln
- Augmented training datasets to quantifiably improve TensorFlow detection model performance.
- Quantified performance of models with evaluations along precision, recall, and mAP metrics.
- Tested real-time model inference speed on an NVIDIA Jetson Nano and documented results in a report.

Teaching Assistant
"Robotics for Software Engineers", University of Virginia
Aug. 2022 – May 2023
"Discrete Math" and *"Intro. to Programming"*, University of Minnesota
Sept. 2018 – Dec. 2019
- Led labs covering software testing, system design, and object-oriented programming for 150 students.
- Developed learning materials for robot control, sensing, localization, ROS design, and perception.

INDEPENDENT PROJECTS

VAE-Guided Testing Framework for OpenPilot's Perception System
Spring 2022
- Modeled feature distribution of training set through a custom variational autoencoder model in PyTorch.
- Performed PCA dimensionality reduction over latent vector representations to enable clustering.
- Formed feature clusters with K-Means to reveal rare image features.
- Evaluated perception model over rare features, revealing a 26% drop in lane confidence.

Synthetic Data Generation for AUV Detection Enhancement
Summer 2020
- Augmented scarce image training sets by generating synthetic data to improve object detection.
- Trained GAN models to perform domain transfer between underwater swimming pool and ocean images.
- Trained detection models on original and augmented sets, evaluations reporting +28% mAP.

PUBLICATIONS

1. "A Framework for the Unsupervised Inference of Relations Between Sensed Object Spatial Distributions and Robot Behaviors." (ICRA 2023)
2. "Semantic Segmentation of Underwater Imagery: Dataset and Benchmark." (IROS 2020)

HOBBIES

Rock Climbing – Mountain Biking – Skiing – Baking – Jazz Trombone