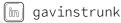
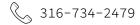
Gavin Strunk

Lead Research Scientist









EDUCATION

M.S. APPLIED MATHEMATICS | JOHNS HOPKINS UNIVERSITY

Expected Graduation: 2029 | GPA 4.0/4.0

DEEP REINFORCEMENT LEARNING NANODEGREE | UDACITY

Completed: November 2018

DEEP LEARNING NANODEGREE | UDACITY

Completed: December 2017

PH.D MECHANICAL ENGINEERING | UNIVERSITY OF KANSAS

Graduated: August 2014 | GPA 3.8/4.0

Dissertation Title: "Ultracapacitor Development and Implementation Management

System"

M.S. MECHANICAL ENGINEERING | University of Kansas

Graduated: December 2011 | GPA 3.79/4.0

Thesis Title: "Parallelized Distributed Embedded Control System implemented on 2D

robotic walking machine"

B.S. MECHANICAL ENGINEERING | UNIVERSITY OF KANSAS

Graduated: December 2010 | GPA 3.3/4.0

SKILLS

PROGRAMMING

Python • MATLAB/Simulink • C++ • LATEX

LIBRARIES/FRAMEWORKS

ROS/ROS2 • OMPL • IPOPT • Pytorch • TorchRL • JAX • CASADI • OpenCV • PCL

TOOLS/PLATFORMS

Git • Jenkins • Atlassian • Docker • Linux

RESEARCH INTERESTS

- → Reinforcement Learning
- → Model Predictive Control
- → Optimal Mass Transport
- → Intersection of Math/Al

EXPERIENCE

LEAD RESEARCH ENGINEER | SCIENTIFIC SYSTEMS CO INC. (SSCI)

June 2019 - Current | Woburn, MA

- → **Proposal Writing:** Lead for grant proposals winning >\$4M
- → Principal Investigator: PI for 3 programs for DARPA, Office of Naval Research, and Navy, leading technical teams from 2-5 researchers.
- → Optimal Transport Multi-sensor Multi-spectral Image Fusion: Developed Optimal Transport-based image fusion algorithm that explicitly optimizes image metrics across spectral bands to fuse multi-sensor and multi-spectral images. Developed offline parameter optimizer that tunes the image fusion to improve downstream algorithm (e.g. object detector) performance without retraining.
- → Model-Based Reinforcement Learning Cognitive Autonomy: Developed Multi-agent Model-based RL method for using a team of less maneuverable homogeneous agents to track an intelligent adversary operating a more maneuverable
- → Uncertainty Quantification in Deep Neural Networks: Developed post-hoc approach for quantifying aleatoric, epistemic and prediction uncertainties for pretrained regression networks.
- → USV Tight Formation Control w/ Force Feedback: Developed nonlinear maritime vessel control strategy to enable underactuated ships to navigate up to sea state 5 in a train by utilizing compression forces between vessels. Won **Engineering Excellence Award.**
- → Density Swarm Control: Collaborated on CubeSat constellation controller to maintain satellite distribution density while changing orbits.
- → Autonomy Decision Explanation Engine: Collaborated on an explainable autonomy engine that learns a black box autonomy system decision making process and explains the actions in human readable text using MDP-based model.

ADVISORY BOARD MEMBER | ROBOPATH LLC

January 2017 - present | Leewood, KS

- → Co-founder and Technical Advisor
- → Selected for NSF SBIR Phase I funding
- → Granted patent: System and Methods for Archiving and Retrieving Specimens US 2015/0217936A1

SENIOR ROBOTICS RESEARCH SCIENTIST | SCHLUMBERGER

January 2017 - June 2019 | Boston, MA

- → Autonomous Underwater Vehicle Autonomy: Developed a novel autonomy system that achieved extremely high reliability by decoupling fault tolerance from business logic intelligence. Operated four open water field tests completing over a month of test days with zero failures.
- → **Abstract USV Formation Control:** Simplified operators control of 30 USVs using centralized abstract control law to maneuver based on a time varying elliptical grouping and distribution.
- → **Tight Tolerance Peg-In-Hole(PIH) Manipulation:** Designed task level optimizer for 0.001" 0.008" accuracy PIH sequencing that improved performance time on a UR5/UR10 by 58% utilizing ROS and MOVEIT.
- → **Negative Feature Extraction in Point Clouds:** Designed an algorithm to extract open (negative) feature templates in point cloud data to determine location of holes in 3D objects for placing pegs.

EMBEDDED CONTROLS ENGINEER | SCHLUMBERGER

February 2014 - January 2017 | Houston, TX

- → PMSM Control for Drilling Tool: Implemented PID permanent magenet synchronous motor controller that supported resolver feedback and sensorless field oriented control
- → Continuous Integration System: Designed and maintained CIS using Jenkins, GIT, and automated deployment scripts

RESEARCH ASSISTANT - MATHEMATICS AND COMPUTER SCIENCE | ARGONNE NATIONAL LAB

Summer 2013 | Lemont, IL

- → Developed a reconfigurable hardware system that interfaces with the cloud aimed at remote sensing for big data and computationally intensive applications
- → Built around TI Sitara ARM A8 processor incorporated IR camera, RGB camera, a large variety of discrete sensors, and network support over Ethernet, WIFI, or GSM connections
- → Proposed a hardware to cloud architecture that supports goal oriented and self-aware hardware systems
- → OpenSource software and project documentation in Hardware tab http://press3.mcs.anl.gov/forest/

INDUSTRY AND COMMUNITY ENGAGEMENT

Active Security Clearance (Secret)

NSF Proposal Reviewer (Foundational Research in Robotics)

Letters to a Pre-Scientist (LPS) Pen Pal: LPS connects students to STEM professionals through snail mail to broaden students' awareness of STEM professionals look like and do at work and inspire all students to explore a future in STEM.

PUBLICATIONS AND TALKS

- 1. G. Strunk **Novel Autonomous System-tactics leveraging Hypergames (NASH)**, Sea, Air, and Space, NavySTP Poster Presentation, 2024.
- 2. G. Strunk, "Uncertainty Quantification's Role in Metacognition", Workshop on Metacognitive Prediction of Al Behavior, ASU Skysong, Invited talk, 2023.
- 3. G. Strunk, "Greedy Clustering-Based Algorithm for Improving Multi-point Robotic Manipulation Sequencing", arXiv:2205.02662 [cs.RO], May 2022.
- 4. A. Jarrot, A. Gelman, G. Choi, A. Speck, G. Strunk et al., "High-speed underwater acoustic communication for multi-agent supervised autonomy," 2021 Fifth Underwater Communications and Networking Conference (UComms), 2021
- 5. A. Speck, A. Croux, A. Jarrot, G. Strunk et al., "Supervised Autonomy for Advanced Perception and Hydrocarbon Leak Detection," Global Oceans 2020
- 6. Vincent, Jack, Vannuffelen, Stephane, Ossia, Sepand, Speck, Andrew, Strunk, Gavin, et al. "Supervised Multi-Agent Autonomy for Cost-Effective Subsea Operations." Offshore Technology Conference, Houston, Texas, USA, May 2020