Gavin Strunk

Robotics Research Scientist

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Experience

SCIENTIFIC SYSTEMS CO INC. (SSCI) | Senior Research Engineer

June 2019 – Current | Woburn, MA

- **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.
- **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.

SCHLUMBERGER | Senior Robotics Research Scientist

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.

SCHLUMBERGER | Embedded Controls Engineer

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

Recent Publications

1. G. Strunk, **"Greedy Clustering-Based Algorithm for Improving Multi-point Robotic Manipulation Sequencing"**, arXiv:2205.02662 [cs.RO], May 2022.
2. 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
3. A. Speck,A. Croux,A. Jarrot,G. Strunk et al., **"Supervised Autonomy for Advanced Perception and Hydrocarbon Leak Detection,"** Global Oceans 2020
4. 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

Skills

PROGRAMMING

MATLAB/Simulink • Python • C++ • LaTeX

LIBRARIES/FRAMEWORKS

ROS/ROS2 • OMPL • IPOPT • Pytorch • Tensorflow • CASADI • OpenCV • PCL

TOOLS/PLATFORMS

Git • Jenkins • Atlassian • Docker • Linux

Education

UDACITY

Deep Reinforcement Learning Nanodegree

Completed: November 2018

Deep Learning Nanodegree

Completed: December 2017

UNIVERSITY OF KANSAS

Ph.D Mechanical Engineering

"Ultracapacitor Development and Implementation Management System"

Graduated: August 2014

GPA: 3.8 / 4.0

UNIVERSITY OF KANSAS

M.S. Mechanical Engineering

"Parallelized Distributed Embedded Control System implemented on 2D robotic walking machine"

Graduated: December 2010

GPA: 3.79 / 4.0

Research Interests

- Reinforcement Learning
- Model Predictive Control
- Guaranteed Safe Control
- Trajectory Optimization
- Underactuated Systems