Sina Aghli, Ph.D.

sina.aghli@gmail.com
Residency Status: US Permanent Resident
GitHub: //sinaaghli
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Expertise

Underwater robots, Self-driving cars, Nonlinear/Adaptive/Robust/Optimal Controls, Motion Planning, Dynamics Modeling, Model Identification, Sensor Fusion, Nonlinear State Estimation, C++, ROS, Hardware testing/verification

Professional Job Experience

Robotics Technologist (NASA JPL) 2023 – now

- ***Exobiology Extant Life Surveyor (EELS):*** *Contributed to autonomy algorithms for sub-surface locomotion and control of the robot.*

Controls Scientist (PickNik Robotics) 2020 – 2023

- ***Under Water ROV:*** *Designed a UKF filter and a time-varying LQR controller for underwater maintenance application*
- ***Inter-satellite force interaction:*** *Designed a hardware-in-the-loop system with a UR5 manipulator to mimic satellite dynamic interaction behavior in a satellite capturing scenario.*
- ***Satellite Docking with CanadaARM:*** *Feasibility Research on the possibility of docking a heavy space module to the space station using a CanadaArm.*
- ***Quadruped Robot:*** *A convex MPC based motion planner and controller.*

Senior Controls Engineer (Scythe Robotics) 2019 – 2020

- *Led the motion planning team to design an adaptive non-linear controller based on Contraction Analysis which reduced controller computation requirement from 40% down to 2% while increasing controller update rate from 30Hz to 2KHz. (patented)*

Assistant Teaching Professor (CU Boulder, Computer Science Dep.) 2019 – 2022

- *Co-PI of NSF-CPS grant*
- *Developed and taught undergraduate Robotics, Data Structures, and Computer Systems courses.*

Electronics Engineer (Magnelab Inc) 2015 – 2018

- *Led a team of two engineers in designing several electronic products (PCB+Firmware) related to current transformers involving signal processing and network communication algorithms.*

Control Engineer (Zoox) 2015

- *Designed multiple ECUs and firmware to communicate with the main computer of zoox's autonomous car to control steering, acceleration, and brakes.*

Education

PhD in Computer Science (University of Colorado Boulder) 2014 – 2018

Thesis: Model Identification and Control of Autonomous Ground Vehicles

MS in Mechatronics (University of Tabriz) 2010 – 2012

Thesis: Modeling, Design, and Control of a Cable-Driven Parallel Robotic Manipulator

BS in Computer Hardware Engineering (Azad University) 2004 – 2008

Thesis: Design of an Eight Bit CPU Data-Path and Control Unit With Custom Instruction-Set in VHDL

Research Grant Collaboration

Researcher on SpaceWrex grant, Integrated Planning, and Control for On-Orbit Capture 2022
Co-PI of NSF-CPS grant, Learning and Verifying Conformant Data-Driven Models for Cyber-Physical Systems ($1.2M) 2020
Research Assistant for DARPA Tactical Technology Office Subterranean Challenge: MARBLE ($4.5M) 2018
Research Assistant for NSF CPS: Synergy: Verified Control of Cooperative Autonomous Vehicles ($777K) 2018
Research Assistant for DARPA Defense Sciences Office: Ninja Car ($1.04M) 2017

Honors

Third Place in DARPA Subterranean Robotics Challenge(Team MARBLE)	2018
Gold Medal in 11th Iran Skills National Contest	2011
Exceptionally Talented Student scholarship (Tabriz University, Iran)	2010
Silver Medal in Khwarizmi National Science Festival (Iran)	2010
Second Place at IRANOPEN International Robotcup Contest	2008

Patents

An Adaptive Method for Autonomous Control of Robotic Grass Cutting Machine
S Aghli, Scythe Robotics Inc.
Patented, pending publication.

Publications

Online system identification and calibration of dynamic models for autonomous ground vehicles
S Aghli, C Heckman.
IEEE International Conference On Robotics and Automation, 2018.

Path-Following though Control Funnel Functions
H Ravanbakhsh, S Aghli, C Heckman, S Sankaranarayanan.
IEEE International Conference on Intelligent Robots and Systems, 2018.

Game-Theoretic Cooperative Lane Changing Using Data-Driven Models
G Ding, S Aghli, C Heckman, L Chen.
IEEE/RSJ International Conference on Intelligent Robots and Systems, 2018.

Terrain Aware Model Predictive Controller for Autonomous Ground Vehicles
S Aghli, C Heckman.
BGSR workshop at Robotics: Science and Systems Conference 2017, 2017.

Design and Fabrication of a Worm Robot Prototype
M Noorani, A Ghanbari, S Aghli.
RSI International Conference on Robotics and Mechatronics (ICROM), 2015.