

Ali Younis

www.linkedin.com/in/ali-younis-28702973

Education

- **PhD Computer Science - Machine Learning**
University of California - Irvine *2020–Present*
Neurips and UAI published Author. **Research focus:** Efficient end-to-end trained non-parametric particle based belief propagation inference for multi-modal state predictions. Applications in **Computer Vision** (tracking, segmentation, prediction), **Robotics** (state estimation, mapping, motion planning) and **AR/VR** (eye/body/head/hand/object tracking). Advised by Professor Erik Sudderth.
Notable Projects: **A)** Neurips 2023. Stable end-to-end learnable particle filter method with novel gradient estimation method for processing of time series data using multi-modal sensor types (video + other sensors). **B)** Particle based motion planning method for planning in high dimensional space using graphical models. **C)** (currently) Extension of end-to-end learnable particle filtering method to particle smoothers and general graphical models for applications in Computer Vision (general segmentation/tracking/ext), multi-modal sensor fusion, AR/VR and time series data processing (like weather data). **D)** Looking into integrating Neural Radiance Fields (NeRFs) with prior particle filtering work to build a general Simultaneous Localization and Mapping method for use in AR/VR/Autonomous Driving/Robotics.
- **University of California - Irvine** **M.S. Computer Science (AI/ML Focus)**
GPA: 3.882 *2017–2018*
- **University of California - Irvine** **B.S. Computer Science and Engineering**
GPA: 3.851, Magna Cum Laude *2013–2017*

Employment

- **Qualcomm - Computer Vision Algorithms Research Team** **San Diego**
Machine Learning Intern *June 2023 – September 2023*
Duties: Research into new machine learning based depth-from-stereo methods that blend classical and neural techniques while leveraging existing on-chip hardware accelerators. Developed proprietary depth-from-stereo technique that significantly outperforms current real-time stereo systems for possible integration into future chipsets. Implement training/testing pipeline on multi-gpu machines using PyTorch. Create optimized PyTorch neural architectures for efficient training on large datasets.
- **Modal AI** **San Diego/Remote**
Software / Machine Learning Engineer (Part-time) *June 2020 – June 2023*
Duties: Developed, trained and deployed to embedded hardware custom depth-from-stereo classic and machine learning (neural) algorithms for real-time depth estimation on drone platforms for applications in mapping and collision avoidance. Implemented full data collection, training, validation and deployment pipelines. Implemented neural network quantization for faster inference. Integration of various Visual Inertial Odometry systems. Drone platform (using Qualcomm's QRB5165 chipset) bring up. Development of handheld ground stations. Low Level USB stack development for camera integration. Development of various Android applications for drones. Build custom Linux images. Used Python, C, C++ and custom OpenCL.

- **Tyvak Nano-Satellite Systems, Inc.** **Irvine**
Software Engineer *August 2018 - June 2020*
Duties: Design and Implement mission critical embedded software system development (actuator/sensor drivers and main control applications) for the satellites. Lead engineer for core libraries and several spacecraft subsystems. Software lead for all computer vision based camera payloads. Primary software engineer for mission with first commercial GPU in space. Platform bring up and Linux OS customization in Build-root. Implemented continuous integration test platforms and developed internal tools. Facilitated inter-team cooperation leading to mission success for various high stakes missions currently orbiting Earth and the Moon. Used C++, C and some Python and CUDA.
- **Qualcomm Corporate R&D (4 Internships)** **San Diego**
Software Engineering Intern *4 Summers from 2014-2017*
Duties: Designed collision avoidance system for drones using only on-board sensors and processing; 3D mapping and planning path (Prototype for 2016 CES demo). Used RGB and RGB-D cameras to map world and estimate current location before planning flight path from current location to goal region. Implemented customer facing UART driver for Qualcomm hardware. Created continuous integration testing tools and suites for drones. Developed new features for Qualcomm's flight stack (Safety/GPS navigation/Ground Station Communications/Sensing). Developed interface for remote drone control and live data visualization using Node.js back-ends. Used C, C++, Java, Node.js, Python and Matlab.
- **Programming Language Research Group under Prof. Demsky** **Irvine**
Undergraduate Research Assistant *4 Years from 2013-2017*
Duties: Developed decentralized secure communications system for IoT devices where communication channel is hostile and intermittent (Published Poster). Research in security of IoT devices (Published Paper). Created bare-metal ARMv7 test platform (real hardware and emulation) for research in robust software execution on unreliable hardware. Implementation of lock-free concurrent data structures in C++11 using weak memory models. Hardware "hacking" and driver development. Android Development.

Publications:

- A. Younis, E. Sudderth. "Differentiable and Stable Long-Range Tracking of Multiple Posterior Modes". Neurips 2023.
- S. Agarwal, G. Hope, A. Younis, E. Sudderth. "A Decoder Suffices for Query-Adaptive Variational Inference". UAI 2023.
- R. Trimananda, A. Younis, T. KWA, B. Demsky, G. Xu. "Securing Smart Home Devices against Compromised Cloud Servers", Poster at HotEdge, June 2020
- R. Trimananda, A. Younis, B. Wang, B. Xu, B. Demsky, G. Xu. "Vigilia: Securing smart home edge computing", Symp. of Edge Computing (SEC) October 2018.

Software Experience

- **Languages:** C, C++, Java, Python, Go, Bash, Matlab, L^AT_EX, Node.js, SQL, ARMv7 Assembly
- **Frameworks/Tools:** PyTorch, TensorFlow/Keras/TFlite, ONNX, CUDA/OpenCL, OpenCV, Make/CMake, Buildroot, Linux, Android, iOS, Google Cloud, MySQL/Postgres, SLURM

Awards and Honors

- **Deans Honor List (All Quarters):** University of California - Irvine
- **Roberto Padovani Scholarship:** Awarded to select interns from Qualcomm Corp. R&D for outstanding performance. Nominated by my team, approved by R&D leadership.
- **Qualcomm Qualstar Award (2 times):** Awarded for excellent team work while at Qualcomm.