Amin Yahyaabadi

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Work Experience

- **Sanctuary AI**, Vancouver, Canada
  Robotics Control Engineer, 2022 - Now
  - Designed and developed Robodrake, the whole-body controller of Phoenix
  - Designed a real-time dynamics and simulation engine for robotics control
  - Lead the automatic creation, development, and deployment of digital robot embodiments
  - Developed the Phoenix hand controller's operation logic, DDS communication layer, and real-time control deployment
  - Integrated Robodrake with Carbon trajectories and tracking modes
  - Designed the real-time continuous inverse kinematics trajectory planner used for Robodrake
  - Optimized of the Phoenix controller for real-time low-latency performance of Phoenix
  - Designed and developmed Granular that optimizes the package generation and delivery of digital robot embodiments
  - Conducted pragmatic test of the body/hand controllers and the nervous system on Phoenix
  - Built scalable processes around software build, test, and deployment
  - Optimized the Docker and CI deployments for the controls team

- **Post Media**, New York, US
  Senior Software Engineer, 2021 - 2022
  - Developed the Post.news full-stack app via Solid-start and Solid-js
  - Developed the Post.news Android app via Capacitor Ionic
  - Optimized the performance of the app startup, news feed, payment pages, and user profiles
  - Integrated build and testing technologies for operational excellence

Education

- **University of Manitoba** Winnipeg, Canada
  M.Sc., Mechanical Engineering Sep 2018 - Sep 2021
  GPA: 4.27/4.5

- **Isfahan University of Technology (IUT)** Isfahan, Iran
  B.Sc., Mechanical Engineering Sep 2013 - Feb 2018
  GPA: 18.03/20 (3.91/4) *2014-2018*
  17.89/20 (3.81/4) *overall*

Research Experience

- **An Intelligent Drone Testbed for Control Systems and Verification,**
  University of Manitoba 2018 - 2021
  Designed an intelligent drone testbed used for validation of new satellite or drone control algorithms and hardware. Identified the dynamics of the drone intelligently with minimal measuring using Particle Swarm Optimization (PSO).
  Developed a custom onboard software for the drone to autonomously control the drone's motion and operations.
  pdf
  M.Sc. Thesis, *Supervisor: Dr. P. Ferguson*
  AI | PSO | UAV | System Identification | Control | Pixhawk | Parrot | Matlab

- **Intelligent vibration control with self-sensing piezoelectric actuator,**
  Isfahan University of Technology 2016 - 2018
  Developed an intelligent control method for a distributed system using a self-sensing piezoelectric actuator and PSO.
  Modelled the dynamics of the system with a novel FEA+FDA method to test the controller.
  B.Sc. Thesis, *Supervisor: Dr. S. Ziaei-Rad*
  AI | PSO | GA | Smart Material | System Identification | Control | FEA | Matlab

- **Auto Code Generation for Onboard Space Object Detection and Flight Software Applications,**
  University of Manitoba 2018 - 2021
  Developed machine learning and analytical image processing algorithms for satellite's onboard detection of resident space objects (RSOs) from commercial-off-the-shelf star trackers. pdf
  M.Sc. Project with Magellan Aerospace, *Supervisor: Dr. P. Ferguson*
  Machine Learning | Image Processing | Xilinx | Arm Cortex | Intel | Matlab | C++

- **ManitobaSat Satellite's Onboard Computer and Flight Software Leader,**
  University of Manitoba 2018 - 2021
  Designed a modular onboard computer (OBC) for ManitobaSat-1, a 3U sized CubeSat satellite. The OBC was a system on a chip that used an MRAM. Developed custom real-time flight software running on FreeRTOS to control all the satellite's operations such as attitude and determination control. pdf
  M.Sc. Project with Canadian Space Agency (CSA), *Supervisor: Dr. P. Ferguson*
  Mechatronics | Control | Smart Fusion | Arm Cortex | RTOS | C++

Notable Projects

- **Rhino XR-3 5 DOF Robot Arm Real-time Control via Arduino**
  Robotics | Control | C++ | Matlab | Arduino — *Selected Topics in Robot Technology, Supervisor: Dr. S. Balakrishnan*
- **Barrett WAM 7 DOF Robot Arm Simulation and Analysis**
  Robotics | Control | Matlab — *Robotics, Supervisor: Dr. H. Mousavi*
- **Model Predictive Control of Robot Arm using Neural Networks**
  Machine Learning | Control | Robotics | Matlab — *Neural Networks, Supervisor: Dr. M. Kamali*
- **Intelligent Fuzzy PID Controller for a Bluetooth controlled DC Motor via AVR**
  AI | Fuzzy Logic | Control | AVR | Matlab — *Intelligent Control, Supervisor: Dr. F. Sheikholeslam*, *Mechatronic Systems, Supervisor: M. Danesh*
- **Parallel Image Processing using MPI and OpenCV**
  MPI | OpenCV | C++ | Parallel Processing — *Parallel Processing, Supervisor: Dr. I. Jeffrey*
- **Custom Simulated Annealing Investigation for Salesperson Problem - New Mathematical Proof of The Multidimensional Newton's Weights Optimization Algorithm**
  Machine Learning | AI | SA | Neural Networks | Matlab — *Applied Computational Intelligence, Supervisor: Dr. K. Ferens*
- **Designing a Signal Processing and Measuring Instrument in Labview - Verifying The Instrument using Acoustic Analysis of a Trumpet in MSC ACTRAN**
  Signal Processing | Acoustics | Actran | LabView — *Mechatronics Lab 2, Supervisors: Dr. M. Danesh*, *Engineering Acoustics, Supervisor: Dr. A. Loghmani*
- **Multilayered Composite Shell Dynamics and Crack Analysis under Impact via Abaqus**
  FEM | Abaqus | Computation Mechanics — *Computer-Aided Engineering, Supervisor: Dr. R. Jafari*

Honours and Awards

- Fellowship for Education Purposes - $40,500, UoM, Canada. 2018-2021
- Faculty of Graduate Studies Program Completion Scholarship - $2,500, UoM, Canada. 2021
- International Graduate Student Entrance Scholarship (IGSES) - $6,000, UoM, Canada. 2018
- Fellowship to Study at IUT for M.Sc Program without Entrance Exam, IUT, Iran. 2017
- Ranked top 10% among the students of the Mechanical Engineering Department, IUT, Iran. 2017
- Ranked top 0.3% among 260000 participants in Iranian University Entrance Exam for B.Sc. Studies. 2013
- Qualified as very good in Mathematics Alympiad Final International Round in the Netherlands. 2012
- Ranked 1st in Mathematics Alympiad National Round in Iran. 2011

Software and Programming Skills

- **Programming Languages:** C++, Rust, Python, Matlab, Julia, D, Go, Verilog, PLC, TypeScript, AssemblyScript
- **Technical Software:** Simulink, Abaqus, LabView, Xilinx SDSoc - Vivado, Simpack, MSC Adams / Car, MSC Actran, Autodesk Inventor, CATIA, Proteus, Modelsim, Maple
- **Embedded Processors:** Arm Cortex A9, Arm Cortex M3, Xilinx Zynq 7020 SoC/FPGA, Smart Fusion 2 SoC/FPGA, Pixhawk Flight Contrller (Px4), Parrot Mambo Flight Controller, Arduino Due /Uno, AVR Atmel STK500, Intel/AMD x86

Open-Source Experience

Made more than 28,000 contributions on GitHub. Some of the notable projects are:

- The leader of the Atom-Community organization that brings an integrated development environment to Atom
- The author of the Zadeh, a library for fast fuzzy filtering and matching written in C++
- The author of project_options and setup-cpp that provide a full C++ development environment
- The author of minijson, a library for the fast minification of the JSON files written in D, C, and AVX2 and SSE4_1 SIMD.
- The author of AcuteML, an intelligent markup language for web development written in Julia
- The leader of the JuliaMatlab organization, an open-source alternative for Matlab written in Julia
- The co-owner of the JuliaMusic organization that provides music research tools (e.g. MusicXML.jl) in Julia

Publications

- **A. Yahyaabadi**, M. Driedger,..., P. Ferguson, "ManitobaSat-1: A Novel Approach for Technology Advancement," in *the Journal of IEEE Potentials, 2020*, pdf
- **A. Yahyaabadi**, M. Driedger,..., P. Ferguson, "ManitobaSat-1: Making Space for Innovation," in *IEEE Canadian Conference of Electrical and Computer Engineering (CCECE)*, Edmonton, Canada, 2019 pdf
- **A. Yahyaabadi**, P. Ferguson, "An intelligent multi-vehicle drone testbed for space systems and remote sensing verification," in *Canadian Aeronautics and Space Institute (CASI) ASTRO*, Montreal, Canada, 2019 pdf
- **A. Yahyaabadi**, P. Harrison, P. Ferguson, "Auto Code Generation for Onboard Space Object Detection and Other Flight Software Applications - A Feasibility Study," in *Canadian Aeronautics and Space Institute (CASI) ASTRO*, Montreal, Canada, 2019 pdf

Attended Conferences

- **Canadian Aeronautics and Space Institute (CASI) ASTRO** Montreal, Canada, 2019
  Submitted two papers and presented them:
  - "An intelligent multi-vehicle drone testbed for space systems and remote sensing verification" pdf
  - "Auto Code Generation for Onboard Space Object Detection and Flight Software Applications" pdf
- **ArcticNet (ASM) 2018** Ottawa, Canada, 2018
  Presented my work by the poster and oral presentation:
  - "A multi-vehicle drone testbed for space systems and remote sensing verification" Proceedings P. 198

Additional Experience

- **The Main Member of the Drone Testbed Lab at the University of Manitoba** 2018 - 2021
  - Developed "an intelligent multi-vehicle drone testbed for space systems and remote sensing verification"
  - Assisted other teams to use the testbed in different research areas such as:
    - Using hand gestures for controlling drone movements
    - Using artificial neural networks as the controller for the drones
- **Summer Internship in Bama Co** Summer 2014/2016
  - Condition monitoring and predictive maintenance planning of machinery and vehicles in Bama Co
- **Jury Membership at Isfahan Mathhouse** 2013 - 2018
  - Member of the Jury in Isfahan Mathhouse for choosing qualified participants for International Competitions (e.g., Alympiad)
  - Alympiad competition participants test grader in Isfahan Mathhouse
- **Teaching Assistant at the Isfahan University of Technology** Fall 2016
  - Statics, instructor: Dr. S. Akbarzadeh

GRE

- Quantitative: 170/170
- Verbal: 151/170
- Analytical Writing: 3.5

Selected Courses

- Applied Computational Intelligence: 4.5/4.5
- Selected Topics in Robot Technology: 4.5/4.5
- Mechatronics: 20/20
- Robotics: 19.5/20
- Neural Networks: 20/20
- Intelligent Control: 18/20
- Applied Vibrations: 19.6/20
- Acoustics: 19.5/20
- Machinery Dynamics: 19.3/20
- Vehicle Dynamics: 18.3/20
- Mechatronics Lab 1 and 2 : 18.25/20 and 19/20
- Applied Electrical/Electronics: 19.03/20
- Dynamics: 18.5/20
- Computer-aided design: 18.1/20
- Engineering Mathematics: 20/20
- Differential Equations: 20/20
- General Mathematics: 20/20
- Advanced Dynamics (Audited)
- Parallel Processing (Audited)

References

- **Dr. Nils Smit-Anseeuw**, Principal Controls Engineer — Sanctuary AI, Canada
  nils.smit-anseeuw@sanctuary.ai Page — University of Michigan Alumni, US
- **Dr. H. Khadivi**, Control Engineering Team Lead — Sanctuary AI, Canada
  hatef@sanctuary.ai Page — The University of British Columbia Alumni, Canada
- **Dr. P. Ferguson**, Associate Professor of Mechanical Eng, NSERC Research Chair, University of Manitoba, Canada
  philip.ferguson@umanitoba.ca Page Page — Massachusetts Institute of Technology (MIT) Alumni, US
- **Dr. S. Balakrishnan**, Professor of Mechanical Eng. — University of Manitoba, Canada
  subramaniam.balakrishnan@umanitoba.ca Page Page
- **Dr. S. Ziaie-Rad**, Professor of Mechanical Eng. — Isfahan University of Technology, Iran
  szrad@cc.iut.ac.ir Page Page — Imperial College London Alumni, UK
- **Dr. K. Ferens**, Assistant Professor of Electrical and Computer Eng. — University of Manitoba, Canada
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