Amin Yahyaabadi

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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 Interests

- Robotics:
  - UAVs
  - Legged Robots
  - Manipulators
- Control Systems:
  - Adaptive, Fuzzy, Model Predictive
- Machine Learning and Artificial Intelligence:
  - Artificial Neural Networks
  - Meta-heuristic Algorithms, Swarm Intelligence
  - System Identification
  - Differential Programming

Publications

A. Yahyaabadi, M. Driedger,..., P. Ferguson, "ManitobaSat-1: A Novel Approach for Technology Advancement," in *the Journal of IEEE Potentials, 2020*, Link

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 Link

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 Link

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 Link

Research Experience

An Intelligent Drone Testbed for Control Systems and Verication
I develop an accessible intelligent multi-vehicle drone testbed for validation of new satellite or drone control algorithms and hardware. System identification of drone's dynamics is done intelligently with minimal measuring using PSO/GA.
AI | PSO/GA | UAV | System Identification | Control | Pixhawk | Parrot | Matlab
Supervisor: Dr. P. Ferguson — **M.Sc.Thesis**

Intelligent vibration control with self-sensing piezoelectric actuator
I developed an intelligent control method for a distributed system using a self-sensing piezoelectric actuator. I modeled the dynamics of the system with a custom programmed FEA beside FDA to simulate the system and test the controller.
AI | PSO/GA | Smart Material | System Identification | Control | FEA | Matlab
Supervisor: Dr. S. Ziaei-Rad — **B.Sc.Thesis**

Auto Code Generation for Onboard Space Object Detection and Flight Software Applications
We 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 using a Matlab's syntax and special guidelines, and we compared the performance of generated hardware optimized C/C++ code to handwritten code.
Link
Machine Learning | Image Processing | Xilinx | Arm Cortex | Intel | Matlab | C++/C
Supervisor: Dr. P. Ferguson — **M.Sc. Project**

ManitobaSat Satellite's "Onboard Computer" and "Flight Software" Leader
We design a modular onboard computer (OBC) for ManitobaSat-1, which is a 3U sized CubeSat satellite to expose special geological samples to space environment. OBC uses new technologies such as a "system on a chip" (Soc) and MRAM. We develop a custom real-time flight software using FreeRTOS to control all the satellite's operations such as attitude and determination control. Link

Mechatronics | Control | Smart Fusion | Arm Cortex | RTOS | C++/C

Supervisor: Dr. P. Ferguson **M.Sc. Project**

Honors 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
Awarded Full Fellowship to Study at IUT for M.Sc Program without Entrance Exam, IUT, Iran 2017
Among top 10% students in 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 Netherlands 2012
Ranked 1st in Mathematics Alympiad National Round in Iran 2011

Notable Projects

Rhino XR-3 5 DOF Robot Arm Real-time Control and Simulation via Arduino and Matlab
Robotics | Control | C/C++ | Matlab | Arduino *Selected Topics in Robot Technology, Supervisor: Dr. S. Balakrishnan*

Barrett WAM 7 DOF Robot Arm Simulation and Analysis via Matlab
Robotics | Control | Matlab *Robotics, Supervisor: Dr. H. Mousavi*

Model Predictive Control of Robot Arm via 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, Mechatronic Systems, Sup: F. Sheikholeslam, M. Danesh*

Custom Simulated Annealing Investigation for Salesperson Problem - A New Mathematical Proof of Multidimensional Newton's Weights Optimization Algorithm
Machine Learning | AI | SA | Neural Networks | Matlab *Applied Computational Intelligence, Sup: K. Ferens*

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 & 2 : 18.25/20 & 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 (Auditing)

Software and Programming Skills

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

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" Link
- "Auto Code Generation for Onboard Space Object Detection and Other Flight Software Applications" Link

  – Presented my colleagues' works:

  - V. Parthasarathy, "A Virtual Ground Station for Automated Spacecraft Health Monitoring" Link
  - J. Campos, "Industry Project Management Tools for Nanosatellites Teams" Link
  - V. Platero, "Outreaching for the Stars with ManitobaSat-1" Link

ArcticNet (ASM) 2018 **Ottawa, Canada, 2018**

– Presented my work by poster and oral presentation:

- "A multi-vehicle drone testbed for space systems and remote sensing verification" Proceedings P. 198

Work Experience

The Main Member of Drone Testbed Lab at the University of Manitoba **Sep. 2018 - Current**

• Perusing my main research "An intelligent multi-vehicle drone testbed for space systems and remote sensing verification"

• Helping other teams use my 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 & vehicles in Bama Co

Special Membership in Isfahan Mathhouse **2013-2018**

• Being a 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

Voluntary Experience

Volunteering as an Open Source Programmer

• The leader of Atom-Community organization that brings an integrated development environment to Atom

• The author of Zadeh, which is a library for fast fuzzy filtering and matching written in C++

• The author of minijson, which is a library for the fast minification of the JSON files written in D, C, and AVX2 and SSE4_1 SIMD.

• The author of AcuteML, which is an intelligent markup language for web development written in Julia

• The leader of JuliaMatlab organization which is an open source alternative for Matlab written in Julia

• An owner of JuliaMusic organization which provides music research tools (e.g. MusicXML) in Julia

• Other projects that are available on Github

Music Performances in Morrow Gospel Church **Sep. 2018/Jan. 2019**

• Two Blues/Folk performances in Blues Nights events, Winnipeg, Canada

References

Dr. P. Ferguson, Associate Professor of Mechanical Eng. — University of Manitoba, Canada
philip.ferguson@umanitoba.ca Page Page — MIT Alumni, NSERC Research Chair

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

Dr. K. Ferens, Assistant Professor of Electrical and Computer Eng.
ken.ferens@umanitoba.ca Page Page — University of Manitoba, Canada