Amin Yahyaabadi

University of Manitoba, Winnipeg, Canada — Department of Mechanical Engineering

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Education

University of Manitoba — Winnipeg, Canada
M.Sc., Mechanical Engineering — *Sep 2018 - Current*

- 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

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

Publications

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

A. Yahyaabadi, M. Driedger,..., P. Ferguson, "ManitobaSat-1: Making Space for Innovation," in *the Journal of IEEE Potentials*, under peer review

A. Yahyaabadi, P. Harrison, P. Ferguson, "Auto Code Generation for Onboard Space Object Detection and Other Flight Software Applications - A Feasibility Study," to be submitted to *IEEE Transactions on Industrial Electronics*

Research Assistance Experiences

- **An intelligent multi-vehicle drone testbed for space systems and remote sensing verification**
  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. 2018-2020
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 Verbal: 151 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

Languages	Embedded Processors	Technical Software
Matlab	Xilinx Zynq 7020 - Zybo Z720 SoC/FPGA	Xilinx SDSoc - Vivado
Julia	Smart Fusion 2 SoC/FPGA	Abaqus
C++/C	Pixhawk Flight Contrller (Px4)	Simpack
Python	Parrot Mambo Flight Controller	MSC Adams
Simulink	Arm Cortex A9	MSC Adams Car
Labview	Arm Cortex M3	MSC Actran
Maple	Arduino Due/Uno	Autodesk Inventor
Verilog	AVR Atmel STK500	CATIA
Linux	Intel x64/x86	Proteus
LaTeX	PLC Programming	Modelsim

= Expert

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

– **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**

  • Owning Atom-Community organization that brings an integrated development environment to Atom

  • Owning AcuteML, which is an intelligent markup language for web development written in Julia

  • Owning JuliaMatlab organization which is an open source alternative for Matlab written in Julia

  • Owning 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