Zouhair Mahboubi

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Summary

Accomplished technical, business, and people's leader with proven expertise in:

- Optimization, Simulations, Estimation, Control Theory, Reinforcement Learning, and Data Visualization
- Autonomous Systems and Unmanned Air Vehicles (design, control, and flight-testing)
- Programming with Python, C/C++ , Julia, and Matlab/Simulink
- Product management, Business planning, and partnerships

Work Experience

7 Knots (Menlo Park, California) **June 2019 - Present**
Founder & Sr. Technical Consultant

- Assist clients across varying industries (small-satellites, drones, autonomous driving, and finance) with technical expertise (modeling, simulation, estimation, control, and optimization)

Sabbatical (Indian Ocean) **September 2018 - May 2019**
Marine Biology Volunteer & Sailor

- Volunteered for marine conservation foundation: Co-founded Citizen Science Visualization website
- Crewed on 60ft/42-ton sailboat: Diagnosed and fixed autopilot, cooling pump, and anchor winch

Kitty Hawk - Cora (Mountain View, California) **June 2016 - December 2018**
Head of Product

- Responsible for setting the product vision and technical requirements
- Advised Executive team on business plans and go-to-market strategies
- Setup operations in new country (export control compliance, equipment shipment, new business licenses, etc.)
- Interfaced and led negotiations with aviation regulatory agencies and key business partners
- Drafted application and secured *Certificate for Unmanned Aircraft Operator*

Kitty Hawk - Zee.Aero (Mountain View, California) **June 2010 - June 2016**
Aerospace Engineer & Team Lead

as Guidance Navigation & Controls Engineer (2012 - 2016)

- Developed and patented non-linear control allocation scheme for over-actuated electric VTOL aircraft
- Identified linearized model shortcomings and improved non-linear simulation
- Implemented MIMO stability margins and uncertainty analysis for robust stability and performance
- Designed fault detection and fail-over logic for backup INS system
- Participated in flight-test operations for full-scale vehicle at NASA facilities
- Setup, designed and conducted experiments for handling qualities evaluation in pilot simulation

as Software & Avionics team lead (2010 - 2012)

- Interviewed, hired, and managed founding software and avionics team
- Designed avionics architecture, autopilot software, and Ground Control Station for unmanned vehicle
- Designed and implemented flight state machine and health monitoring system
- Participated in windtunnel and flight test operations for small-scale vehicles

NASA Ames Research Center (Moffet field, California) **Sept. 2009 - May 2010**
Research Assistant

- Performed aerodynamics and stability analysis of a foot-launched hang-glider being converted to an electric UAV and contributed to the design of the avionics architecture (*Intelligent Systems Division*)
- Implemented weight, power, communication, and trajectory modules for rapid analysis and design of conceptual satellite missions (*Mission Design Center*)

Publications and Patents

- Z. Mahboubi and M. J. Kochenderfer, "Learning Traffic Patterns at Small Airports from Flight Tracks", in *Journal of Intelligent Transportation Systems*, April 2017.
- Z. Mahboubi and colleagues, "Online Optimization Based Flight Control System". *U.S. Patent Application 15297029*, filed October 2016.
- Z. Mahboubi and M. J. Kochenderfer, "Continuous Time Autonomous Air Traffic Control for Non-Towered Airports", in *IEEE Conference on Decision and Control*, December 2015.
- Z. Mahboubi and M. J. Kochenderfer, "Autonomous Air Traffic Control for Non-Towered Airports", in *Air Traffic Management Research and Development Seminar*, June 2015.
- Z. Mahboubi, Z. Kolter, T. Wang, G. Bower, and A. Y. Ng, "Camera Based Localization for Autonomous UAV Formation Flight", in *AIAA@ Infotech Conference*, 2011. [Best student paper award].
- Z. Mahboubi. Altitude Record for Self-Piloting Planes in the Under 5 Kilogram Weight Class. Presentation to Stanford University AIAA Chapter, 2009.

Education

Stanford University, California, USA
Ph.D. Aeronautics and Astronautics (CGPA: 4.00/4.00) **2012 - 2016**

Thesis: *Automated Air-Traffic Control for Non-Towered Airports*
· Modeled behavior of aircraft in the airport pattern as a hidden Markov Model (HMM)
· Used Bayesian Inference methods to learn HMM parameters from real-world radar observations
· Modeled collision advisories as partially observable semi-Markov decision process (POSMDP)
· Used Reinforcement Learning techniques to obtain optimal advisories

Awards
· Natural Sciences and Engineering Research Council of Canada Scholarship (awarded but declined)
· Fonds de Recherche du Québec, Nature et Technologies Scholarship (awarded but declined)

M.Sc. Aeronautics and Astronautics (CGPA: 4.00/4.00) **2008 - 2010**

Projects
· Improved the reliability and maturity of autonomous UAVs
· Demonstrated capability by setting world altitude record for 'autonomous electrical UAV under 5kg'
· Collaborated on camera-based localization for autonomous UAVs flying in formation flight

Awards
· Nicholas J. Hoff Award for Outstanding Master's Degree Student
· AIAA Infotech@Aerospace 2010 Best Student Technical Paper
· Aero/Astro Departmental Fellowship
· NSERC CGS M and FQRNT A8 scholarships for Master studies in Aeronautics

McGill University, Montreal, Canada
B.Eng Mechanical Engineering with Minor in Computer Science (CGPA: 3.99/4.00) **2004 - 2008**

Honours Thesis Topic
Viscous Drag Minimization via Control Theory at Low Mach Numbers

Awards
· British Association Medal & Dean's Honour list
· J.W. McConnell Award and Scholarships (for top 5% in faculty, held for 4 years)
· Antje Graupe Pryor International Award
· DAAD Undergraduate Exchange Award & Meq Exchange Bursary

Technische Universitat Muenchen, Munich, Germany
Study Abroad **2006 - 2007**

Research Assistant
· Implemented a proof of concept simulation for an assembly scenario
· Used Haptic devices for feedback, stereo-graphics for visualization, and a Kuka robotic arm

Additional Information

- Private Pilot License
- Languages: fluent in English, French, and Arabic. Conversational German
- Volunteering: Marine Mega Fauna Foundation (2018), Stanford Young Astronauts Program (2009 - 2016), Stanford Educational Studies Program (2011 - 2014), Literacy Project in Uganda (Summer 2008)
- Hobbies: Sailing and Scuba Diving