

# ZOUHAIR MAHBOUBI

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## SKILLS

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- Experience with Unmanned Air Systems design, control, and flight-testing
- Excellent academic knowledge and practical experience of Simulations, Optimization, Estimation, Control Theory, Markov Decision Processes, and Reinforcement Learning
- Excellent programming knowledge with C, C++, Matlab, Julia, and Python
- Product management, project management, and business development experience

## WORK EXPERIENCE

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### **Kitty Hawk (Mountain View, California)**

**June 2016 - Dec 2018**

#### ***Head of Product - Technical***

- Responsible for setting the vision and product requirements
- Work with Executive team on business plan modeling and go-to-market strategy
- Interface and negotiate with regulatory agencies and key business partners
- Setup operations in new country (export control compliance, equipment shipment, new business licenses, etc.)
- Drafted and secured Unmanned Aircraft Operator Certificate

### **Zee.Aero (Mountain View, California)**

**June 2010 - 2016**

#### ***Aerospace Engineer & Team Lead***

as Guidance Navigation & Controls Engineer (2012 - 2016)

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

as Software & Avionics team lead (2010 - 2012)

- Interviewed, hired, and managed founding software and avionics team
- Designed avionics architecture and autopilot software for an unmanned vehicle
- Designed and implemented flight state machine and health monitoring system
- Architected Ground Control Station software
- Participated in 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 conceptual satellite design (Mission Design Center)

### **Technische Universitat Muenchen (Munich, Germany)**

**June 2006 - Sept. 2006**

#### ***Research Assistant***

- Wrote a .NET wrapper for existing C++ Haptic APIs
- Implemented a proof of concept simulation for an assembly scenario using Haptic devices for feedback, stereo-graphics for visualization, and a robotic arm (Kuka)

## EDUCATION

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**Stanford University**, California, USA

**Ph.D.: Aeronautics and Astronautics**

**2012 - 2016**

CGPA: 4.00/4.00

**Thesis:** *Automated Air-Traffic Control for Non-Towered Airports*

- Modeled behavior of aircraft in the airport pattern as a hidden Markov Model (HMM)
- Learned model parameters from real-world radar observations
- Solved for optimal advisories using partially observable semi-Markov decision process (POSMDP)

### **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)

**Masters of Science: Aeronautics and Astronautics**

**2008 - 2010**

CGPA: 4.00/4.00

### **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

**Bachelors of Engineering: Mechanical Engineering Honours**

**2004 - 2008**

Minor in Computer Science

CGPA: 3.99/4.00

### **Honours Thesis Topic**

*Viscous Drag Minimization via Control Theory at Low Mach Numbers*

### **Awards**

- British Association Medal & Deans 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

## PUBLICATIONS

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- 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 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.
- Z. Mahboubi, S. Clarke, ".NET API Wrapping for Existing C++ Haptic APIs", in *IEEE International Workshop on Haptic Audio Visual Environments and their Applications*, 2006.

## ADDITIONAL INFORMATION

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- Licensed private pilot
- Languages: fluent in English and French, conversational German
- Volunteering: Stanford Young Astronauts Program (2009 - 2016), Stanford Educational Studies Program (2011 - 2014), Literacy Project in Uganda (Summer 2008)
- Activities: sailing, horseriding, snowboarding, open-water swimming, and scuba diving