Boyang LI

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EDUCATION

Ph. D. in Mechanical Engineering *Anticipated Oct. 2018*
Thesis Title: *Design, Modelling and Control of a Tail-Sitter Unmanned Aerial Vehicle*
Supervisor: Prof. Chih-yung Wen
The Hong Kong Polytechnic University, Kowloon, Hong Kong SAR

Master of Engineering in Flight Vehicle Design, School of Aeronautics *Apr. 2015*
Thesis Title: *Experimental System and High-Lift Mechanism for 3-DOF Flapping Wings*
Supervisor: Prof. Bifeng Song
Northwestern Polytechnical University, Xi'an, China

Bachelor of Engineering in Flight Vehicle Design, Honors College *Jun. 2012*
Northwestern Polytechnical University, Xi'an, China

RESEARCH EXPERIENCE

1. **Design, Modeling and Control of a VTOL Tail-sitter UAV** *July, 2015 - Present*

- Designed and built a quad-rotor vertical takeoff and landing (VTOL) tail-sitter UAV
- Developed the nonlinear dynamic model for the UAV based on wind tunnel experiments
- Developed the Model Predictive Controller (MPC) to improve the disturbance rejection capability
- Imported the MPC controller into embedded onboard flight computer running in ROS package
- Introduced an optimal hover-level flight transition control method with improved performance
- Carried out indoor flight tests in VICON and outdoor flight tests to verify and optimize the controller

2. Search and Rescue UAV System (First Prize Awarded) *Jan. 2016- Apr. 2016*

- Built a high efficiency fixed-wing UAV system equipped with image acquisition equipment
- Developed onboard and post image processing program to identify ground targets with OpenCV-Python
- Developed two-UAV communication relay system to ensure the long-distance telemetry quality

3. **Experimental Study about High Efficiency Flapping Wings** *Mar. 2012- Jun. 2015*

- Designed and built a flapping wing experimental mechanism with 3 degrees-of-freedom (DOF)
- Developed software for measure and control of the flapping wing with LabVIEW and ATI transducer
- Carried out force/torque measurement experiments in the wind tunnel and water tank

4. **Dancing Robot for China Robot Competition** (First Prize Awarded) *Jun. 2010- Sep. 2011*

- Built a deformable robot with 24 degrees-of-freedom (transforms from a hand to a dog shape)
- Designed the PCB with ATmega 128 MCU to control the movement of 24 servo-motors

PUBLICATIONS (Google Scholar)

- **Li, B.;** Sun, J.; Zhou, W.; Wen, C.Y. and Chen, C.K. " *Model Predictive Position Control for a Tail-sitter UAV Against Disturbance in Hover Flight*", IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS), Spain, 2018, Submitted
- **Li, B.;** Zhou, W.; Sun, J.; Wen, C.Y. and Chen, C.K. "*Model Predictive Control for Path Tracking of a VTOL Tailsitter UAV in an HIL Simulation Environment*", AIAA Modeling and Simulation Technologies Conference, USA, 2018
- Sun, J; **Li, B**; Shen L; Wen, C.Y. *"Dynamic Modeling and Hardware-in-Loop Simulation for a Tail-Sitter Unmanned Aerial Vehicle in Hovering Flight"*. AIAA Modeling and Simulation Technologies Conference. USA, 2017.
- **Li, B.;** Sun, J.; Wen C.Y. "*Development and Testing of a Two-UAV Communication Relay System.*" Sensors (Basel) 16(10). 2016
- Sun, J.; **Li, B**.; Jiang, Y.; Wen, C.Y. *"A Camera-Based Target Detection and Positioning UAV System for Search and Rescue (SAR) Purposes".* Sensors (Basel) 16. 2016.
- **Li, B.;** Song, B.; Wang, L. "*A Three-dimensional Flapping Wing Mechanism for Wind Tunnel Experiments".* 29th Congress of the International Council of the Aeronautical Sciences (ICAS). 2014

INTERN

DJI Innovation Shenzhen, China
Department of Propulsion System *July. 2014- Sep. 2014*

- Designed, built and tested a new configuration of Hybrid Quadrotor VTOL UAV
- Developed vibration measurement experimental platform for the propulsion system

HONORS & AWARDS

- Talent Development Scholarship, the Hong Kong SAR Government, 2017
- Second Prize, Search and Rescue Group, Taiwan UAV Competition, 2017
- First Prize, Search and Rescue Group, Taiwan UAV Competition, 2016
- First Prize, Innovation Group, Taiwan UAV Competition, 2016
- Second Prize, Walking Robot Competition, China Robot Competition, 2011
- First Prize, Dancing Robot Competition, China Robot Competition, 2010

SKILLS

- Pilot for RC fixed-wing/multi-rotor/helicopter UAV
- Matlab/Simulink, C++, LabView, Python, ROS

RECORDS OF STANDARD TESTS

GRE: 320 (V: 153, Q: 167, AW: 3.5) *July. 2013*
TOEFL: 105 (R: 29, L: 28, S: 22, W: 26) *Nov. 2013*