

Tairan Liu

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Baton Rouge, LA • U.S.A.

Education

Louisiana State University

Ph.D. Candidate

Control System and Engineering, Department of Mechanical and Industrial Engineering

BATON ROUGE, LA, U.S.A.

Expected December 2019

University of Science and Technology of China

Bachelor of Natural Science

Theoretical and Applied Mechanics, Department of Modern Mechanics

HEFEI, ANHUI, P.R.CHINA

July 2012

Professional Experience

Louisiana State University

Research Assistant

• Aerial Robotic Network for Agricultural Applications

BATON ROUGE, LA, U.S.A.

July 2016 – Present

Research Assistant

• Computational Molecule Synthesis

October 2015 – May 2016

Teaching Assistant

• Machine Design Lab
• Autonomous Vehicles

August 2014 – May 2016

University of Science and Technology of China

Research Assistant

• UUV Electronic System, Remote Control, and Data Transmission

HEFEI, ANHUI, P.R.CHINA

July 2012 – January 2013

Undergraduate Research Assistant

• Bionic UUV Design, Test, and Data Processing

March 2011 – July 2012

Research Interests

- Multi-Agent System
 - Lyapunov-Based Nonlinear Control
 - Robotics
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Graduate Level Courses

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|---|---|
| • Advanced Mechanical Systems Control | • Advanced Engineering System Dynamics |
| • Introduction to Modern Control Theory | • Sensors and Actuators |
| • Advanced Linear Systems | • Numerical Methods in Applied Mechanics |
| • Advanced Topics in Control | • Advanced Vibrations |
| • Industrial Robotics | • Intelligent Control and Applications in Power Systems |
| • Topics in Modern System Science | |
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Research Experience

Louisiana State University

BATON ROUGE, LA, U.S.A.

Aerial Robotic Network for Agricultural Applications

July 2016 – Present

Designed and built quadrotor fleet from scratch. Developed autonomous flight control firmware and flight control/monitor applications on PC. Developed distributed control network for quadrotors.

Multi-Agent System Formation Control

July 2016 – Present

Developed new formation control methods, provided mathematical proofs, conducted simulational and experimental validation.

Computational Molecule Synthesis

October 2015 – March 2016

Developed open-source software which can decompose large molecules to small bio-active fragments, then use fragments to generate target molecules or new molecules for drug design.

Multirotor Copter Applications in Agriculture

February 2015 – June 2015

Developed an application to process aerial images. Optimized the software for better processing speed.

University of Science and Technology of China

HEFEI, ANHUI, P.R.CHINA

Bionic Four-Tail Fin UUV (Mimic Dragonfly)

August 2011 – January 2013

Developed program on MCU for motor control, developed remote control and wireless data transfer programs on PC and MCU for the bionic UUV with four oscillatory tail fins. The tail fins were designed to mimic the motion pattern of a dragonfly.

Bionic Long Undulatory Fin UUV (Mimic Black Ghost Knifefish)

November 2011 – June 2012

Designed and built a UUV to mimic the propulsion pattern of black ghost knifefish. Developed program on Arduino for the UUV. Studied the effects of the frequency and amplitude of the swaying fin ray, wave number in the fin surface, and the speed of the incoming flow on propulsion thrust.

Bionic Double-Tail Fin UUV

November 2011 – June 2012

Conducted experiments to optimize the performance of the double tail fin UUV. Developed a whole system to automatically conduct experiment, collect and process data, and plot results.

Flow Trajectory After Passing Dual Circular Cylinder

October 2011 – November 2011

Designed and built an adjustable dual circular cylinder model for the fluid experiment. Conducted experiments with hydrogen bubbles, laser beam, and high resolution high speed camera to study the water flow trajectory after passing dual circular cylinder.

Composite Bionic Actuators

April 2011 – August 2011

Assisted with motion pattern design. Developed programs on Arduino for the actuators.

Other Experience

University of Science and Technology of China

HEFEI, ANHUI, P.R.CHINA

Translation of CFD Code

October 2012 – January 2013

Translated CFD code (Lattice Boltzmann Method and Immersed Boundary Method) in Fortran to C/C++.

Robo-Game Competition of USTC (2010)

June 2010 – October 2010

Participated in prototyping and building of autonomous and manned robots, and developed program on MCU for the autonomous robot.

Publications

Refereed Journal Articles

4. **Tairan Liu**, Marcio de Queiroz, Pengpeng Zhang, and Milad Khaledyan. Further results on the distance and area control of planar formations. *International Journal of Control*. accepted
3. Pengpeng Zhang, Marcio de Queiroz, Milad Khaledyan, and **Tairan Liu**. Control of directed formations using interconnected systems stability. *Journal of Dynamic Systems, Measurement, and Control*, 141(4):041003, 2019
2. Limeng Pu, Misagh Naderi, **Tairan Liu**, Hsiao-Chun Wu, Supratik Mukhopadhyay, and Michal Brylinski. etoxpred: a machine learning-based approach to estimate the toxicity of drug candidates. *BMC Pharmacology and Toxicology*, 20(1):2, 2019
1. **Tairan Liu**, Misagh Naderi, Chris Alvin, Supratik Mukhopadhyay, and Michal Brylinski. Break down in order to build up: Decomposing small molecules for fragment-based drug design with emolfrag. *Journal of Chemical Information and Modeling*, 57(4):627–631, 2017

Manuscripts in Submission

2. **Tairan Liu** and Marcio de Queiroz. Distance + angle-based control of 2d rigid formations. *Journal of Dynamic Systems, Measurement, and Control*. submitted
1. Milad Khaledyan, **Tairan Liu**, and Marcio de Queiroz. Flocking and target interception control for formations of nonholonomic kinematic agents. *IEEE Transactions on Control Systems and Technology*. under review

Manuscripts in Preparation

2. **Tairan Liu** and Marcio de Queiroz. Directed Formation Control with Orthogonal Basis in 2D and 3D space. in preparation
1. **Tairan Liu** and Marcio de Queiroz. Directed Formation Control with Distance + Area/Angle Constraints Using Multiple Lyapunov Functions. in preparation

Conference Proceedings

1. **Tairan Liu**, Marcio de Queiroz, Pengpeng Zhang, and Milad Khaledyan. Directed formation control of n planar agents with distance and area constraints. In *2019 Annual American Control Conference (ACC)*, Philadelphia, PA, Jul 2019. to appear

Conference Poster

1. **Tairan Liu**, Misagh Naderi, Supratik Mukhopadhyay, and Michal Brylinski. Decomposing small molecules for fragment-based drug design with emolfrag. In *SCALA 2018 - Scientific Computing Around Louisiana*, LSU, Baton Rouge, LA, Feb 2018

Professional Activities

Membership

Institute of Electrical and Electronics Engineers (IEEE), Student Member since 2017.

Skills

Hardware: Arduino, Raspberry Pi, STM32 FC, NodeMCU, XBee, etc.

Software: XCTU, QT Creator, Microsoft Office, TeXstudio, Inkscape, AutoCAD, Arduino IDE, etc.

Programming Languages: Python, MATLAB/Simulink, C, C++ (associated with GUI design with QT) .

Natural Languages: Chinese (mother tongue) and English.

Others: HPC (Philip@LSU, SuperMike-II@LSU, QB2@LONI), LaTeX.
