Tairan Liu

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Baton Rouge, LA • U.S.A.

Education

Louisiana State University   BATON ROUGE, LA, U.S.A.
Ph.D. Candidate   *Expected December 2019*
     Control System and Engineering, Department of Mechanical and Industrial Engineering

University of Science and Technology of China   HEFEI, ANHUI, P.R.CHINA
Bachelor of Natural Science   *July 2012*
     Theoretical and Applied Mechanics, Department of Modern Mechanics

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Professional Experience

Louisiana State University   BATON ROUGE, LA, U.S.A.
Research Assistant   *July 2016 – Present*
     • Aerial Robotic Network for Agricultural Applications

Research Assistant   *October 2015 – May 2016*
     • Computational Molecule Synthesis

Teaching Assistant   *August 2014 – May 2016*
     • Machine Design Lab
     • Autonomous Vehicles

University of Science and Technology of China   HEFEI, ANHUI, P.R.CHINA
Research Assistant   *July 2012 – January 2013*
     • UUV Electronic System, Remote Control, and Data Transmission

Undergraduate Research Assistant   *March 2011 – July 2012*
     • Bionic UUV Design, Test, and Data Processing

Research Interests

- Multi-Agent System
- Lyapunov-Based Nonlinear Control
- Robotics

Graduate Level Courses

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

Research Experience

Louisiana State University   BATON ROUGE, LA, U.S.A.
Aerial Robotic Network for Agricultural Applications   *July 2016 – Present*
     Designed quadrotor fleet from scratch. Developed flight control firmware and flight control/monitor applications on PC.

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 random molecules for drug design.

Multirotor Copter Applications in Agriculture *Februrary 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

Four-Tail Fin UUV *August 2011 – January 2013*
Designed circuit, developed program on MCU for motor control, developed remote control and wireless data transfer programs on PC and MCU for a bionic UUV with four oscillatory tail fins. The tail fins were designed to mimic the motion pattern of a dragonfly.

Black Ghost Knife Fish UUV *November 2011 – June 2012*
Designed a UUV to mimic the propulsion method of the black ghost knifefish. Also designed the circuit, and developed program on Arduino for the UUV. Studied the relation between thrust and the frequency of the swaying fin ray, the relation between thrust and the amplitude of the swaying fin ray, the relation between thrust and the wave number in the fin surface, and the relation between thrust and the speed of the incoming flow.

Double-Tail Fin UUV *November 2011 – June 2012*
Conducted experiments to optimize the performance of a double tail fin UUV. Developed a whole system to automatically conduct experiment, collect and process data, and plot results.

Flow Around Circular Cylinders *October 2011 – November 2011*
Designed 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 two circular cylinders.

New Bionic Actuator *April 2011 – August 2011*
Designed a circuit for the bionic actuator, and developed program on Arduino for the actuator.

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 of autonomous and manned robots, and developed program on MCU for the autonomous robot.

Publications

Refereed Journal Articles

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

3. **Tairan Liu** and Marcio de Queiroz. Distance + angle-based control of 2d rigid formations. *Journal of Dynamic Systems, Measurement, and Control*. submitted

2. **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*. 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, February 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 Creater, Microsoft Office, TeXstudio, Inkscape, AutoCAD, 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.