Tairan Liu

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Athens, Georgia, USA

EDUCATION

Louisiana State University, Baton Rouge, Louisiana, USA. May 2020
Doctor of Philosophy, Mechanical Engineering GPA: 4.0
University of Science and Technology of China, Hefei, Anhui, P.R.China July 2012
Bachelor of Natural Science, Theoretical and Applied Mechanics

EXPERIENCE

University of Georgia, Athens, Georgia, USA

- **Coverage Control with Heterogeneous Robots** 09/2020–Present
  - Developed novel distributed algorithms.
- **Aerial Robotic Network in Agricultural Measurements and Operations** 09/2020-Present
  - Designed and built quadrotors with telescopic arm for agricultural measurements and operations.

Louisiana State University, Baton Rouge, LA, USA.

- **Formation Control with Multi-Agent Systems** 07/2016-05/2020
  - Developed new formation control methods, provided mathematical proofs.
  - Conducted computational and experimental validation.
- **Aerial Robotic Network for Agriculture Applications** 07/2016-10/2019
  - Designed and built a quadrotor fleet from scratch.
  - Developed autonomous flight control firmware and flight control/monitor applications on PC.
  - Developed distributed control network for quadrotors.
- **Computational Molecule Synthesis** 10/2015-05/2016
  - 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 in Agriculture** 02/2015–06/2015
  - Developed an application to process aerial images.
  - Optimized the software for better processing speed.

University of Science and Technology of China (USTC), Hefei, Anhui, P.R.China

- **Bionic Four-Tail Fin UUV (Mimic Dragonfly)** 08/2011–01/2013
  - Developed program on MCU for motor control.
  - Developed remote control and wireless data transfer programs on PC and MCU for the bionic UUV.
- **Bionic Long Undulatory Fin UUV (Mimic Black Ghost Knifefish)** 11/2011–06/2012
  - 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** 09/2011–05/2011
  - 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** 10/2011–11/2011
  - 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** 04/2011–08/2011
  - Assisted with motion pattern design.
  - Developed programs on Arduino for the actuators.
- **Robo-Game Competition of USTC (2010)** 06/2010–10/2010
  - Participated in prototyping and building of autonomous and manned robots.
  - Developed program on MCU for the autonomous robot.

SKILLS

Hardware:	Arduino, Raspberry Pi, STM32 FC, NodeMCU, XBee, etc.
Software:	XCTU, QT Creator, TeXstudio, Inkscape, AutoCAD, FreeCAD, Blender, Arduino IDE, etc.
Programming Languages:	Python, MATLAB/Simulink, C, C++ *(GUI design with QT)*.
Natural Languages:	English, Chinese
Others:	HPC *(Philip@LSU, SuperMike-II@LSU, QB2@LONI)*, LaTeX.

PUBLICATIONS/CONFERENCES

Tairan Liu, Davoodi Mohammadreza, and Javad Mohammadpour Velni. Deployment of heterogeneous multi-agent systems with varying mass over a graph. In *2021 IEEE Conference on Control Technology and Applications (CCTA)*. In submission

Tairan Liu and Marcio de Queiroz. An orthogonal basis approach to formation shape control. *Automatica*. Accepted

Tairan Liu, Marcio de Queiroz, and Farid Sahebsara. Distance-based planar formation control using orthogonal variables. In *2020 IEEE Conference on Control Technology and Applications (CCTA)*, pages 64–69, Montréal, Canada, Aug. 2020

Tairan Liu. Start from distance-based formation control. University of Georgia, Athens, GA, May 2020

Tairan Liu. Directed formation control of planar agents with distance and area constraints. In *2019 MIE Graduate Student Conference*, LSU, Baton Rouge, LA, Apr. 2019

Tairan Liu. *Distance-Based Formation Control: Theory, Applications, and Issues*. PhD dissertation, Louisiana State University, May 2020

Tairan Liu and Marcio de Queiroz. Distance + angle-based control of 2-d rigid formations. *IEEE Transactions on Cybernetics*. In press

Tairan Liu, Victor Fernandez-Kim, and Marcio de Queiroz. Switching formation shape control with distance + area/angle feedback. *Systems & Control Letters*, Jan. 2020. Article 104598

Milad Khaledyan, **Tairan Liu**, Victor Fernandez-Kim, and Marcio de Queiroz. Flocking and target interception control for formations of nonholonomic kinematic agents. *IEEE Transactions on Control Systems Technology*, 28(4):1603–1610, 2020

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*. In press

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

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

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)*, pages 1824–1829, Philadelphia, PA, Jul. 2019

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

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

AWARDS/HONORS

Outstanding Research Assistant, Department of Mechanical and Industrial Engineering, Louisiana State University, Baton Rouge, LA, USA. 2019.

LSU-ME Enrichment Award, Department of Mechanical and Industrial Engineering, Louisiana State University, Baton Rouge, LA, USA. 2014.