

Qi Lu | Curriculum Vitae

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I am a fixed-term-track assistant professor at the University of Texas at San Antonio. The focus of my research is designing efficient and scalable foraging robot swarms.

Education

- **University of New Mexico (UNM), Albuquerque, NM, USA**
 - *Computer Science, Ph.D.* *July 2019*
Dissertation: An Efficient Multiple-Placed Foraging Algorithm for Scalable Swarms
Advisor: Melanie E. Moses; Committee: Carlo Pinciroli (WPI), Stephanie Forrest (ASU), Joshua P. Hecker (Lockheed Martin)
 - **Aalborg University, Aalborg, Nordjylland, Denmark**
 - *Computer Science, M.S., Advisor: Dr. Uli Fahrenberg* *May 2011*
Thesis: Model Checking for Real-Time Embedded Systems
 - **Guangdong University of Technology, Guangzhou, Guangdong, China**
 - *Computer Engineering, M.E., Advisor: Weimin Wu* *November 2010*
Thesis: The Analysis of NTFS File System Using Reverse Engineering
 - **Hubei University, Wuhan, Hubei, China**
 - *Computer Science and Engineering, B.S.* *June 2005*

Work Experience

- **University of Texas - San Antonio**
 - *Assistant Professor of Practice, Computer Science* *January 2020 – Present*
 - Teaching *Data Science* and *Mathematical Foundation of CS* courses.
 - Research in swarm robotics, bio-inspired robotics, and autonomous robots.
 - Grant writing, advising, faculty governance, and community service.
 - **Northern New Mexico College, Española, NM**
 - *Visiting Professor, College of Engineering and Technology* *August 2019 – January 2020*
 - Taught *Computer Networks* and *Java Programming*
 - Research, advising, and community service
 - **Dept. of Computer Science at UNM**
 - *Research Assistant* *May 2015 – July 2019*
 - Research in swarm robotics, multi-agent systems, and bio-inspired robotics.
 - Mentored undergraduate and graduate students in research
 - **Dept. of Neurology at UNM**
 - *Project Assistant* *February 2015 – August 2015*
 - Compiled, tested, and debugged a C++ software for acquisition and analysis of functional MRI data
 - Programmed in Siemens's pulse sequence development environment.

- **Dept. of Electrical & Computer Engineering at UNM**
Research Assistant *January 2014 – December 2014*
 - Research in 3D pavement surface reconstruction
 - and cracking recognition
- **Dept. of Computer Science at UNM**
Teaching Assistant *August 2013 – May 2014*
 - Grading and tutoring in *Intro. to Machine Learning*
 - and *Foundation of Functional Programming* courses
- **Dept. of Computer Science at UNM**
Research Assistant *August 2011 – December 2013*
 - Research in software verification and formal method
- **BDNA Software Technology Corporation, Guangzhou, China**
Software Engineer *March 2007 – August 2007*
 - Developed Java programs for acquiring software installation information on Windows computers
- **Wuhan Police Vocation College, Wuhan, China**
Lecturer *August 2005 – December 2006*
 - Taught *Computer Architecture, Java programming*
 - and *Data Structure and Algorithms*

Publications

Bio-Inspired Swarm Robotics & Multi-Agent Systems.....

1. Dohee Lee, **Qi Lu**, and Tsz-Chiu Au. Multiple-Place Swarm Foraging with Dynamic Robot Chains. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2021)*, October 2020 (under review).
2. **Qi Lu**, G. Matthew Fricke, John Ericksen, and Melanie Moses. Swarm Foraging Review: Closing the Gap Between Proof and Practice. *Current Robotics Reports*, Springer, June 2020 [PDF].
3. **Qi Lu**, G. Matthew Fricke, Takaya Tsuno, and Melanie Moses. A Bio-Inspired Transportation Network for Scalable Swarm Foraging. *IEEE International Conference on Robotics and Automation (ICRA)*, May 2020 [PDF].
4. **Qi Lu**, Antonio D. Griego, G. Matthew Fricke, and Melanie E. Moses. Comparing Physical and Simulated Performance of a Deterministic and a Bio-inspired Stochastic Foraging Strategy for Robot Swarms. *IEEE International Conference on Robotics and Automation (ICRA)*, Montreal, Canada, 2019. [PDF]
5. **Qi Lu**, Joshua P. Hecker, and Melanie E. Moses. Multiple-Place Swarm Foraging with Dynamic Depots. *The Journal of Autonomous Robots*, 2018. [PDF]
6. **Qi Lu**, Joshua P. Hecker, and Melanie E. Moses. The MPFA: A Multiple-Place Foraging Algorithm for Biologically-Inspired Robot Swarms. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016)*, Daejeon, Korea. October 2016. [PDF]
7. **Qi Lu**, Melanie E. Moses, and Joshua P. Hecker. A Scalable and Adaptive Multiple-Place Foraging Algorithm for Ant-Inspired Robot Swarms. *2016 Robotics: Science and Systems Conference (RSS 2016) workshop*, University of Michigan, USA. June 2016. [PDF]

Image Processing & 3D Surface Reconstruction.....

1. Yuming Zhang, Cong Chen, Qiong Wu, **Qi Lu**, Su Zhang, Guohui Zhang, and Yin Yang. A Kinect-Based Approach for 3D Pavement Surface Reconstruction and Cracking Recognition, *IEEE*

Transactions on Intelligent Transportation Systems, 2018. [PDF]

Software Verification & Model Checking.....

1. Deepak Kapur, Zhihai Zhang, Matthias Horbach, Hengjun Zhao, **Qi Lu**, and ThanhVu Nguyen. Geometric Quantifier Elimination Heuristics for Automatically Generating Octagonal and Max-plus Invariants. *Automated Reasoning and Mathematics: Essays in Memory of William McCune*, LNAI 7788, 189-228. April. 2013 (Book chapter). [PDF]
2. **Qi Lu**, Michael Madsen, Martin Milata, Søren Ravn, and Uli Fahrenberg. Reachability Analysis for Timed Automata using Max-Plus Algebra. *The Journal of Logic and Algebraic Programming*, Amsterdam, The Netherlands. December 2011. [PDF]
3. Jesper Dyrhberg, **Qi Lu**, Michael Madsen, Søren Ravn, and Uli Fahrenberg. Computations on Zones using Max-Plus Algebra. *The 22nd Nordic Workshop on Programming Theory (NWPT2010)*, Turku, Finland. November 2010. [PDF]

File Systems and Evolutionary Programming.....

1. Weimin Wu, **Qi Lu**, Zhenhua Wang, Qing Su. Dynamic analysis of B^+ Tree Structure of Index in NTFS Directory. *The Journal of Computer Engineering and Design*, Beijing, China, 2010.
2. Jun Yang, **Qi Lu**. An Improved Evolutionary Programming Algorithm and Its Application. *The Journal of Modern Computer*, Guangzhou, China. May. 2009.
3. Zhenhua Wang, Baocai Chen, **Qi Lu**. Research and Implementation of Object Code Static Disassembly. *The Journal of Modern Computer*, Guangzhou, China. March. 2010

Mathematics Education.....

1. Younhee Lee, **Qi Lu**, and Woong Lim. An Application of Mathematics to Computer Programming: Connecting Translation Vectors, the Minkowski Difference, and Collision Detection, *The Mathematics Teacher*, 112(2):150-154, 2018. [PDF]

Recent Presentations

- A Scalable and Efficient Multiple Places Swarm Foraging. *Department of Computer Science and Engineering at University of Texas Arlington*, May 4th, 2020 (Virtual).
- A Scalable and Efficient Multiple Places Swarm Foraging. *Department of Computer Science at University of Dayton*, Dayton, Ohio, Feb 17th, 2020.
- Lists in C++ Programming. *Department of Computer Science at University of Texas San Antonio*, San Antonio, Texas, January 10th, 2020.
- A Bio-Inspired Transportation Network for Scalable Swarm Foraging. *IEEE Intl. Sym. on Multi-Robot & Multi-Agent Systems (MRS)*, Rutgers University, NJ, August 22-23, 2019.
- Comparing Physical Performance of a Deterministic and a Stochastic Foraging Strategy for Swarms. *IEEE Intl. Conf. on Robotics and Automation (ICRA)*, Montreal, Canada, May 2019.
- Comparing Foraging Strategies for Robot Swarms. *15th Annual Computer Science Student Conference*, Albuquerque, New Mexico, March 2019.
- Deterministic and Bio-inspired Stochastic Foraging Strategies for Robot Swarms. *14th Annual Computer Science Student Conference*, Albuquerque, New Mexico, April 2018.
- Swarm Foraging with Multiple and Dynamic Depots. *In proceedings of ACM 13th NMSC conference*, Albuquerque, New Mexico, April 2017.
- The MPFA: A Multiple-Place Foraging Algorithm for Biologically-Inspired Robot Swarms. *IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2016)*, Deajeon, Korea. October 10-14, 2016.

- 3D Pavement Surface Reconstruction and Cracking Recognition Based on Kinect Fusion Techniques. *Transportation Research Board 95th Annual Meeting (TRB)*, Washington D.C. 01-2016.
- Multiple-Place Foraging Algorithm: A Distributed Foraging Model for Evolutionary Swarm Robotics. *IEEE Intl. Conf. on Intelligent Robots and Systems (IROS)*, Hamburg, Germany, 2015.

Ongoing project

- Forming Dynamic Robot Chains in Environments with Obstacles
- Ultra Wide-Band Based Collaborative Localization for a Bio-Inspired Foraging Robot Swarm in GPS-Denied Environment

Patent

- Melanie E. Moses, Joshua P. Hecker, and Qi Lu. System and Methods for Multiple-Place Swarm Foraging with Dynamic Depots. *Supporting Technology Transfer and Catalyzing*, University of New Mexico, 2018.

Certificates & Training

- Attended UTSA Research Strategy & Grant Writing Workshops, 2020
- Passed Graduate Teaching course in the College of Education at UNM, January - May, 2017
- Attended 3rd Summer School on Formal Techniques, Menlo College, CA. May 20-24, 2013.
- Attended 2nd Summer School on Formal Techniques, Menlo College, CA. May 27-June 1, 2012.
- China Qualification Certificate of Computer and Software Technology Proficiency (junior), 2006
- China Teacher Certificate for Higher Education, 2005

Programming and Technical Skills

- Gazebo, ARGoS, and V-REP robot simulations.
- C++, Python, Matlab, Haskell, Prolog, Scala, Java, Open GL and Qt.
- Robot Operating System (ROS), Bash shell scripting, SVN, Git, and \LaTeX .
- Python Matplotlib and R for visualizing data.

Github Repositories

- <https://github.com/BCLab-UNM/MPFA-ROS>
- <https://github.com/BCLab-UNM/MPFA-ARGoS>

Community Service

- Committee member, Student Success Committee in CS at UTSA, 2020.
- Committee member, Communications & Outreach Committee in CS at UTSA, 2020.
- Volunteer lecturer, 2020 Summer Python Coding for Kids, Girard Fellowship - Albuquerque Chinese Christian Church, New Mexico.
- Committee member, IEEE Intl. Sym. on Multi-Robot & Multi-Agent Systems (MRS), 2019.
- Reviewer, 2020 Applied Soft Computing, 2020 PLOS ONE, 2019 - 2020 IEEE ICRA, 2018 IEEE IROS, 2017 - 2019 Swarm Intelligence, 2017 and 2020 Autonomous Robots.

- Team leader, Fly Your Ideas Competition, Airbus, 2018 - 2019.
- Robot demo volunteer, 2018 1st annual InterPlanetary Festival at Santa Fe Institute, 2018 TEDx ABQ, Albuquerque.
- Technical support, NASA, Swarmathon Competition, 2017 - 2018
- President, Chinese Scholar and Student Association at UNM, 2013 - 2014.

Awards & Grants

- UTSA Internal Seed Grant, PI, will be submitted on March 3rd, 2021 (\$20,000).
- NSF CRII, PI, submitted on Nov. 2nd, 2020 (\$175,000).
- UTSA CS Department Research Grant, 2020 (\$5,000).
- IEEE MRS NSF Travel Grant, 2019 (\$750).
- UNM Graduate Student Research Grant, summer 2019 (\$500).
- ICRA RAS Travel Grant, 2019 (\$800).
- UNM Student Conference Award, 2019 (\$600).
- UNM Doctoral Conference Presentation Award, 2019 (\$920).
- IROS RAS Travel Grant, 2016 (\$900).
- Danish Government Tuition Waiver Scholarship, 2009 – 2011.