Zachary Serlin

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Education

2020 ✿ **Ph.D., Boston University** in Mechanical Engineering.
Advisors: Prof. Calin Belta and Prof. Roberto Tron
Dissertation title: *Distributed Formal Methods and Sensing for Autonomous Systems*.

2016 ✿ **M.Sc., Tufts University** in Mechanical Engineering.
Honors Dual B.SC./M.Sc. Program
Thesis title: *A Novel Approach for the Simulation of Xenopus laevis Tail Regeneration*.

2015 ✿ **B.Sc., Tufts University** in Mechanical Engineering
Magna Cum Laude
Deans List all Semesters.

Experience

✿ **MIT Lincoln Laboratory | Technical Staff | 8/2020 – Present**
  • Developing algorithms for heterogeneous multi-robot motion planning and decision making.
  • Creating multi-robot planning algorithms for safety critical applications.
  • Developing algorithms for run-time decision making and cooperation for robotic teams.

✿ **MIT Lincoln Laboratory | BMDS Student Technical Assistant | 9/2018 – 8/2020**
  • Developed optimization based algorithms for heterogeneous multi-robot decision making.
  • Created a planning algorithm for safety critical applications based on formal synthesis.
  • Tested algorithms with hardware-in-the-loop full scale experiment of 13 heterogeneous robots (ground and air).

✿ **MIT Lincoln Laboratory | Surveillance Systems Summer Analyst | 5/2018 – 8/2018**
  • Developed novel multi-robot multi-target search algorithms.
  • Designed a software-in-the-loop simulation environment to test novel algorithms.
  • Fielded novel algorithms with hardware-in-the-loop full scale experiment in outdoor environment.

✿ **BU - Schlumberger-Doll Research Collaboration | Student Team Leader | 9/2016 – 1/2020**
  • Explore combining Time-Window Temporal Logic planning and sampling based reactive planning.
  • Expanded capabilities of UWSIM simulation environment.
  • Collaborate in team of 3 to develop a reinforcement learning based algorithm for autonomous underwater vehicles.

✿ **Barrett Technology | Mechanical Engineering Intern | 6/2016 – 9/2016**
  • Designed components for FDA approved, Class II medical robot - BURT.
  • Generated process routers for construction of novel robot designs.
  • Worked with a team to design a patient interface based on client feedback.

Skills

Coding	✿	Python • Matlab • ROS • LaTeX • C++ • HTML
Software	✿	Solidworks • Gazebo • Comsol • LabVIEW • RViz
Misc.	✿	Concert Level Jazz Saxophonist • Street Performer • Expert Skier • Charter Boat Fishing Captain • Tufts Admissions Tour Guide

Research

- ✿ **Boston University Robotics Lab | Graduate Researcher | 9/2016 – 8/2020**
    - My research focused on the intersection between temporal logic based autonomous decision making, objective function optimization for heterogeneous multi-agent path planning, and distributed multi-image feature matching.
    - Created hardware-in-the-loop system that includes ground robots, manipulators, and drones in motion capture environment with ROS.
    - I also worked on explainability in reinforcement learning algorithms for robotic applications.

- ✿ **Tufts Soft Robotics Lab | Design, Actuation, & Control Lead | 9/2015 – 9/2017**
    - Designed a novel tendon-based, caterpillar inspired, soft material robot.
    - Built and tested a prototype of the system with a team of 7 peers.
    - Competed at the first Robosoft Grand Challenge in Livorno, Italy.

- ✿ **Tufts Autonomous Systems and Robotics Lab | Lead Researcher | 5/2013 – 5/2016**
    - Developed a level set approach to model cell growth and regeneration with a novel control algorithm.
    - Generated model capable of simulating growth and regeneration of large and dynamic biological structures.

- ✿ **Reviewer for:**
    - International Conference on Robotics and Automation 2020
    - International Conference on Intelligent Robots and Systems 2020

Publications

[1] **Z. Serlin**, G. Yang, B. Sookraj, C. Belta and R. Tron, 'Distributed and consistent multi-image feature matching via quickmatch', in *International Journal of Robotics Research*, 2020.

[2] A. Jones, K. Leahy, C. Vasile, S. Sadraddini, **Z. Serlin**, R. Tron and C. Belta, 'Scratchs: Scalable and robust algorithms for task-based coordination from high-level specifications', in *International Symposium of Robotics Research*, 2019.

[3] X. Li, **Z. Serlin**, G. Yang and C. Belta, 'A formal methods approach to interpretable reinforcement learning for robotic planning', in *Science Robotics*, 2019.

[4] G. Yang, B. Vang, **Z. Serlin**, C. Belta and R. Tron, 'Sampling-based motion planning via control barrier functions', in *Proceedings of the 3rd International Conference on Automation, Control and Robots (ICACR)*, 2019.

[5] **Z. Serlin**, K. Leahy, R. Tron and C. Belta, 'Distributed sensing subject to temporal logic constraints', in *International Conference on Intelligent Robots and Systems 2018 (IROS)*, Madrid, Spain: IEEE/RJS, 2018.

[6] **Z. Serlin**, B. Sookraj, C. Belta and R. Tron, 'Consistent multi-robot object matching via quickmatch', in *International Symposium on Experimental Robotics (ISER)*, Buenos Aires, Argentina: IFRR, 2018.

[7] C. Donatelli, **Z. Serlin**, P. Echols-Jones, A. Scibelli, A. Cohen, J.-M. Musca, S. Rozen-Levy, D. Buckingham, R. White and B. Trimmer, 'Soft foam robot with caterpillar-inspired gait regimes for terrestrial locomotion', in *International Conference on Intelligent Robots and Systems (IROS)*, Vancouver, BC, Canada: IEEE/RJS, 2017, pp. 476–481.

[8] **Z. Serlin**, J. Rife and M. Levin, 'A level set approach to simulating xenopus laevis tail regeneration', in *Proceedings of the Artificial Life Conference*, Cancun, Mexico: MIT Press, 2016, pp. 528–535.