Open Positions:
Research Affiliates (Volunteer) & Research Interns

About the SPARC Lab: The SPARC (**S**afe + **P**erformant **A**utonomous **R**obotics & **C**ontrol) Lab at Tufts University is a research lab led by Professor Ryan K. Cosner that works at the intersection of robotics, control theory, and machine learning to develop safe and performant robot autonomy. The lab's vision is to develop safe, deployable, and trustworthy autonomy algorithms that enable robots to work capably and confidently alongside humans. Our research approach follows a theory-algorithm-application loop where we develop application-motivated theory and use that to design provably sound algorithms that we deploy on real-world systems. Please see our website for more information.

Position Descriptions: The lab is recruiting talented, passionate, and driven Tufts students to join our team! There are two avenues for working with the lab:

1. **R**esearch a**F**filiate (RF): A volunteer position focused on learning and exploring research.
    - Access the lab space and computational resources required for your project.
    - Robot access with mentor approval.
    - No minimum time expectations.
    - No explicit research output expectations; this role is a learning resource. You are, however, expected to come prepared for scheduled meetings to respect lab members' time.
    - Start and end at will.
    - Success metrics: Did you engage critically and learn something new?
2. **R**esearch **I**ntern (RI): A compensated or for-credit position with defined research expectations.
    - Access to the lab space, computational resources, and robots required for your project.
    - Time expectation: Minimum 5 hrs/week.
    - Expected to balance coursework with research responsibilities, spend time in lab, and attend regular meetings.
    - Start and end with each term (Fall, Spring, Summer).
    - Success metrics: Did you engage critically? Did you learn something new? And did you advance the lab's research agenda?

Students may switch the roles between semesters depending on performance and resource availability.

Authorship for all roles will follow the IEEE authorship guidelines and is based on contribution. Role status (PhD student RA/RF/RI), seniority, and duration in the lab do not determine authorship.

Research Directions: Potential research directions include: aligning mathematical safety concepts with human preferences, developing methods to rapidly and automatically synthesize safety algorithms in novel environments, deriving practically useful safety guarantees using realistic uncertainty models, and studying the utility of combined first-principles and data-driven models to close the sim-to-real gap and enhance real-world deployment. Please see sites.tufts.edu/sparc/research/ for additional information and relevant publications from the lab on each of these research directions.

While these are potential directions, it is expected that research projects will evolve as we follow the path of scientific inquiry and adapt each project to best suit the student's individual interests. The unifying ideas across all projects will be that they (1) advance the state-of-the-art in safe robot autonomy and (2) involve a mixture of theoretical analysis, algorithm development, and hardware deployment.

Research Equipment Resources: A core mission of the SPARC Lab is the validation of our theoretical results on physical systems. We are committed to equipping the lab with a cutting-edge suite of robots, sensors, and computers. The planned equipment, subject to research priorities, includes a motion capture system, GPU cluster, quadrupedal robot, humanoid robot, manipulator robot, and quadrotor swarm. Additional equipment will be acquired to support new research directions as needed.

Required Qualifications:

- Current Tufts student in Mechanical Engineering, Electrical Engineering, Computer Science, or a closely related field. Undeclared students interested in these fields are also welcome to apply.
- Excitement for robotics, machine learning, and/or control theory.

Required expertise will vary by project, so let's design a project that fits your background and the lab's research interests.

How to Apply:

1. Email Prof. Cosner at *ryan.cosner@tufts.edu* with your: (1) research interests, (2) academic background with your resume and unofficial transcript, (3) position of interest (RF or RI), and (4) intended timeline to work with the lab.
2. Discuss potential research directions with Prof. Cosner and possibly other members of the lab.
    - You can find the lab's current research directions at: https://sites.tufts.edu/sparc/research/.
3. Draft a short research proposal with a current SPARC Lab member.
    - Please use the SPARC Lab RF/RI research proposal template: template link.
    - The goal of the proposal is to define project scope and serve as our initial literature review. They do not need to be fully-fledged research ideas!
    - Proposals may also be submitted to funding sources, e.g. Tufts' Summer Scholars.
    - This should be a *collaborative* effort with current Prof. Cosner and other lab members, so definitely ask for help! Don't work on this alone!
4. Email the completed proposal to Prof. Cosner.
5. Receive a decision based on effectiveness of collaboration, alignment with the lab's goals, project feasibility, and lab resources.

Timelines: Apply at any time. Expect a decision within 2 weeks of submitting a proposal. (RI applications can also be considered for RF positions depending on available resources).

Contact Information:

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