



x^{LAB}: we solve for problem x

LAB UNIVERSITY of PENNSYLVANIA



2 Postdoc positions in Safe Autonomous Systems

Starting: September 1, 2021

1. AI Co-Designer for Model-based Design of Cyber-Physical Systems
2. Learning with Improvisation for Multi-agent Autonomous Systems

The xLAB at the University of Pennsylvania is looking for motivated Postdoc researchers in the area of “Design of Safe Autonomous Systems” starting September 1, 2021. We are looking for proactive individuals to join our Autonomous Systems lab, bringing their excitement for scientific research in formal methods, control systems, optimization, machine learning and robotics with them.

Context and scope

The open positions are linked to (1) Symbiotic Design for Cyber-Physical Systems: a DARPA project in collaboration with Siemens R&D and MIT, focused on developing the next generation of model-based design for Cyber-Physical Systems, and (2) Mobility21 - a Department of Transportation National University Transportation Center focused on developing the next generation of safe autonomous systems for movement of people and goods. The research activities will encompass two main topics, as briefly discussed next.

Research topic 1: AI Co-Designer for Model-based Design of Cyber-Physical Systems

- Project background at <https://www.linkedin.com/pulse/ai-co-designers-model-based-design-rahul-mangharam/>
- Use formal methods, controls and machine learning to build next generation model-based design tools
- Develop machine learning tools to mine previous complex system designs and synthesize “auto-complete” for new system requirements

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- Develop gradient-free optimization tools for parametric optimization of partially complete system design
- Architectural exploration to synthesize autonomous system designs for unmanned aerial, ground and underwater vehicles

Research topic 2: Learning with Improvisation for Multi-agent Autonomous Systems

- Project details at <https://www.linkedin.com/pulse/learning-multi-agent-play-strategies-improvisation-rahul-mangharam/>
- Explore planning and control algorithms to balance safety and performance in adversarial racing scenarios
- Develop learning-based control strategies to analyze opponent driving skill and synthesize overtaking approaches
- Explore the value of cooperation in multi-agent teams in adversarial settings
- Formalize “rules for racing” to certify racing agents that are safety and performance compliant

We expect candidates to have interest in (and, ideally, some prior experience with) some of the aforementioned topics. Knowledge on learning-based control, verification of learning-based systems is desirable, as well as hands-on experience with the programming of autonomous systems would be a plus.

Candidate profile and requirements

Applicants for the Postdoc position must also hold a Doctoral degree in computer science, information/computer/software engineering, information science, telematics, electrical engineering, or related studies.

Good candidates have:

- Firm mathematical foundations in any one of the following: control/hybrid systems, formal methods, optimization
- Solid machine learning programming skills;
- Very good proficiency in written and spoken English
- High motivation, self-initiative, as well as strong passion and commitment to research;

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- Ability to work collaboratively in an interdisciplinary and international team with both senior and junior people;
- Postdoc candidates are expected to show an established research record, including publications in major conferences and journals.

Penn Engineering aims to increase the number of female employees and therefore specifically invites qualified women to apply. Applicants at Penn Engineering are not discriminated against in personnel selection procedures on the grounds of gender, ethnicity, religion, age, sexual orientation.

Research team and working environment

The Postdoc positions will reinforce and extend the research activities of the “Safe Autonomous Systems” group at Penn Engineering. The group has a long-standing track record in the area of cyber-physical systems, and is one of the leading US groups on life-critical systems. The high quality of the research output is supported by several awards and by numerous conference papers at ICRA, NeurIPS, CPSWeek, ESWeek, ACC, CDC, and RTSS. Group members have co-chaired the leading conferences and workshops in the field such as EMSOFT, RTSS, RTAS, BuildSys, ICRA.

The group also leads the F1Tenth Autonomous Racing Community [<https://f1tenth.org>], NSF Frontiers project on Medical CPS [<http://medcps.org/> and <https://cybercardia.cs.stonybrook.edu/>], IoT for Agriculture [<https://iot4ag.us/>]

Previous PhD and Postdocs are now tenure track professors at Duke University, University of Virginia, ShanghaiTech University, Oregon State University, Northern Arizona University, etc.

Our lab in the School of Engineering and Applied Sciences (Penn Engineering) is centered between the Electrical and Systems Engineering Department and Computer and Information Science Department. This provides ample collaboration with faculty across a wide spectrum of expertise. Our lab belongs to both PRECISE Center and GRASP.

Location

The University of Pennsylvania is a private Ivy League research university in Philadelphia. The city has a very high quality of life, excellent public transportation, over 400 restaurants and plentiful recreation opportunities. This is a wonderful city for families too. More about life in Philadelphia at <https://www.upenn.edu/life-at-penn/philadelphia>



Contractual details

The Postdoc positions have a salary of \$57,000/year and include premium health insurance.

How to apply

To apply for the available Postdoc positions, please prepare a single PDF file (max. 15 MB) containing:

1. Research Statement
2. Curriculum vitae;

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3. Copy of your Master or PhD degree;
4. Link to the online version or a copy of your PhD thesis ;
5. Additional documents such as a list of publications, transcript of records, and other relevant certificates.
6. Request 2 recommendation letters to be emailed.

Applications must be emailed to [Prof. Rahul Mangharam <rahulm@seas.upenn.edu>](mailto:rahulm@seas.upenn.edu)

