

Research priorities: The goal of the SPARK (Sensing Perception Autonomy and Robot Kinetics) lab is to advance the state of the art in robotics and autonomy for air, ground, and space applications, with a focus on perception and estimation. Our research is characterized by the following guiding principles:

1. **Rigorous foundations:** the work in SPARK involves a mix of theoretical and experimental research in robotics. While the students are expected to have strong implementation skills (e.g., C++ programming, implementation and testing on real robots), they are also required to tackle and solve deep theoretical problems using tools from estimation theory, optimization, geometry, vision, and control. An ideal research effort involves the design and analysis of new perception algorithms, their implementation in simulation or real platforms, and a rigorous experimental evaluation that supports and motivates the research. When addressing well-established problems in autonomy, or creating new research areas, the lab strives to produce high-quality publications (quality over quantity!), by focusing on top conferences and journals across multiple research communities.
2. **Passion for autonomy and perception:** a key quality of the SPARK lab members is a deep passion for autonomy and perception (including estimation, vision, sensor fusion, learning). This translates into the desire to push the boundary of the state of the art in these areas, and to communicate the research findings to experts (e.g., colleagues in your research community) and non-experts (e.g., from visitors to high-school students and undergrads). Another manifestation of this excitement is the desire to make software and papers publicly available, to give the community broad access to new results.
3. **Succeed together:** last but not least – the most important guiding principle is to achieve research excellence while respecting the others (teammates, colleagues, and more) and contributing to the well-being of the group, the department, the research community, and society in general. Ethical behavior, fairness, and team-working are foundational principles of the SPARK lab, and the lab members are encouraged to actively contribute to this vision.

Interactions with the students: I meet every graduate student in the lab at least once a week, while I tend to have biweekly meetings with UROPs. When needed (typically before deadlines), we meet more than once a week, and I'm always happy to allocate more time for student meetings (I enjoy working with them on technical aspects!). I typically provide a well-defined research topic to early Master students and suggest a potential solution method. As the graduate student progresses towards his/her PhD, I work with them towards defining a broader research topic, while leaving them more and more intellectual freedom in finding novel solutions.

Lab culture: The SPARK lab currently includes 8 graduate students and 1 postdoc. Moreover, 2- 4 UROPs typically work in the lab every given semester. My goal for the next two years is to reach a total size of 10-12 graduate students and 2 postdocs.

Typically, new master students are paired up with more senior PhD students or postdocs, and they have intensive interactions with me and with the rest of the lab members. Work hours are flexible as long as there is substantial progress towards the planned research goals.

The students need to be primarily motivated by intellectual curiosity and the pursuit of novel research results. This often aligns with the submission of conference and journal papers to top venues, the presentation of research results at national and international events, the demonstration of research results in project review meetings and public demonstrations. Since most of my students started less than 1 year ago, currently I provide most of the guidance on research and career opportunities, but this will evolve as the lab grows in size and seniority of the students.

Expectations: I discuss long-term expectations during the first meetings with incoming students. This discussion typically focuses on the research priorities of the group (see above) rather than listing a number of “boxes to check” during their Master/PhD. This is primarily due to the fact that there are many ways to successfully complete a PhD and I encourage students to be driven by intellectual goals rather than performance metrics. For instance, some students can write 3 high-quality conference papers and 1 journal each year, while other students may focus on the release of open-source implementations and demos and only publish a conference and a journal paper in a year. Our publications target top conferences and journal in robotics and computer vision, and the students are encouraged to attend the top conferences and contribute to the research community.

I also have a more focused discussion on short-term expectations at the beginning of each semester, when we discuss the research goals for the semester.

I encourage students to pursue Summer internships when relevant for their research, although I often suggest having internships later in their PhD. I also encourage them to work with UROPs and I’m actively engaged in hiring and training UROPs.