Virtual Undergraduate Town Hall FAQ

Planning Motions for Robots, Crowds and Proteins

Speaker: Nancy Amato, Host: Lori Pollock

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Motions for Robots, Crowds and Proteins

What topics should I study if I want to do motion planning?

- To understand motion planning, the foundational coursework you need includes basic Algorithms, Data Structures, and Programming. I have had students start doing interesting and fundamental research with my group in their freshman year, and I've even had a few high school students work with me.

How should I look into motion planning if it is not a major or an area of research at my university?

- Motion planning probably won't be a major anywhere. Typically, robotics courses, especially those offered in the Computer Science Department, will offer a segment on motion planning.
- There are a number of excellent motion planning texts available for free:
  - Principles of Robot Motion, Choset, Lynch, Hutchinson, Kantor, Burgard, Kavraki and Thrun, MIT Press
  - Planning Algorithms, Steven LaValle, Cambridge Press

What kind of real world applications will allow the user to help in the motion planning algorithm?

- One example is a robotic manipulator that needs to work in a hazardous environment. If I motion planner can provide a remote human insight into where the robot manipulator is able to move, then the human can interpret the data and make a recommendation for where the robotic manipulator should go.

Do you use ROS (Robot Operating System)?

- No, we are not currently using ROS in our group. We will get it in the future if we get a robot that requires it.
- There are a number of open source motion planning libraries, such as OMPL that are good and can be integrated with ROS.

Are any c space or PRM algorithms available to use on ROS or other platforms?

- The Open Motion Planning Library (OMPL) works well with ROS and includes implementations of many sampling-based motion planning algorithms including the graph-based probabilistic roadmap methods (PRMs) and tree-based methods such as rapidly-exploring random trees (RRTs).

Why Recommendation Letters are Important and How to Cultivate Them

Is it ok to ask a graduate student in a lab for a recommendation?

- Asking a grad student is not recommended. While they know a lot about you if they worked with you, the letter should officially come from the professor. The grad student could help the professor write the letter.

Can a student ask for a letter of reference after only knowing a faculty member for a few months or does it depend on the student's work ethic and progress?

- Time doesn't necessarily matter. What is important, is how well they know the aspect about you that they should address in the letter. For example, I will be able to write a letter of recommendation for my summer DREU students after this summer program, which is only 10 weeks.

If you have only had industry experience and technical courses but you are interested in interdisciplinary graduate programs, how can you set yourself apart?

- Think about the characteristics that will be important for that interdisciplinary field and think about the things that you have done that would transfer - you could even make a map or bi-partitite graph to help your references understand your experiences that prepare you for your interdisciplinary field of choice.
- You could also try to get a handle on what is needed by talking with the admissions officer of the program. They could probably give you hints such as, students who have studied particular subjects find that knowledge helps them, or "we want to see passion and the potential to succeed."

In traditionally male-dominated research positions and topics, how can a female applicant set herself apart and succeed?

- Seek mentors. Mentors can help you identify the characteristics of what is needed to succeed in your field. Everyone should have multiple mentors who can help them navigate the system they are trying to succeed in.
- Build your network – starting from now! If you have a network of researchers that is broad, then you will likely know someone at each meeting or conference you attend, which will help you feel comfortable. But don't limit yourself to people you already know – make a point to meet new people, both senior and junior to you, so you are continually broadening your network and your experiences. This will help ensure you are aware or relevant opportunities.
- I strongly recommend you look at the CRA-W programs and participate in the ones that are relevant to your current career stage - we have them for people at all stages - from undergraduate students through mid-career and beyond. You can find more resources for CRA-W at CRA-W.org