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Statement of Purpose

of YuanPei Chen (ECE Intern for Winter—2021)

I am a sophomore from South China University of Technology, majoring in intelligent construction. After two years of study, I am now more interested in robotics and its 3-D perception part.

Hong Kong University of Science and Technology has always been my dream school, among which RAM-Lab has the world's top level in the direction I am very interested in, It makes me yearn for it.

Interested Research Topics #1: What I want to apply for is RAM-Lab's ECE-07 open-project, which uses Baxter robot and MoveIt! ROS library for system integration as well as algorithm research.

The reason why I want to apply for this course is from my experience: In my freshman and sophomore years, I joined the vision group of the robotics lab of the SCUT, in which I was responsible for many innovative and difficult projects, and participated in a number of high-level competitions such as RoboMaster and ICRA AI Challenge. During this period of time, we achieved some good results, and I gradually fell in love with robots. In particular, mechanical arm, 3-D perception, planning, SLAM and so on, is my main focus during this period of time. Among them, TigerArm, a mechanical arm mainly developed by me, is also based on MoveIt! In the perception part, RealSense D435i depth camera was used, PCL point cloud library and deep learning algorithm Yolov3 were used too. For details, please see my Github repository(https://github.com/cypypccpy/). Originally, this mechanical arm was developed to serve the RoboMaster competition, but the purpose of the competition is to achieve a certain function. The theoretical depth may not be deep enough, so I hope to join the ECE-07 open-project and further study under the guidance of the group.

Why Me #2: why I can complete this project: First of all, the experience of similar projects is the biggest source of confidence for me to complete this project. The familiarity with ROS, MoveIt, PCL, PyTorch and other frameworks and libraries enables me to quickly adapt to this project. Secondly, I have rich knowledge of computer vision and robots, and have experience in independently developing robots with my teammates who responsible for Mechanical and electronic control. I am not limited to TigerArm, but also dabbed in opencV-based visual auxiliary aiming, SLAM, mobile robot Navigation based on Navigation Stack in ROS and other fields. Thirdly, I once studied under Professor HeQing Mu in the State Key Laboratory of Subtropical Building Science of South China University of Technology. I was responsible for deep learning in the project and had a preliminary understanding of scientific research. Two articles I participated in are under review.

Highlight #3: As for my highlights, I joined Prof. Mu's research group in my freshman year and began to learn computer vision and deep learning. In the winter vacation of my sophomore year, I completed the deep learning part of the project of my research group and planned to publish the paper in the top journal of intelligent construction. During this period, I took part in the American College Students Mathematical Contest in Modeling and won the H prize. In a sophomore in June, I took part in Xi 'An ICRA AI Challenge as the principal, to achieve a fully automatic robot shooting confrontation, won the third prize of the nation's grades(https://github.com/cypypccpy/rmua_scut). In July of the sophomore year, TigerArm, a mechanical arm independently developed by our team, participated in RoboMaster and won the bronze. In July of the sophomore year, we added the functions of localization, navigation and behavior tree decision-making to TigerArm, and won the third place in the semi-final of Huawei Embedded Software Competition and successfully entered the final(https://github.com/cypypccpy/21_tigerarm_ros). Recently, I have been learning to reproduce a SLAM system that uses GTSAM library for factor graph optimization in the backend. I hope to further deepen my understanding of GTSAM and SLAM by rewriting the code(https://github.com/cypypccpy/SRSLAM).

Conclusion: As for my future career plan, I hope to keep going in the academic road, keep up with the forefront, and then try to make the service robot or other artificial intelligence really fall into the ground, enter People's Daily life, even do it lead this intelligent era. Therefore, I hope to further learn the knowledge related to robot perception in RAM-Lab as an intern, which is also the field I focus on and love.