

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Excellent

Explanation to Applicant

The applicant has an outstanding track record in the proposed area of study. This is shown in the awards he has obtained and in his active participation in research centers on the subject.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

The applicant's experience has proven to be sufficient to produce tangible outcomes. Although the impact of the solution is enormous, it is important to further motivate the social component of the impact of this technology on people's lives.

Summary Comments

In general, the applicant has sufficient qualifications to produce substantial advances in the field.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Excellent

Explanation to Applicant

The proposed research aims to improve the accuracy and scalability of SLAM frameworks for autonomous vehicle navigation in dynamic environments through the application of c-zonotopes. The reasoning behind increasing the accuracy and scalability of SLAM frameworks is well-identified. I also appreciate the introduction of challenges and mitigation strategies. However, the proposal may be difficult for a non-expert reader to follow due to the lack of explanation for certain terms (such as zonotope and c-zonotope) and acronyms (such as IMU).

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Excellent

Explanation to Applicant

The applicant has successfully incorporated outreach into their research activities. For instance, they established an autonomous driving group at their university and showcased their autonomous vehicle, creating public awareness around public transportation and research opportunities through the dissemination of open-sourced research materials. The proposed system is also open-source and has the potential to enhance automated vehicle technologies. The applicant's future goals are driven by the goal to utilize robotic technologies to reduce climate impact and help the aging population.

Summary Comments

Despite being an undergraduate student, the applicant has demonstrated exceptional dedication to research and outreach, as demonstrated by their track record and stellar references. While the applicant's research has not yet resulted in any published

papers, it was featured at their university's Undergraduate Research Scholarship Awards event. The applicant's grades are good, although not outstanding. Overall, the proposal is well-written, and the justification for the research is clear; however, it may be challenging for a non-expert reader to fully understand.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Very Good

Explanation to Applicant

The applicant started the research journey of robotics, CV, embedded systems, HCI, and control networks in high school when the applicant researched out to a college professor for directions and research resources. The applicant was able to discuss the research findings at the 2018 IROS Conference as a junior in high school. Moreover, the applicant proactively strived for research resources in under-resourced communities, successfully obtained the opportunity of working in a robotics program of a high school robotics team, and became a lead programmer in three years. After joining UT Dallas, the applicant started working on an autonomous vehicle (AV) testbed for control system security tests. The applicant soon becomes the leader of 18 undergrads and is responsible for annual action plans, success metrics, guidance, and member recruitment from underrepresented groups. They put the whole system on GitHub and plan to submit it to CARLA by 2022. Moreover, the applicant built connections with other research groups/institutes and local governments and hosted outreach activities. During this time, the applicant gained knowledge of AV navigation, state estimation, and related key algorithms. Moreover, the applicant found that the current state estimation needs to work better for campus space and traffic. Therefore, the applicant investigated topological navigation in robotics for the AV domain and obtained NSF REU for this research. The applicant was a poster presenter at the 2022 Texas Institute of Transportation Engineers. The applicant also presents at the university's undergraduate Research Scholarship Awards conference about a novel state estimation method of AV.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

The proposed project on autonomous driving is a significant and complex research topic that could impact individuals and society in many ways. Except for leading undergrads' research, and programming teams, the applicant is the president of the university's environmental organization and a member of the sustainability committee. In that position, the applicant initiated multiple outreach activities.

Summary Comments

The applicant has a decent academic performance. The applicant proposed to develop a landmark-based SLAM algorithm based on zonotopes. Considering the applicant's previous research experiences and achievements and the available research resources, the proposed project is highly achievable. Moreover, the applicant understood the research problem and made a clear research plan and subtasks. Therefore, the proposed research is significant to the AV mapping and localization community. Furthermore, the research topic of AV safety is critical for the next generation of transportation. Overall the candidate is well recommended, and the proposed research has solid intellectual merits and broader impacts. The proposal is well written but needs detailed task implementation approaches and experiment design. The applicant also shows passion and success in leadership roles and the ability to initiate outreach activities beyond academia.

Intellectual Merit Criterion

Overall Assessment of Intellectual Merit

Very Good

Explanation to Applicant

Strengths: Clear motivation, demonstrated understanding of the space, and plans. Exceptional background in terms of hands-on experience and intellectual leadership - based on personal narrative and achievements during undergraduate career. Weaknesses: Lack of publication experience/record, given amount of time engaged in research. GPA good but not excellent.

Broader Impacts Criterion

Overall Assessment of Broader Impacts

Very Good

Explanation to Applicant

Impressed by the candidate's demonstrated passion and commitment to the cause of autonomous vehicles, including safety and environmental impact.

Summary Comments

A meritorious proposal, and a very promising student with clear drive and talent.