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Regarding: NASA Space Technology Research Fellowship

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To Whom it may concern,

It is my pleasure to write this letter of recommendation in support of the NASA Space Technology Research Fellowship application of Colin Rennie, a PhD student in robotics at Rutgers University under the supervision of a colleague of mine, Dr. Kostas Bekris.

Colin spent this past summer, the second summer of his graduate studies, under my supervision at NASA Ames Research Center. In the previous semester before his time here, Colin had begun getting up to speed on our ongoing work with tensegrity robotics and had shown to his advisor a growing interest in addressing some of the difficult problems related to planning for such complex systems. This interest combined with Colin's aptitude for the subject matter led to his advisor's suggestion that Colin spend the summer at Ames under my supervision – a suggestion that I was happy to accept.

Dr. Bekris' group and I have collaborated on projects involving motion planning for tensegrity robots for a couple of years now; first through a graduate student under his supervision, Zakary Littlefield, and more recently by way of Dr. Bekris' Early Career Fellowship award. The progress has gone terrifically, and I'm always excited to talk to their group about progress and brainstorm solutions to any new problems that arise in their research. In our meetings over the past year or so, it became clear that their motion planning algorithms can yield very intricate solutions even in very complex terrains, but that one of the biggest difficulties they faced was the computation needed to receive these solutions and the resulting time that computation required.

This is the problem Colin was excited about addressing. Starting with simpler systems with similar traits, such as a physics-based snake robot made up of several identical rigid bodies connected in series and actuated at its joints, Colin's research over the summer focused on using machine learning models to determine which combinations of controls for this system were likely to yield desirable overall motions for the system. Then instead of searching the whole space of possible controls randomly, the motion planning algorithm would be able to use this model to predict which combinations of controls sent to the system would result in motion toward the goal and bias the sampling process toward these predictions. In my contact with their group since this summer, I've been updated that taking this approach to planning with a more complex tensegrity system is now a priority – and will be a result that I'll be excited to see.

In my interactions with Colin this summer, he showed himself to be a capable young researcher able to take an idea and work through the details and potential difficulties with limited supervision. Specifically, I had a very full lab this summer with several ongoing projects and not much time to spare, but was happy to see that in my update meetings with Colin he would always have made good forward progress, and would always be thinking about the potential upcoming difficulties and how to solve them. At the end of the summer period, Colin presented his initial findings to the Intelligent Robotics Group, and I was also impressed by his professionalism and overall ability to communicate scientific research well to a group of his peers.

In conclusion, in the time I've known Colin he has proven himself to be both a very capable student and a productive and responsible researcher. Furthermore, Colin is someone who draws inspiration from various paradigms in his approach to problems – a desirable trait and something exciting to see in a young researcher. I was happy to supervise him as a visitor to my lab this summer, and I expect very good things from him in the coming years.

Sincerely yours,
Vytas SunSpiral