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05/14/2018

SAG Grant Reflection
Interactive Robotics Laboratory
Project Gemini

Our team achieved many milestones and reached new heights this semester, in unprecedented fashion. However, in order to have reached our goals, we required a fair amount of funding and support from external parties. We would like to express our gratitude to the SAG committee for gifting us with the funding necessary to turn our aspirations this semester into a reality.

Our team focused its efforts on 4 main areas in order to have created our collaborative construction interaction: Perception, Planning, Controls, and Mechanical. The middle men in the interaction were primarily software-based and thus didn't need much monetary support this semester, but the Perception and Mechanical teams only made it thanks to the generosity of SAG. Explained a little more granularly, our interaction was that of remote construction with human-robot cooperation. The user would build a model structure using building blocks in a given location, then the AI would comprehend the structure, figure out how to build it, and then move to physically put down the real-life building blocks in order to actually construct it. In order to "see" and comprehend the user-made structure, our Perception team required high quality depth sensing cameras which would provide 3D localization and recognition capability. They also needed model building blocks (a.k.a. wooden cubes) to test on and use as the user's material. SAG got us these supplies promptly and allowed our Perception team to begin designing and testing almost immediately. They were in fact the first team to finish. The Mechanical team was planning on building new armaments for our new twin arms. This includes servo motors, gears and shafts, bolts and nuts, as well as Arduino and other electrical cables and hardware. Despite many last-minute setbacks and urgent "ASAP" purchase requests, SAG came through every time and was very responsive to our needs and pinched timelines. Mechanical team was able to punctually finish both hands because the large amount of materials needed came in on time. With SAG's assistance, a lot of 3D printing and some help from our supervisor Dave Barrett, we were able to successfully fabricate all of our required components with just enough time to fully test and integrate the hardware with the software. We then presented our finished masterpiece at EXPO, to brilliant success.

Being able to succeed in IRL this semester was a very big deal for me. As project leader, being able to gain experience in leading and managing a team of 10 is a very useful learning opportunity and being given the resources to work with so that I can help my team

succeed is equally important. Being able to provide my team with the supplies and materials they require allows me to focus more on leading and organizing project development rather than worrying about where to find money for motors and cameras. As a robotics researcher, I learned a ton from working on my personal research project in the team, and my success was enabled by the fact that I had the hardware necessary to make my software work as intended. As the person in charge of the Planning team, had I not had the Arduinos or the cameras, I would've never been able to see the fruition of my work, as my code would've just been code in a computer, never realized or actuated into reality. Only by being equipped with the materials and hardware necessary was I able to test my software with the real world, and learn new things and correct my mistakes, bugs and problems that would've only been able to have been found in the real world. Some teams, such as Perception or Mechanical, might not even have been able to progress forward at all without the help of funds from SAG, giving them the ability to jump the hurdle of buying equipment and allowing them to focus on learning about and researching their actual research project. As a robotics major, being able to do research in artificial intelligence and social robotic interactions is very key to my education and personal development at Olin. I feel that Olin RoboLab is the only place where I do that on campus. But even then, I can only progress so far by myself. Having the resources to pursue more advanced and deeper robotics topics propels my learning and real world experience, and SAG empowers my team to be able to reach higher than we can on our own.

On behalf of my team, thank you to the SAG committee and staff for helping us this semester and giving us the resources to not only build arguably the best environment and interaction we've ever made, but also help us improve as a team and an organization. We honestly would not have made it this far without SAG's help. We had bold plans coming into this semester, and a lack of funding would've had us falling very short of our goals. We've learned so much and were able to build a powerful foundation, with strong footholds to continue forward. Next semester, we're planning on continuing this momentum and build on our new foundation, hopefully with an even more awesome and intricate interaction. We look forward to SAG's continued support as we dive ever deeper into the realm of human-robot collaboration and social robotic interactions.