

Report on research projects under the IDEA League Student Grant

Personal information			
Full Name:		Jaeyong Song	
Field of study:		Mechanical Engineering	
Degree pursued:		Master's Degree	Current year of studies: 2
Home University:		Technical University of Delft (TU Delft)	
Sponsoring professor at home university	Name:	Heike Vallery	
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Information about the research stay			
Host University:		ETH Zurich	
Sponsoring professor at host university	Name:	Robert Riener	
	Email address:	robert.riener@hest.ethz.ch	
Dates of research stay		from: 01/09/2018	to: 28/02/2019
Summary of the research project (200 words max.)			
<p>The aim of my research project was to develop a force sensor pad for the scapular orthosis. Stabilizing scapula can provide a better range of motion of shoulder joint. But this can cause discomfort or pain if the orthosis presses too hard. Thus, gaining knowledge about the contact force between scapula and the orthosis can be beneficial.</p> <p>An operational amplifier circuit was built with a RC low pass filter with 100Hz of cut-off frequency in order to remove high frequency noise as a high frequency signal was not expected due to the achievable frequency range for the human movements. A sampling rate of 50Hz was used because of the limited sampling rate of the force gauge (AFG 100N).</p> <p>For the sensor pad, 8 force sensors (FSR 400, force sensitive resistor) were attached to silicon pad and each sensor was reinforced by carbon fiber so as to prevent bending which biases the sensor values.</p> <p>The sensors were calibrated using curve fitting based on the obtained data from the pad and the force gauge. Hysteresis and deadzone for the sensor were observed when the applied force was releasing. The hysteresis was compensated according to the maximum measurable force.</p>			

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Experience report

Please tell us about your experience at the host university and give us an evaluation of the benefits of the research stay for the course of your studies

The overall experience at ETH Zurich was excellent. Not only the research work that I was assigned to but also the other ongoing research and projects in the Sensory-Motor Systems (SMS) lab were very intriguing and inspiring. Moreover, during the stay, I was able to talk to many PhD students from the lab about various subjects broadening my knowledge and perspective. My supervisor, a PhD student from the lab, was extremely helpful and friendly as well. In addition to the educational benefits, it gave me an opportunity to discover a new country and their culture.

This research stay was especially beneficial because the lab is dealing with the sensory-motor actions and human-machine interactions which are related to my specialization (BioMechanical Design). It was so much fun to gain some hands on experience regarding electronics and coding which will be quite useful for future study, career or any other application development. I already had some required knowledge for the project but never had a chance to use it for an actual application before. I also had to learn more about electronics which was relatively new to me.

In conclusion, I truly appreciate and cherish the opportunity that the host university, ETH Zurich, and the SMS lab gave me for an internship and getting me such invaluable experience with so much inspiration.

Picture

Please Provide a picture of you at the guest university



The report should be signed by both professors involved. (The signatures will be deleted when the template is published on the IDEA League web page.)

Jaeyong Song

Heike Vallery

Robert Riener

Students Name

Sending Professor

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