DTU Gives Disabled Students Robotic Arms

Disabled children have often partially or fully lost the use of an arm, which makes their lives extremely difficult. To address this, the Robotica group, from the long-established Center for Electricity and Electronics (CEE) at Duy Tan University, created a project named “Robotic Arms for the Disabled”.

Mr. Dang Ngoc Sy, standing, attaching a robot arm on Phan Trong Hieu

After four months of dedicated research and development, the group completed their project. Two robotic arms were successfully attached to Phan Trong Hieu and Tran Dang Khoa on a working visit to Quang Nam province.

The Robocon Vietnam Robot Contest, with impressive prizes has inspired and motivated DTU students for several years now. In 2013, they won prizes for the Best Manually Controlled Robot and the Best Automatic Robot and received Third and Style prizes in 2014, so initiating a project to create robot arms was not that difficult for the DTU Robotica group. The team consisted of experienced engineers, Mr. Sy, Dinh Huu Quang and Pham Quyen Anh from the CEE, Dr. Ta Quoc Bao from the Center for Advanced Chemistry and Ms. Le Thi Thanh Thao, from the DTU Silver Swallows Studio, who was the originator of the idea. They shared a passion to design robotic arms and rapidly got to work to help the two disabled children.

In addition to the many raw materials that were required, such as plastic wires, non-stretch zippers, desiccant padding and highly durable Velcro, DTU invested in two plastic 3D printers and visible light communication technology. The CEE also constructed two plastic melting 3D printers to manufacture the detailed components with high accuracy.

Tran Dang Khoa is very thankful for his artificial hand

To create an arm like a human's the Robotica group designed simulated each component, the fingers, hands, elbows, joints and muscles in 3D, using Solidworks software, which was then sent to the 3D printer. Printing one component averaged six hours, with some up to fifteen. To obtain the required precision, many trial printouts needed to be repeated several times. The group went to Quang Nam to measure the children for their prostheses and compute the structural forces corresponding to the length of

the arms, so that the robotic arms would be compact, lightweight, highly esthetic and useful in grasping objects of a various shapes, sizes and weights.

On March 2nd, the DTU robot arms were taken to the two disabled children. Both are well-mannered and excellent students who have lost the use of their hands since birth. Tran Dang Khoa is in 6th grade at the Nguyen Hue High School in Dai Loc. He has no left hand and always felt insecure in the presence of others. Khoa's family is poor and couldn't afford prosthetics for him.

Phan Trong Hieu, is in the 8th grade at the Nguyen Trai High School, Quang Nam and lost both hands touching an unexploded bomb, which broke his mother's heart because she knew that her child would never recover. She inventively made a tube of butter punched with holes to hold pens for her boy. However, Hieu's life and well-being were never been the same and he had not been nearly as happy as he was before.

Then DTU brought the boys priceless gifts of the customized robotic arms. Initially, they felt uncomfortable and awkward but, soon after having them fitted and, encouraged by their families, the boys started to respond well to their artificial arms and now consider them as new, long-lasting, natural friends.

"I want to thank DTU from the bottom of my heart for offering Hieu this valuable pair of hands," said Mrs. Ngoc Dao, Phan Trong, Hieu's mother. *"To see him so happy using them is the most wonderful thing that could ever happen to a mother's heart. Hieu can now comfortably play with his friends and do many new things, from personal activities to studying, anything he wants!"*

Mr. Sy, Vice-Director of CEE and responsible for the robotic arms project, explained, *"Our group visited Quang Nam three times to take measurements and try out the prototype prosthetic hands. On the second trip we were only 50% successful, but the finished product was a great success. The boys could grasp objects, drink and pour water. Hieu can now even ride a bicycle quite well. The design group was delighted to help these disadvantaged families and to instil more happiness and self-confidence in the two children. Our group is now designing Version 3 for disabled people in totally different situations. Our goal is to improve the 'Smart Arms' with intelligent sensors that can interpret signals from the central nervous system to control the muscles and execute movements, which should help the disabled overcome even more difficulties in their lives."*

(Media Center)