CEAS Students Design Life Changing Tool

By: Desiré Bennett

A promise from one family member to another leads to a senior design project turned life-changing invention.

Some of the best things in life are born out of difficult situations – and this one began with an aunt’s vow to her nephew.

That nephew, Carson David QiuFeng Berter – a rambunctious 10-year-old with an infectious smile – was born with Arthrogryposis Multiplex Congenita or AMC.

AMC is a rare condition that causes many joints to be stiff and crooked at birth, causing Carson to struggle with daily limitations that make things like maneuvering buttons, snaps, or zippers, using scissors, or writing, difficult.

“This project’s mission started with my promise to enable Carson to dress himself for his senior prom,” said Carson’s aunt Mechanical Engineering Technology (MET) senior Debbie Flaig. “I was racking my brain trying to think of something to do for my senior design project until a phone conversation with my Sister (Carson’s mother) where she was lamenting about how the boys at school made fun of Carson for his wardrobe – he couldn’t wear jeans because he couldn’t do the zippers or snaps, so sweats were his ‘uniform’ – and a light bulb went off in my head.”

Flaig approached her former lab partner, fellow College of Engineering and Applied Science MET senior Ian Wright, with the concept to design a tool to aid AMC patients in basic grooming and lifestyle tasks. “One meeting with Carson sealed the deal and Ian was in it for the long haul,” Flaig said. “Carson has such a great spirit and infectious smile, that I think Ian has become just as much emotionally invested as I am in the project – it is more than just a grade for the both of us at this point.”

Flaig and Wright believe they are designing more than a senior project – they’re designing a way for people inflicted with AMC to gain a level of self-sufficiency.
Their project, which focuses on the upper extremities of the body, with special attention to contractured (permanently fixed in a bent or extended state) wrists and hands, is the first research project of its kind focused on AMC patients.

“AMC is very rare – there were only 225 registered members of AMC Support, Inc in 2012. Because of the small number of patients, tools specifically geared to the AMC patient simply don’t exist,” said Flaig. “Doctors recommend tools designed for arthritic patients due to the similarities in grip strength to aid in basic grooming, eating, etc, but none of these tools take into account the added limitations of contractures and limited to non-existent rotation of the wrist joints that most AMCers experience.”

Flaig says they have designs for six tools and a housing into which the tools are engaged for operation. “Preliminary design was done with 3D computer models in Solid Works. Alpha prototypes were made out of ABS plastic utilizing UC’s 3D printing capabilities to confirm range of motion and proof of design.”

According to Flaig, after testing with Carson and a 72 year old Arthritis patient, modifications were made to the 3D models to improve functionality of each of the modules so that they could be operated comfortably by both test subjects, essentially expanding their potential client base.

Flaig and Wright plan to have the Beta Prototype of each module at the April 3, 2014 MET Tech Expo, held on UC’s Victory Parkway campus, with demonstrations by both Carson and an Arthritis patient.

“I am thoroughly impressed by the ingenuity of the project and honored that Debbie and Ian would devote their Senior Design Project to my son’s disability,” said Teresa Berter. “I would never have dreamed how much the tools they created could mean to a 10-year-old boy – he is in complete awe of Aunt Debbie and her friend, how smart they are, and how much they care about him!”

And that aunt seems to be in complete awe of him as well. “Progress on this front would only result from a labor of love,” said Flaig. “We will not become millionaires from helping folks with AMC, but I am becoming the favorite aunt of a pretty awesome boy who is kind of my hero.”

For more information on how you can help Carson and others with AMC, contact the project directors at FlaigDA@bv.com and wrightim@mail.uc.edu.

The MET Tech Expo is free and open to the public.

Select this link for more information on the College of Engineering and Applied Science.