Skysong Innovations
Advancing the Arizona State University Knowledge Enterprise

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Sensing Muscle Activation to Control an Ankle Joint

Approximately 1.7 million people in the United States suffer from loss of a limb through amputation. Many of these have lost part of a leg or foot. Walking with a prosthetic requires amputees to expend much more energy than able-bodied individuals. Rigid prosthetics changes the amputee's gait causing the individual to walk with a dragging motion. The amputee has greater difficulty walking up or down stairs, as the ankle does not bend. Prosthetics can be uncomfortable to wear when sitting, because the ankle does not drop to allow a natural position. Technology for building prosthetics that allows motion has existed for many years. Unfortunately, the technology that controls the movable prosthetics has lagged behind. Solutions are needed that allow movable prosthetics to be controlled by human interaction.

Researchers at Arizona State University have developed a sensor control that detects muscle motion. The sensor is located in a novel position allowing the amputee conscious control of an ankle joint. The sensor is positioned so that it does not wear out quickly, and it is unaffected by perspiration. The piston action at the connection of the residual limb and the prosthetic does not cause sensor input quality to degrade. Amputees are able to walk with a near normal gait and are able to sit in a natural position. Traversing stairs becomes easier and more natural. This innovation improves the life of amputees by allowing them to be more mobile, and it reduces the amount of effort required for motion.

Potential Applications

- Moveable prosthetics
- Exoskeletons
- Robotic applications

Benefits and Advantages

- Better Lifestyle – Provides amputees with greater mobility.
- Greater Comfort – Prosthetics are more comfortable to wear.
- Retrofit – Allows for replacement of any existing lower leg prosthetic.
- More Natural – Improves the gait of amputees.

For more information about the inventor(s) and their research, please see Dr. Thomas Sugar's directory webpageDr. George Wolf's directory webpage