SUMRO (Symmetric Upper-limb Mapping Robotic Prosthesis)

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Physical disability is a major consequence of limb amputation. High-level lower extremity amputees (hip disarticulation and hemipelvectomy), have a bigger percentage than other amputees and they prefer using crutches or a wheelchair instead of conventional prostheses. Current technology for lower limb prosthetics shows promising results, though the issues of mobility in different terrains, independent natural gait, high cost, and adaption of robotic prostheses according to individual's physical features. This project aims to overcome these challenges by coming up with a new version of robotic prosthetics that exploits interlimb coordination and adding the system a human-in-the-loop control. Sumro provides a customized limb to individual's body structure and helps amputees to naturally adapt to various terrain conditions. Symmetric Upper-limb Mapping Robotic prosthesis (SUMRO) utilizes a control approach that captures the movements of left arm through its sensors and properly maps these movements to actuate servo motors of a prosthetic right lower limb to enable amputees regain natural gaits. SUMRO exploits the interlimb neural pairing between the contralateral limbs to control a robotic prosthesis with three degrees of freedom, with two actuated joints at the hip and the knee, and a passive adaptable joint at the ankle. Functional demonstration of the system captures movements of the left arm of an individual to control a prototype of the prosthesis attached to a dummy human model's right leg. This prototype enables amputees to adapt to new terrains and environments by considering human decision mechanism while simultaneously minimizing the intentional effort required during movements of locomotion.

Awards Won:

Fourth Award of $500

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