In-socket Sensor for Transfemoral Prosthesis

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ABSTRACT

For transfemoral amputees, the biomechanical interaction between the stump and the prosthetic socket during the stance and swing phases of gait is critical for a normal-like ambulation. However previous sensors used in microprocessor-controlled prosthesis are all end-effector based with none detecting user input. This study is done to research the possibility of using piezoelectric material as an in-socket sensor for microprocessor-controlled above knee prosthesis to detect user intention movement in order to achieve a more responsive gait as well as improve abilities beyond normal walking such as stair climbing and hill descend. The proposed piezoelectric material is an active material that does not require an external power source. However due to inavailability of the said material during the duration of the project, force sensing resistors were used as replacement. The FSR sensor proved to be able to detect user intention movement in order to achieve a more responsive gait as well as improve abilities beyond normal walking such as sit to stand movements and stair climbing. It is also evident that forces generated at the patient stump can be translated into user intention during gait and be used as an input for a microprocessor controlled prosthesis. It is hoped that the incorporation of user intention in the prosthetic knee system would improve the ability and lifestyle of people with transfemoral amputations.

REFERENCES