Pressure Sensing Prosthetic Socket

Smart transtibial prosthetic liner that alerts users and clinicians to prevent skin damage.

Students at Purdue University have proposed technology using sensors to detect pressure in transtibial prosthetic sockets. Every year 34,5000 individuals undergo a transtibial amputation, which is the most common type of amputation. Despite the number of people with transtibial prosthetics, transtibial prosthetic sockets are uncomfortable and can cause skin irritation and infection of the residual limb. This is primarily due to the unequal pressure distribution between the transtibial socket and the residual limb. The Purdue technology helps prevent skin damage and infection by alerting the patient with a notification to their smartphone if a pressure value above the patient-specific level is detected. This notification tells the patient to remove or adjust their socket. The pressure and location data will also be sent to the patient's prosthetist, who can help the patient obtain a better fit for their socket. This technology will provide better patient care and quality of life for individuals using a transtibial prosthetic and mitigate health complications, such as infection in those patients.

Technology Validation: The students 3D-printed the socket and lined it with pressure sensors. In testing, a full-size prototype withstood over 100 lbs of force while 75% (6/8) of the sensors in a scaled-down model successfully reported a high-pressure event.

Advantages:

- wireless on the inside of the socket (conductive filament used)

- prevents skin damage

- rechargeable

- patient-safe

Applications:

- prosthetic socket

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