



NSF Convergence Accelerator's 2022 Cohort Phase 1 Award

Project Title

Rapid Fabrication of Custom-Fit Reshapable Prosthetic Devices with Electronic Skin Sensors

Awardee

RockyTech, Ltd.

Award/Contract

49100423C0008

Award Contract Type

R&D

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December 8, 2022

Principal Investigator

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NSF Funded Program

NSF's Convergence Accelerator

NSF Program Director

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Track H: Enhancing Opportunities for Persons with Disabilities

Convergence Accelerator

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PROJECT ABSTRACT

Prosthetic devices are essential for people with amputation to restore missing capabilities and return to the main activities of daily life. Dissonance between the user's limb and the prosthetic device, as well as discomfort due to poor fitting have been the key factors in the low quality of life of amputees. This team led by four investigators from RockyTech, University of Colorado Boulder, and Quorum Prosthetics will develop rapid fabrication technology of custom-made, easily adjustable prosthetic sockets and liners with integrated electronic-skin (e-skin) sensors.

The project's ambitious goal is to develop an advanced smart socket system that is self-adaptive to the complex interplay of factors affecting the stump through real-time e-skin sensing and communication. The team will focus on two main areas; (1) materials and (2) human-machine interface, also called the stump-socket interface. The team will develop new composite materials utilizing molecular-level chemical design of polymer structures and engineering of bulk materials properties, allowing for fast fabrication of custom-fit prosthetic devices and an easy do-it-yourself adjustment.

Additionally, the team will develop an e-skin liner with an embedded sensory system to achieve a unique interface design with performance-based evaluation measures, while giving a comprehensive picture of the overall function of the socket design. This proposed technology development is built upon the strong expertise and existing strengths of the team, and involves the integration of various aspects of chemistry, material science, engineering, device fabrication, customer relations, and technology-to-market and. This collaborative research will allow for a more complete view of the problem and innovation from different perspectives, which will be further enhanced and facilitated through the NSF convergence accelerator program.