Abstract Submitted
for the SES21 Meeting of
The American Physical Society

Soft Robotic Prosthetics Utilizing Granular Materials[1] MARIGORDON VARNER, ELI OWENS, Presbyterian College — Many open-sourced prosthetics are relatively inexpensive but struggle to grip irregular objects. To solve this problem, we propose using a soft robotic universal gripper that utilizes the jamming transition of a granular material. Prior work with such universal grippers have successfully gripped irregular objects by controlling the jamming transition of a confined granular material using compressed air. However, the use of compressed air makes these devices relatively slow and cumbersome for a prosthetic. We propose to instead use iron filings confined in a flexible membrane for our granular material and then induce the jamming transition in our gripper electromagnetically instead of pneumatically. The iron filling can be made to transition from an unjammed state to a jammed state when a solenoid held behind the gripper is turned on or off. When the solenoid is off the gripper is pressed into the object to be gripped, and the loose fillings confined in the flexible membrane easily conform to the shape of the object. Then, the solenoid is turned on and the fillings jam and firmly grip the object. With this technique, we have successfully held and released several irregularly shaped objects providing a promising new avenue for open-source upper prosthetics.

[1]SC-INBRE

Marigordon Varner
Presbyterian College

Date submitted: 29 Sep 2021 Electronic form version 1.4