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Title of Poster: Robotic Tunneling Worms for Operation in Harsh Environments

Over the course of the NASA Robotics Academy summer program at Marshall Space Flight Center (MSFC), our team has *conceptualized* and *initiated prototyping* of a burrowing robotic worm. This robotic worm consists of a piezoelectric ultrasonic drill, a conical auger, and multiple elongating segments mimicking the peristaltic motion of an earthworm. One key function of this robot is to retrieve lunar samples taken from various depths within the lunar regolith, for either in-situ analysis or for return to Earth. These samples offer a wealth of information on the Moon's impact history and evolution. The Wormbot is designed to overcome many of the difficulties associated with using a more conventional approach to drilling into the regolith, given its intrinsic properties. To maximize our effort on this project, we have concentrated on fully developing particular sub-sections of the overall design. Specifically, we have designed and built a single segment prototype along with an appropriate auger, in order to determine the feasibility of the design given the required actuation capabilities (i.e. stroke length) and generated forces required for burrowing. A control system has been implemented on an Arduino microcontroller and is capable of controlling both the segment and the auger. The auger, powered by a brushless DC motor with a planetary gearbox, has been designed and created using fused deposition modeling rapid prototyping (at MSFC). This auger will be used to confirm that material will be sufficiently displaced as the drilling/burrowing motion acts on the surrounding soil.