

Project No.	Project Title	
2021-01-191	Simulation Analysis of Exoskeleton	
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Abstract

Exoskeletons success in augmenting human ability in walking and running. Which resulted in a reduction in the effort (i.e., metabolic rate) expended by their user while performing these aerobic tasks. These devices are typically placed on the foot, shank, thigh, and torso. When designing these exoskeletons there is a need to consider the effect of the device mass, as there might be a case where the additional mass required for the device will increase the level of effort more than what the exoskeleton actuators will reduce. However, currently, no study has tested the effect of carrying mass on the shank and thigh segments on metabolic effort. Furthermore, in terms of basic science, this is important for understanding how body shape changes the effort required to perform running.

The purpose of this project is to prepare for an experiment that measures the effects of mass distribution at the lower's extremity on the running cycle. we would focus first on the effect on the running economy. In the experiment, we will measure the subject's movement, the forces applied to the subject, muscle activity, and metabolic consumption. The long-term goal of the project is to provide an understanding of the effect of the mass and also to model this effect in simulation (OpenSim). In the current state, I have built a simulation of human walking, and in advanced stages of the experiment design.

Keywords: Adaptation, Exoskeleton, running, muscle-tendon analysis