

P15001: Soft Ankle-Foot Orthotic



Clinical Background

Foot Drop is a neurological disorder which impairs the ability of an individual to dorsiflex the foot (i.e. point the toes upward) and is often a side effect of a stroke, ALS, Multiple Sclerosis, or a peroneal nerve injury. Current AFO's are bulky, rigid, and disrupt the user's natural gait by providing assistance at all times, regardless of need.

Device Overview

An active AFO will provide users with assistance only during appropriate times in the gait cycle through the use of an air muscle. This timing will be determined using a Heelstrike sensor to measure gait and a distance sensor to distinguish terrain. The air muscle will be filled with compressed air from an air tank; this will make the AFO untethered, a feature that has not been completed by a senior design team at RIT.

This device is not a replacement for medical treatment- it is simply a device to assist someone with walking.

Team Members

Adam Podolec – Electrical Engineer
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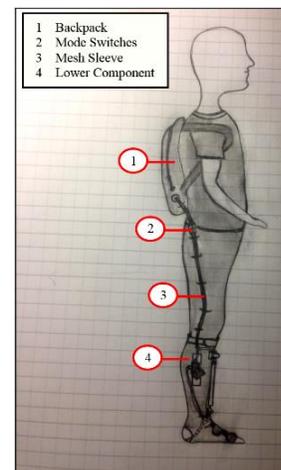
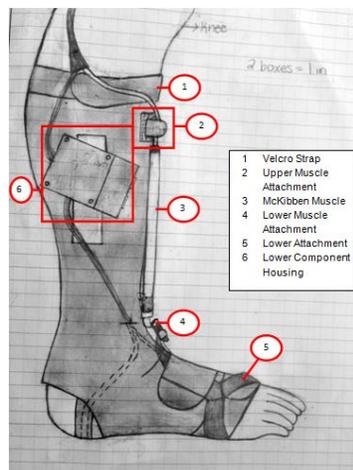
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Multidisciplinary Senior Design

Design Usage

The design of the AFO was split into two pieces, an upper component and a lower component. The upper component consists of a small backpack worn by the user. Housed within the backpack is a compressed air tank with a regulator, a solenoid valve, a printed circuit board (PCB), and batteries. A pressurized air hose, power cable, and signal wiring are tethered together in a mesh sleeve and routed from the backpack to the lower component. The lower component is comprised of the soft orthotic, the McKibben muscle with lower and upper attachments, the lower component housing with the sensor PCB board and IR sensor, the heel sensor, and the toe sensor.



To use the device, an individual would apply the lower component to their foot, making adjustments as necessary. Once the air hose and power lines are connected, the user will turn on the main power switch in the backpack. To activate the AFO, the user will press a button near their hip on the power supply line. When the device is active it will begin sensing and recording the user's gait data to a micro SD card.

Imagine RIT
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Bio Engineering Lab