

Wearable Device for Dystonia Management and Pain Relief

Status:	Filled
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Project Description

The goal of this capstone project is to develop a novel, compact, and effective wearable device for the foot and lower leg that reduces the pain and duration of dystonia symptoms while they are occurring. Dystonia of the leg and/or foot is a painful, inconvenient movement disorder that can make it difficult or impossible to walk due to painful, prolonged muscle contractions (cramping) of the toes, foot, and/or leg - often characterized by curled, cramped toes. When an episode of dystonia occurs, there is currently no solution that can provide immediate relief. Our device could be quickly and easily put on to provide immediate relief and comfort to the user. This device will not alleviate dystonia completely, but it will help users to cope with the painful symptoms more comfortably. This device includes a combination of therapeutic and distractive interventions to reduce pain and relax muscles in the affected area. This wearable device will also connect to a phone app via bluetooth to enable tracking of dystonia episodes.

Primary Project Goals:

Determine the efficacy of potential therapeutic techniques to ease the pain and crampin from dystonia (eg. massaging, heating, TENS machine, distraction, "e-stim," mechanical bracing) and choose which techniques to include in our device.

Develop a prototype of the device that satisfies technology readiness level 6¹, by the end of the 8-month capstone project.

Create a user interactive control system that is built-in to the device.

Ensure that the device can communicate with a mobile app via bluetooth.

Refine the design to be compact and portable - less than 20 cm² when stored and light enough to be carried in a standard backpack with ease (less than 5 lb).

Develop a working, barebones mobile app that is bluetooth compatible with the device.

¹ <https://www.nasa.gov/sites/default/files/trl.png>