Detecting Myofascial Tightness in Order to Reduce Undiagnosed Pain, Year 2

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The fascia is a layer of connective tissue that connects the lower layers of an individual's skin to the bones, organs, muscles, nerves, and blood vessels. When tight, the fascia can restrict flexibility and cause pain. There is no current test that can diagnose this condition and due to the lack of diagnosis, myofascial tightness can result in long-term pain and mistreatment. This includes long-term post-operative pain and chronic pain which can result in drug misuse or addiction. This leads to the question: Can a system be engineered to measure and detect myofascial tightness? The specific test area studied is the gastrocnemius and Achilles. The primary engineering goal is to use the device on human participants and compare collected data to a qualified scientist's diagnosis. A newly designed two-piece casing is 3D printed and allows for three FSRs to attach. All three are necessary for device function but only one is used to measure tightness. An Arduino Nano, which collects data, is located inside the device and connects to a USB cord to allow all wiring to be contained in the device. An adjustable projector stand is constructed to project a standardized grid onto the test area. Participants with various degrees of tightness are tested with the device and the results are compared to the qualified scientist's tightness rating for each individual. A linear regression T-test was used to confirm that the collected data was statistically significant and upward trending which allowed for ranges to be determined. The program was adapted to allow for a diagnosis to now be automatically produced. Created color gradient maps allow tightness visualization on a more in-depth level with accompanying graphs. All engineering goals were satisfied.

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