

SmartStride User Manual

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About Us

SmartStride is a team of five senior engineering students dedicated to developing innovative healthcare solutions through their final capstone project. Motivated by the growing intersection of technology and medicine, our team set out to tackle a challenge within the medical community: improving rehabilitation for individuals with Idiopathic Toe Walking (ITW). As telehealth and wearable technologies continue to evolve, SmartStride offers a new solution that fits seamlessly into the growing area of at-home health monitoring tools. Our device is a compression sock embedded with electromyography (EMG) and inertial measurement unit (IMU) sensors, which are designed to monitor gait patterns and muscle activity outside the clinic continuously. Using machine learning, SmartStride classifies ITW severity on a severity scale and provides system-uploaded, personalized data. This helps clinicians with a remote, detailed view of patient progress and allows them to adapt treatment plans more effectively. Our goal is to bridge the gap between clinical research and accessible care, ultimately enhancing patient outcomes and transforming the rehabilitation experience for those living with ITW.

The ITW Assessment Device:

Our device is a solution designed to alter the rehabilitation process for individuals with Idiopathic Toe Walking. By using advanced technology, we are able to provide new insights into patient progress and treatment effectiveness.

Key Features:

- Electromyography (EMG) capabilities
 - This technology allows for muscle monitoring and pinpointing muscular activation.
- Continuous monitoring for session-based data collection
 - Session data streams direct for in-depth monitoring and analysis.
- Remote assessment capabilities for improved accessibility

- Web-based monitoring allows your doctor to see and give feedback without the need for an in-person visit

Our Mission

At SmartStride, we are committed to addressing the limitations of traditional rehabilitation methods, including the restrictions on doctors' location and long periods of time between rehabilitation follow-ups. It provides a physical therapy session in your home. Our goal is to provide more effective and accessible treatment options for ITW patients through:

1. Personalized assessment
2. Remote monitoring capabilities
3. Data-driven information for healthcare providers

Safety

Electrical

This device adheres to manufacturing standards and low-voltage safety standards. Battery voltage regulators are in place to protect the device.

DO NOT puncture or attempt to modify the battery.

Patient Safety

Ensure that walking is done on a nonslip surface or that the participant is wearing nonslip socks under the device.

Remove electrodes and consult a medical professional if a reaction includes rash, lasting discoloration, discomfort, intense itching, or swelling.

FDA Disclaimer

Any statements and claims in this manual have not been evaluated by the Food and Drug Administration (FDA).

Operations:

Preparation

Battery Hookup / Charging

1. Ensure the battery is attached via the two-wire connector to the voltage regulator

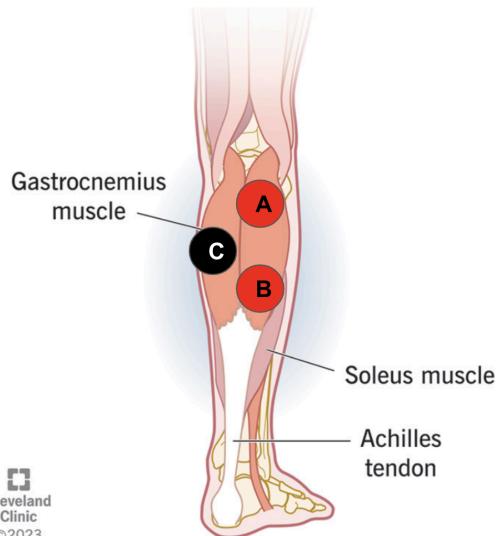
A green light should appear when properly connected to the board.*

*Note: when the battery is dead, the light may not initially appear

2. Plug in the battery via the USB cable (included) in a cool, dry place.

Electrode Placement

Calf muscle



1. Start by taking three electrodes out of the package
2. Remove the backing on the electrode
3. Place the Red electrode flat on the skin at locations A and B and the Black electrode at site C

Cleveland Clinic. (2023). Calf muscle diagram.

<https://www.google.com/url?sa=i&url=https%3A%2F%2Fmy.clevelandclinic.org%2Fhealth%2Fbody%2F21662-calf-muscle&psig=A0vVaw0lbbHj65zGJS7jMJHlh0Le&ust=1745287217657000&source=images&cd=vfe&opi=89978449&ved=0CBEQjRxqFwoTCLDopteD6lwDFQAAAAAdAAAAABAE>

Start-up / Operation

PT Session Operation

1. Slide sock on
2. Ensure three IMUs are placed in the location noted during the initial training
3. When ready, switch the battery to the On Position
4. Begin PT Session

Clean up

Once the PT Session is completed

1. Remove wires attached to electrodes
2. Turn off devices by moving the switch to OFF Position
3. Clean Device
 - a. Use a Sterlizing wipe to clean off hard surfaces such as container cases
 - b. To clean the sock, use a fabric-cleaning spray.
4. Slide the sock off and store it in a cool dry place

Storage

For Long Term Storage (More than 3 Days)

1. Unplug battery
2. Store in a cool, dry place
3. Ensure the battery is plugged in for charging every 3 days