

SIMM Gait

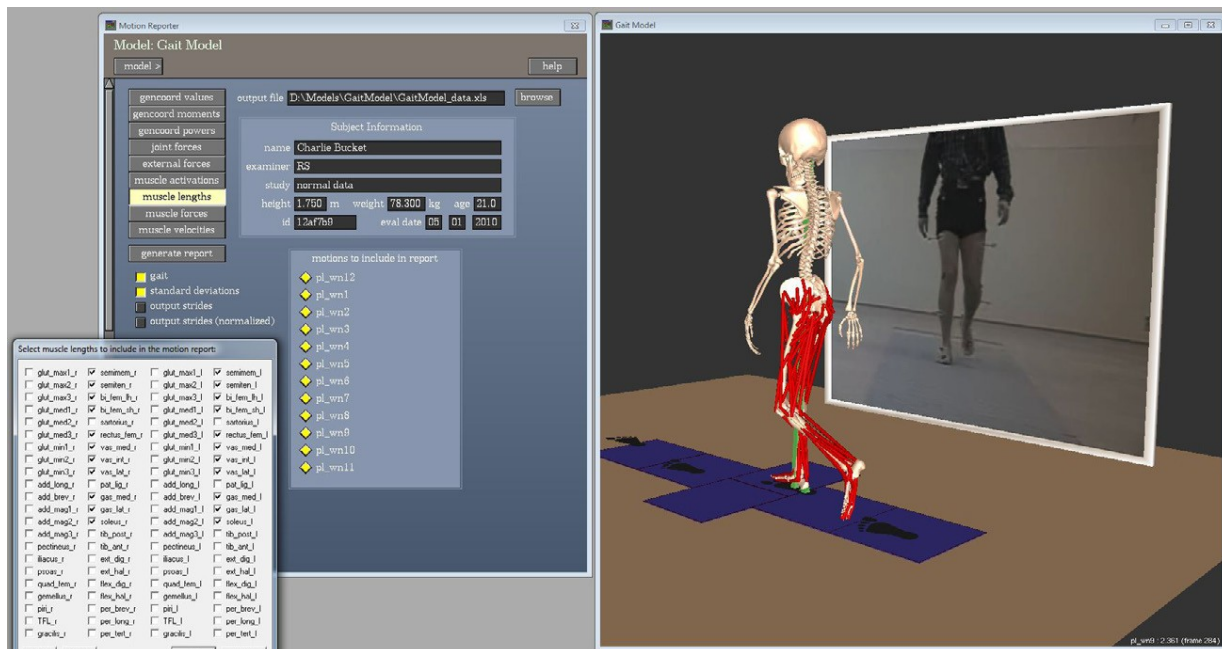
SIMM Gait is a powerful measurement and reporting tool. It integrates into a graphical report kinematic, kinetic, and EMG data, as well as muscle length, velocity, and force information. It uses a detailed, validated 3D musculoskeletal model and state-of-the-art data collection algorithms to create comprehensive reports of any set of recorded motions. SIMM Gait is flexible and customizable, but can also be fully automated using scripts. In addition, it contains several features specifically designed to create complete research gait reports.

SIMM Gait output is an Excel file organized into sheets. The sheets contain graphs of the angles, moments, powers, and reaction forces of the joints, and the activations, lengths, velocities, and forces of the muscles. The graphs show the means and standard deviations of all of the report variables, as well as normal, or reference, data for comparison.

Because SIMM Gait is a module of SIMM, you can use it to collect sophisticated measurements not possible in any other software package. For

example, with SIMM's bony deformation tool you can enhance the musculoskeletal model used for the reports by including subject-specific bony deformations such as tibial torsion or femoral anteversion. Also, SIMM's muscle optimization algorithm can estimate individual muscle activations and forces during the recorded motions. With this feature enabled, the output report will contain optimized activations and forces for all of the muscles (averaged over all trials) instead of only the EMG signals.

SIMM Gait has a "gait" mode for creating comprehensive gait reports. When in gait mode, it treats each motion as a series of walking strides, marked by foot strike and toe off events. If moments and powers are chosen for the report, SIMM Gait verifies that each stance phase of a stride occurs on a force plate, so that correct inverse dynamics moments can be calculated. If part of stance occurs off of a force plate, that stride is not included in the kinetics calculations, but is still used in the kinematic calculations.



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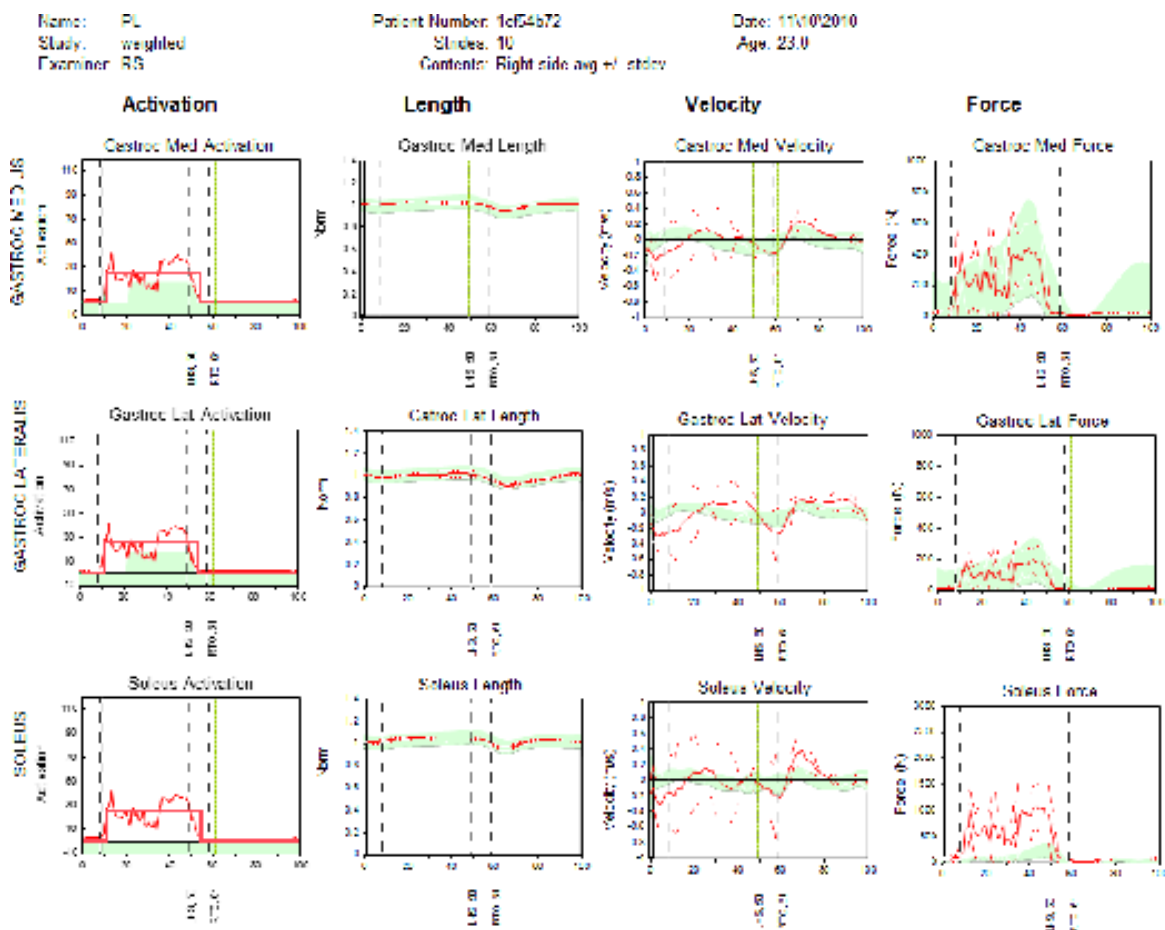
Features

- Works with any kind of motion (e.g., golf swing, pitching, batting, running)
- Reports include muscle lengths, velocities, and forces
- Report graphs are easily customizable
- Can be automated using scripts
- Reports angles, moments, powers, and reaction forces for all joints
- Handles any number of force plates and any number of analog channels
- Can import external force measurements on any part of the body (not just feet), and automatically determines which body part contacts which force plate
- Uses a fully customizable musculoskeletal model
- Displays reference video in the SIMM GUI, synced to the motion capture animation
- Can optimize muscle activations for inclusion

- in the report
- Handles contact involving one foot striking multiple force plates
- Minimizes the effects of marker noise and drop out by using a global, least-squares inverse kinematics algorithm
- Uses a Bayes filter to calculate onset, offset, and amplitude of EMG signals
- Includes Excel utility for creating database of "normal" data

Gait Features

- Calculates foot strike and toe off events using force plate data and marker data
- Calculates foot progression, stride length, stride velocity, step length, and step width
- Automatically divides motion trials into left strides and right strides
- Displays footprints in the SIMM GUI



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