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"The Bonita system is the cornerstone of the collection of objective, accurate and reliable biomechanical data for us to expand the running injury database. The system is surprisingly affordable and provides clinics with data that would not be observable through a visual gait analysis of the runner." Dr. Reed Ferber, University of Calgary, Running Injury Clinic
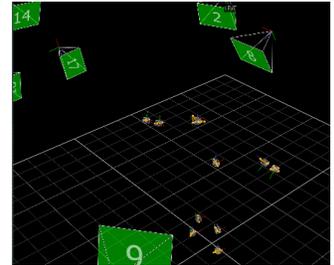
Pioneering motion capture since 1984.

University of Calgary
+ Running Injury Clinic

Vicon Bonita

Running Injury Clinic

Vicon Tracker

Challenge

Established in 2004, the Running Injury Clinic (RIC) is the first of its kind in Canada investigating running injuries from both a research and clinical perspective. Located on campus at The University of Calgary and within the Centre for Clinical Gait Research, the RIC is headed up by Dr. Reed Ferber.

The RIC conducts research studies investigating the biomechanical factors that give rise to several common running related injuries.

The RIC houses an eight camera Vicon MX3+ motion analysis system to perform running or walking biomechanical gait analysis. Data collected from this analysis is fed into a database, allowing the RIC to stratify the information by injury type, and provide an output of the characteristics most common to a particular type of injury.

"For our database to benefit the average runner, we need data from a variety of sources that will match the accuracy of our current system," said Dr. Ferber. "This will enable us to compare the client's data to the average of thousands of runner's with the same injury thereby allowing a comparison to normative data."

Dr. Ferber decided that making a cheaper, easier to use motion analysis system available to buy through the RIC, could not only help fund the database project,

but also give the RIC a certain element of control over the quality of data being fed into the database.

For the RIC to be able to sell this type of system to private physiotherapy clinics, it would have to be affordable, but most importantly, accurate enough to provide reliable results.

Solution

The RIC chose a three camera Vicon Bonita system, Vicon Tracker software and its custom-written Matlab software. This set-up is valuable because the Bonita system can provide the clinician with the same high quality research data that was previously only available at the RIC on campus at The University of Calgary.

The Bonita data collected within these clinics can be sent back to the RIC where it can be added to the growing database of running injury information promoting a further understanding of the aetiology of running injuries.

Dr. Ferber said, "The Bonita system is the cornerstone of the collection of objective, accurate, and reliable biomechanical data for us to expand the running injury database.

"The system is surprisingly affordable and provides clinics with objective and reliable joint ROM and force data that would

otherwise not be observable through a visual gait analysis of the runner."

Retro-reflective markers are placed on specific anatomical landmarks on the injured runner's lower extremity to aid in the determination of joint centre and joint positions. Using video data and force plates imbedded in the treadmill, specific 3D limb positions and joint forces that occur during the gait cycle are measured. Reliable and scientifically valid data can then be calculated allowing the effects of an intervention or the factors contributing to a particular injury to be determined.

Results

As well as strengthening the running injury database, the clinician can use the data from the Bonita system, along with an evaluation of the client's strength and flexibility, to provide an assessment of the potential causes of injury. From this, a tailored rehabilitation program is developed to address the previously determined impairments identified in the injured runner.

Recently, and most exciting, is research being done at the RIC in the area of running injury prediction.

Dr. Ferber explained, "Through the use of classification algorithms that help distinguish specific features of a particular injury, it may be possible to identify those most at risk for injury."

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