VICON

CGM2 IS GAINING GROUND WITH AUSTRALIA'S BIOMECHANICS COMMUNITY

Monash Health Kingston Centre in Australia has one of Australia's longest-standing gait labs, specializing in adults with neurological conditions including stroke, MS, and cerebral palsy. Corey Joseph, one of the leading biomechanists at the laboratory, is part of a community of researchers working to validate the Conventional Gait Model 2 (CGM2) with the hope of introducing it into clinical settings in the near future.

Dr Corey Joseph, Biomechanist and Researcher, Clinical Gait Analysis Service, Monash Health Kingston Centre

"Curiosity is really what got me wanting to experiment with CGM2," says Joseph. He was very familiar with Plug-in Gait but, as he puts it, "You can't look in to see how things are done in Plug-in Gait. It's a black box, and there are very well-known limitations to it."

When he learned about the work being done by Dr. Fabien Leboeuf on CGM2, he was intrigued. "I was interested in it being open access," he says. "You could download the kit and work with it yourself. I wanted to experiment with it for a few reasons. One was because I was interested to see the improvements that had been made from Plug-in Gait. And, in particular, things like removing Knee Alignment Devices (KAD), so you can just use two medial and lateral markers in the knee like you do on the ankle. And some additional things that you could do with a foot—just really simplifying it into two structures instead of one.

"The other thing that interested me was the ability to use clusters, rather than using tibia and thigh markers— that's really problematic because patients knock them a lot and then we have to spend time fixing that."

NATIONAL INTEREST

CGM2 is attracting a lot of attention in the Australian biomechanics community. "The momentum behind it is picking up," Joseph says. "There's now a national group in Australia that's talking about using it as their primary model, but nobody's transferred over to it yet because we just don't know enough about it."

Joseph is excited by the number of researchers experimenting with the model, and the potential that its incorporation into Nexus offers. "I commend Vicon for incorporating it into the software platform because I think that's an opportunity for everybody to use it and experiment with it," he says. "Everybody has barriers in their technical capacity, and including it in Nexus takes away that huge hurdle of having to know how to download something from GitHub, work with Python and then just knowing how to use it."

Joseph and his colleagues at The Kingston Centre are interested in seeing how CGM2 performs with both clinical and general populations. Their data was captured with a legacy Vicon system which, despite its age, Joseph describes as "the gold standard of motion capture".

"The main project we're working on is testing CGM2 on our entire normative data set," says Joseph. "Essentially what we want to do is look at each iteration of the model, either relative to itself or with respect to Plug-in Gait. So, for example, looking at Plug-in Gait versus CGM2 1.0, then looking at the improvement with 1.1, then the change in the hip joint center for 2.1. They're the ones we can retrospectively use with our data set."

The project got off to a challenging start. Over the course of 2020, Joseph ran each version of the model, from 1.0 through to 2.1, on their data, but felt he needed more information on the development of the model. He and his team put the project on hold.

"It wasn't until recently, when we started working with it more and communicating with Dr. Leboeuf that we came back to the project," says Joseph. He and his team integrated the most recent CGM2 updates into their pipeline and began working closely with Dr. Leboeuf, feeding back on the model as they were testing it.

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FROM RESEARCH TO PRACTICAL APPLICATION

Four years on, Joseph is keen to begin using CGM2 in clinical settings. "We want to start implementing it in the clinical world, because we see its advantages," he says. "We love Plug-in Gait. We know what it gives us, its pros and cons, and we'll work with it. But there are lots of advantages to CGM2 and I want to cross over to using it in our clinical practice.

"We have a working group that consists of all the clinical biomechanics labs in Australia. We're all committed to experimenting with it, with the view to move straight over to using it when it's proven to be ready. In the medium term everybody will adopt it, but it's not quite there yet."

Joseph applauds Dr. Leboeuf's approach to working with researchers seeking to validate CGM2. "Dr. Leboeuf has been really forthcoming and willing to help out with the work that we're doing. We're collaborating with him on it, and when we publish our findings he will be a co-author. It's been a really positive relationship," he says.

He hopes that other members of the biomechanical community will pick up the baton, too. "I would encourage people to experiment and help progress the model," he says.

For Joseph, at least, CGM2 is the future. "We're sitting on 20 years of clinical data for 10 plus neurological conditions. I can see anything we publish in those spaces being outputs from CGM2," he says.

"The concept of having an open access model that you can use outside Nexus didn't exist until CGM2, and I think it is awesome that we have it now. Having a model that goes across software platforms is really useful. It's really positive science."

> *For more information on using CGM2 within the Vicon ecosystem, download our user guide. For the latest updates, see our Nexus online help pages on CGM2.*