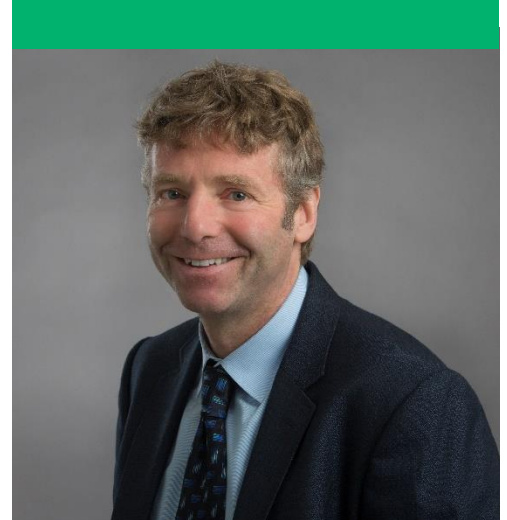


## Markus A. Wimmer, PhD

The Jorge O. Galante, MD, Professor of  
Orthopedic Surgery



### Advancement of Medicine

In May 2024, I was appointed to the Jorge O. Galante Professorship, with funds becoming available in September 2024. This honor is especially meaningful for me, as my early research career flourished under Dr. Galante's mentorship.

Your generosity has allowed me to support activities in the Motion Analysis Lab. Our team has developed an interface that provides musical feedback, or the transformation of real-time pressure data into auditory cues/music. It is meant to guide patients towards improved limb alignment and joint load while walking. This newly designed method relies on pressure data captured from commercially available, pressure-sensitive shoe insoles. These pressure signals are then converted in real-time into musical cues.

By mediating plantar pressure through engaging auditory cues, our system fosters long-lasting motor adaptations without altering natural walking patterns. Additionally, its capability to monitor compliance and performance through cloud-enabled telemetric data will enhance personalized care and bridge the gap between in-clinic and home-based rehabilitation.

We hope that in the future our tool will reduce the burden of weekly visits to a rehabilitation center by allowing patients to receive support at home, particularly benefiting those in low-income communities. By increasing the accessibility of our system, we expect to improve adherence to the rehabilitation program — enabling home-based training with constant feedback at the patients' convenience — and improve patient satisfaction.

### Research

The Galante endowment fund supported several team members working on the musification of pressure signals to support my lab supervisor, **Chris Knowlton, PhD**. Dr. Knowlton is a professional dancer and choreographer and has extensive experience in augmented digital dance. The funds also



provided supplies for my PhD student, **Luisa Cedin, PT, MS**, who is a physical therapist by training. Dr. Knowlton and Luisa collaborate effectively as a team to advance the insole project. Luisa's pre-doctoral stipend is funded through a National Institutes of Health Training Grant, which I co-direct.

## Grants

Our activities have led to an I-Corps Seed Award by the Institute of Translational Medicine (ITM) in Chicago. This award allowed us to perform a value proposition of our device and conduct interviews with stakeholders, both physical therapists and patients. We have also applied for an ITM Implementation Award, which would position us well to pursue federal funding, further advancing clinical translation of our technology.

## Publication Highlights — Abbreviated

As related to above work performed in 2024:

- "Exploring musical feedback for gait retraining: A novel approach to orthopedic rehabilitation," *Healthcare* (2025).
- "Ankle fracture gait training through musical feedback: case study," *JOSPT Cases* (2025).

## The Year Ahead: 2025 and Beyond

My goal for 2025 is to launch a second research initiative focused specifically on cartilage degeneration, aiming to develop novel therapeutic approaches to osteoarthritis with support from this fund. My first choice is to support postdoctoral fellows who are interested in finding solutions to treat osteoarthritis.

## With Gratitude

Thank you for giving me the opportunity to advance orthopedic science at Rush. It allows me to pursue innovative, exploratory research paths, with the goal of discovering novel therapeutic strategies in the treatment of joint disease.