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Sacramento, CA USA 95817

Department of Biomechanical Engineering
Delft University of Technology
Delft, Netherlands

Dear Search Committee:

I am writing to apply for the “Assistant/Associate Professor (tenure track) in Dynamics of Multibody systems” in the Department of Biomechanical Engineering at TU Delft. For the last 15 years, I have developed unique research expertise in the dynamics and control of bicycles as well as other topics that align with your department’s research areas, making me a highly qualified candidate for this position. I have authored or co-authored 21 journal and conference articles on the subject of bicycles and my doctoral work focused almost exclusively on the topic, resulting in a dissertation entitled “Human Control of a Bicycle” which is well cited. I have published 8 other articles, many of which were ancillary to the bicycle dynamics and control research. These works and my active role in the associated academic communities make me one of the handful of people in the world with the expertise needed to take the TU Delft Bicycle Dynamics and Control lab into the future.

I am currently an Assistant Professor of Teaching in the Mechanical and Aerospace Engineering Department at the University of California, Davis. My position is an academic senate tenure-track position primarily focused on advancing undergraduate engineering education. I spend approximately 70% of my time on teaching and learning, 20% on professional achievements and activities, and 10% on academic and public service. I have been in this position for over four years and my accomplishments over those years align mostly with this position’s teaching focus. I have also maintained a research program centered on human mobility in transportation, sports, and assistive technologies with much of the work advancing engineering in the dynamics and control of bicycles. Prior to this position, I was a postdoctoral researcher in the field of human motion and control with applications in powered lower limb exoskeletons. Before that, I was a graduate student with research in bicycle dynamics, control, and handling in a sport biomechanics lab. Through these experiences, I have developed strong applied computational and experimental vehicle dynamics and biomechanics experience.

My current research trajectory is focused on developing human-machine synergistic controllers for powered exoskeletons, powered prostheses, and personal mobility vehicles, particularly single track vehicles. These assistive devices will play a significant role in how abled and disabled individuals get around in the future.

I am well versed in the various funding opportunities in the USA and have a strong record of obtaining competitive funding even though it is not a requirement for my current position. As a graduate student, I initiated and co-authored an awarded US National Science Foundation grant to study the control of bicycles. This effort was unique given both the student initiative and the fact that we were able to make the case for obtaining resources for a research area that is often more challenging to fund. As a student, I was also awarded a very competitive Fulbright Scholarship to the Netherlands, where I spent a productive year in the bicycle dynamics lab at TU Delft. Most recently, I was co-PI on a successful \$5 million grant from the US Department of Education. Over the last four years I have also been awarded several internal grants for education activities. I am looking forward to learning about the funding systems that support faculty research in the Netherlands so that I can continue my successful trajectory. At TU Delft, I plan to fund my future work through grants and industry partnerships in the Netherlands, European Union, and internationally.

My extensive teaching record in dynamics and design includes courses in the topics of mechanical design, mechanical vibrations, system dynamics, multibody dynamics, and vehicle dynamics at the undergraduate (BSc) and graduate (MSc, PhD) levels. I make use of many education research backed practices in my teaching and I am constantly improving the courses using these practices. I have taught courses of up to 120 students and managed up to four teaching assistants per class. I am also a leader in the use and promotion of computational thinking for learning, recently co-authoring a book entitled “Teaching and Learning with Jupyter” which provides an introduction to the related methods and tools. I look forward to expanding this for the large courses at TU Delft.

Over the past four years, I have also mentored nearly 500 BSc and MSc students in over 100 engineering projects. As these projects involved external project sponsors, I developed relationships with a diverse set of research, non-profit, and industry organizations. Several of these projects are also with international groups in Kenya, Nicaragua, Cambodia, and Sweden. I am especially proud of the mechanical design exchange program I have developed with Meijo University in Japan. As my native language is English, I will be able to teach MSc classes immediately at TU Delft, but I also have a beginner understanding of Dutch and am eager to become fluent so I can teach BSc courses.

Lastly, I have a strong service record. I serve on my department's undergraduate curriculum committee where we are modernizing our course offerings. I serve on the scientific and planning committees of the Bicycle and Motorcycle Dynamics conference series and recently hosted the International Cycling Safety Conference at UC Davis for the first offering outside of Europe. On the education front, I am a topic editor of the innovative Journal of Open Source Education, now in its second year of publishing.

If at TU Delft, I see numerous opportunities for collaboration within the university. It is exciting that so many authors of papers I have read are at this institution. In the Biomechanical Engineering department, Prof. van der Helm and Prof. Harlaar's expertise in upper and lower limb biomechanics will provide insight for bicycling biomechanics. Prof. Vallery's work in biomechatronics and teaching dynamics can align nicely with this position's efforts. I have interacted with Prof. Seth when he was at Stanford and his foundational work and expertise in musculoskeletal simulation are a strong interest of mine. I have studied and cited Prof. van der Kooij's control identification work and would be excited to learn directly from him. Dr. Geijtenbeek's predictive simulation methods and tools are leading this research area and his connections to Motek Medical would be helpful for my experimental work. I have co-authored a paper with Prof. Happee in the Department of Transport and Planning and will seek collaborations related to vehicle engineering. The Control and Simulation group has strong expertise in manual control theory and identification that I have leveraged in the past. For example, I have worked with Prof. van Paassen on the Python control software and could expand that effort and Prof. Mulder's work in manual control has benefited my applications to single track vehicles. Lastly, I am excited to develop collaborations with Dutch bicycle companies being that the country leads the world in innovative utility bicycle designs.

The best career fit for me is to be a faculty member at a university department that is mission focused, works together forwarding this common mission, and strives for continuous change all while deeply valuing engineering education through teaching and research mentorship.

I have included my research plan that centers around human mobility and a teaching statement that outlines my pedagogical practices in addition to how I think I would fit into your department.

Thank you for your consideration.

Sincerely,

Jason K. Moore