PhD Position in Simulation Engineering/Biomechanics (Biomechanic Simulation)

The **Human-Centered Computing and Extended Reality (HEX) Lab (https://hex-lab.io)** at **Technical University of Munich (TUM)** is offering a **fully funded, full-time PhD position** (salary based on TVL-E13 paygrade, Bavaria). The position is affiliated with the School of Medicine and Health and TUM School of Computation, Information, and Technology.

The **Human-Centered Computing and Extended Reality Lab,** under the management of Prof. Daniel Roth, aims to pioneer new technologies to enhance medical care and healthcare. We pursue fundamental, translational, and radical blue-sky research to improve medicine for patients and healthcare professionals alike. We adopt a holistic perspective on machine intelligence, emphasizing AI-driven technologies that enable meaningful collaboration between humans and machines.

About the Position:
We seek for a highly motivated PhD candidate to work on cutting-edge research in **simulation-based learning, simulation engineering and biomechanics**. The candidate will conduct high-quality research, publish in top-tier venues, and collaborate with interdisciplinary teams across biomechanics, medicine, computation, and technology.

We are seeking a motivated PhD candidate to join our team for a cooperative project. This project focuses on developing clinical support decision systems in the field of total knee arthroplasty (TKA). The aim is to lower the rejection rates for knee implant recipients by using a biomechanical simulation to predict optimal alignment of the implant.

You, as a candidate, will focus on developing a biomechanical simulation of the human knee during the gait cycle with special attention paid to the ligaments and other soft tissue of the knee joint. The simulation shall include TKA implants from different suppliers and simulate the changed knee trajectory of each implant during walking/running. You will contribute to a system that evaluates the effect of each implant and recommends a position for each patient to optimize ligament tension after the surgery, by using wearable data generated pre-surgery.

A core part of your work will involve advanced dynamic simulations of human soft tissue and acquiring data through wearable studies to feed the digital twin. You will use tools such as OpenSim/Omniverse/MuJoco/Unity and will be required to integrate AI-driven approaches within your simulation. This position requires high motivation to further the state of the art in biomechanics and biomechanical simulations.

Requirements
Applicants must hold a **Master's degree** (or equivalent) in Computer Science, Mechanical Engineering, Sport Sciences, Robotics, AI, or a related field. Strong **programming skills** in relevant languages, SDKs, and frameworks (e.g., Python, C++, TensorFlow/PyTorch, ROS, OpenSim/Omniverse/Mujoco) are required. Experience with (and/or) machine learning/deep learning, real-time systems, hardware integration is required. Candidates with a strong background in biomechanics and the simulation/mathematical description of human soft tissues will be preferred. We are looking for a **team player** with strong problem-solving skills, an excellent research mindset, and a passion for interdisciplinary collaboration. Candidates should be willing to get engaged into team tasks and are encouraged to engage in teaching activities.

Application Process

Interested applicants should submit:

- **One-page academic CV**

- **Two-page research statement** outlining their proposed PhD thesis (identifying a research problem and planning their research approach while reflecting on their skills and past experiences, emphasizing a clear research vision and referencing to the state-of-the-art)

- **Academic transcripts, research publications (if applicable), and two references**

📩 **Apply via email:** hex-applications[dot]ortho[at]mh[dot]tum[dot]de
📅 **Deadline:** 30.05.2025
📍 **Lab Location:** TUM University Hospital, Trogerstr. 10, 81675 Munich, Germany
🌐 **Website:** hex-lab.io

We welcome, embrace, and respect diversity of people, identities, and cultures. We therefore encourage all potential fitting candidates, regardless of their personal background, to apply for the opportunity.