**Interaction on 10.000m² Interactive Floors**

**Goal**
Extend the Multitoe computer vision framework written in C++ to work across multiple touch sensitive surfaces, write new outdoor tracking systems, create interaction techniques for walking, running, and skating.

**Background**
Multitoe is our interactive 8m² floor with “toe-size” tracking resolution. It uses a JVC 12 mega pixel projector and a 13-megapixel camera. The camera-based system allows us to observe an entire room from below. Google “multitoe” or “gravityspace” to see more.

Previous years’ students wrote a GPU based tracking system that recognizes multiple users based on their shoeprints in 50ms, a 3D framework that allows reconstructing the pose of users, and an event-based GUI framework in C++ and Qt that automatically adopts layouts in real-time across the entire floor.

**Objectives**
Extend the Multitoe computer vision/user tracking framework:
1. write a tracking system that senses touch/motion in large spaces and outdoors.
2. create interaction techniques that allow users to interact & collaborate while walking, running, and skating
3. evaluate your applications using performance analyses and user studies
4. write up your findings; given the right results, we will support you in publishing.
5. extend “interaction across poses” started by previous project
6. support HCI1 class in writing applications for Multitoe
External Partner

**Microsoft Research, Cambridge, UK.**
The project will take place in cooperation with Microsoft Research in Cambridge, so expect help and mentoring from all of us, as well as your external partners.

**Skills**

During the project you will develop software and hardware including performance-critical GPU code. You will apply your knowledge of basic computer vision, build actuated mechanical devices, and write graphics-intense applications. Given the technical nature of the project, **excellent grades in HCI2 and Computer Graphics are important.**

**Group structure**

4-7 students. Roles, areas of responsibilities and specialization will be defined in the first week.

**Questions?**

Email us at dominik.schmidt@hpi.uni-potsdam or baudisch@hpi.uni-potsdam or come see us in the multi display lab (HPI main building, H.2 Atrium)
Project page: [www.hpi.uni-potsdam.de/baudisch/projects/multitoe.html](http://www.hpi.uni-potsdam.de/baudisch/projects/multitoe.html)