Summer Research Opportunities in Multi-Device Interaction with Professor Michael Nebeling in the Information Interaction Lab at UMSI:

Despite increasingly powerful wearable devices such as smartwatches and smartglasses (such as Microsoft's HoloLens), the available functionality and particularly the input capabilities are still severely limited, making them impractical for many complex tasks common to desktop environments. Rather than trying to modify the hardware or develop new input methods, the research projects carried out in the Information Interaction Lab (https://www.mi2lab.com) are exploring two new directions.

First, we are investigating how involving other devices can provide new interaction possibilities and enable tasks that are difficult to do using a wearable device alone. Pairing up wearable devices with other kinds of mobile devices in mobile settings or using sensors such as Kinect can provide much richer context and help design more powerful interfaces. Second, we are studying how a user can involve other users via crowdsourcing techniques and how getting them to complete complex tasks on their behalf can overcome physical constraints of the limited form factor. Involving humans in the process can help inform the design of future computer algorithms, but it is an interesting challenge in itself to develop human-based task workflows that yield the desired results.

This research adds to a growing body of knowledge on wearable interfaces, cross-device interaction, and crowdsourcing. The two main research questions are: (1) Which technical features are required and what are suitable interaction techniques to integrate and combine multiple devices with a wearable interface? (2) What are appropriate techniques for managing crowds from a wearable device and which kinds of tasks can be completed by workers on the user's behalf? Recent prototypes we have developed include a cross-device web browser that allows users to split web pages and distribute content between a smartwatch and other devices (XDBrowser, see CHI'16 and CHI'17 papers), as well as a wearable interface to Google Docs allowing users to write and edit papers from their smartwatch by directing crowd workers via speech commands (WearWrite, see CHI'16 paper).

Skills required:

My experience shows that students with a more technical background such as Computer Science do very well when working with me. At the minimum, you should have programming experience and should be interested in working with mobile/wearable and web technologies. Ideally, you are familiar with state-of-the-art web technologies, including HTML5/CSS3, JavaScript/jQuery, Node.js, and PHP. Programming experience with Android for Android mobile and wear projects and C# for HoloLens and Kinect projects is a big plus.

About Professor Michael Nebeling:

I joined UMSI as an Assistant Professor in 2016, after completing a postdoc in the Human-Computer Interaction Institute at Carnegie Mellon University, and a PhD in Computer Science at ETH Zurich. I'm looking for people who share my vision and interests in designing, building, and studying novel user
interfaces, powered not only by technology, but also by people. If you are interested in working with me, please email me at nebeling@umich.edu. You can also find out more about me and my work at http://michael-nebeling.de. More information about recent student activities and research opportunities in my Information Interaction Lab can be found at https://www.mi2lab.com.