Internship report

TableTop Interaction Laboratory

CHALMERS University of Technology, Gothenburg Sweden

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Background

Today worldwide development of products becomes increasingly popular. Designers or developers often have to work together on a project but they can meet each other only at high travelling expenses. Some form of virtual collaboration can help here to cut down travelling costs but still allow productive collaboration. This gives cause to develop tools to allow remote digital product development and planning. To support such collaboration, a tabletop interaction system called Motiva was developed at ETH Zurich. This system employs optical tracking, bottom projection on a large table and allows for multi-user interaction. Interaction on the table is done using common tools (interaction devices) like pencils, rulers, erasers, etc. Apart from allowing multiple users to interact on one table, the system provides collaboration capabilities for remotly located users. Currently an improved framework is being developed at the *Innovation Center Virtual Reality (ICVR)* at ETH Zurich and at the *TableTop Interaction Lab (t2iLab)* at Chalmers University of Technology. This framework is developed in tight collaboration with industry, especially with Qualisys AB in Gothenburg.

Location and Duration

The internship took place at the TableTop Interaction Laboratory (www.t2i.se) at Chalmers University of Technology in Gothenburg, Sweden.

Duration: from the *2. October 2006* until the *9. February 2007*.

Task

While the current Motiva system supports low-speed tracking of interaction devices around 20 Hz, the overall goal of the internship is to improve and extend Motiva so that it is capable of high-speed tracking (>100 Hz).

For this purpose an ARM microcontroller has to be programmed to communicate with a high-speed camera from Qualisys AB. The software on the ARM microcontroller should track and identify the interaction devices recorded by the camera at a frame rate of up to 500 Hz. The resulting coordinates of the devices have to be forwarded to a PC.

Apart from developing a system on an ARM microcontroller, the internship incorporates testing different camera configurations, making accurate timing measurements and adapting the existing

interaction devices to the new system.

Conclusion

The resulting software on the ARM microcontroller is a real time system, built from scratch, that proved to handle camera data up to 500 frames per second. It is adaptive and event based so that even on high load, the system continues to run robustly. The system is highly configurable so that it can be adapted easily to future changes in the Motiva system.

The research internship at the t2i Lab in Gothenburg was a great chance for me to learn a lot about low-level programming, microcontroller programming, hardware development and low-level debugging. The friendly and supportive atmosphere among the researchers at the t2i Lab helped me a lot to finish the task in time and solve some hard problems.

Contacts

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Confirmation

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