

# UROP for Summer 2008

Project title: Development of Tabletop and Handheld User Interfaces, and Simulation of Search and Rescue

## Project Overview

This statement describes work that will continue an existing project is funded by Thales Research and Technology, and which has employed several students at the Massachusetts Institute of Technology under the Undergraduate Research Opportunities Program (UROP). The work will be undertaken at the Humans and Automation Lab (HAL) at MIT.

The project is developing tabletop and handheld displays for synchronous remote collaboration. The particular application domain is emergency response teams. A microworld simulating an urban search and rescue scenario is being generated. The focus of the project is collaborative displays for sharing relevant graphical information between geographically distributed team members. The main displays support sharing of spatial information (maps), temporal information (schedules) and textual data (forms).

The work consists software development, design of graphical user interfaces, and implementation of a high-level simulation of some aspects of a previously defined urban search and rescue scenario. A visiting student will be working on the project over summer 2008. A UROP position is also available for summer 2008.

## UROP Work Description

The UROP project is to develop interfaces for collaboration between a handheld mobile device, and a large tabletop display. The application domain is urban search and rescue (USAR). A testing scenario has been previously defined. The asymmetry between the display devices and roles, and the time pressure inherent in the domain, make this an interesting new twist on computer-supported cooperative work. Because the system must be physically distributed, implementation of the interfaces is a challenge.

Interfaces will be created to support functions including the following.

- Maps: a collaborative mapping interface based on a web-based system (OpenLayers, which is similar to Google Maps) has been created. This is written in a combination of Javascript and Java. It will be developed a bit further to prepare it for experiments with users.
- Schedules: a graphical system for arranging the tasks of team members will be implemented. This will include handheld and tabletop views. The design of the schedules has been prepared – the task is now to write the software to generate the collaborative graphical schedule.
- Forms: an interface for collaboratively completing and submitting forms will be designed and implemented. For the USAR scenario, forms for searching buildings and reporting victims, will be created.

The implementation of the displays involves arrangement of the information on the tabletop display, and mechanisms for 'window management', which allows for some creative programming.

Most of the software development will be in Java. Experience with Java is essential. Use of the Java2D and threading APIs would be beneficial. Experience with Eclipse and SVN would be helpful. The mapping application is partly written in Javascript.

The synchronous collaborative nature of this application make the implementation more challenging than a standard single-user, single-machine interface. Understanding of networking

principals and multi-threaded applications is important.

## **Supervision**

The UROP will be working in the [Humans and Automation Lab](#)

Faculty supervisor: Prof. Mary Cummings

Direct supervisor: Dr. Mark Ashdown, room 37-307, <http://www.markashdown.name>, <ashdownm@mit.edu>.

Space and a computer are available in room 35-220. Use of a personal laptop would be useful. Access to the tabletop and handheld displays for testing will be available in 37-307.

More information is available by contacting Mark Ashdown.

The following paper gives a quick introduction to the project:  
<http://markashdown.name/research/Ashdown-Tabletop2007.pdf>