

# **The Pebbles Project: Using PCs and Hand-held Computers Together Proposal for a CHI'00 Demonstration**

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## ***Statement about Why a Demonstration***

We would like to give a live demonstration of the applications we have created as part of the Pebbles research project.

We have created a wide variety of applications that run on multiple computers. These applications are available on the Web, and have been downloaded about 15,000 times in the last year and a half. We have given many small demonstrations of these programs, and they are always well-received. Since we use multiple hand-held computers at the same time, during the demonstrations, we get people from the audience to operate some of the hand-helds. The main PC screen is where most of the action is (since the hand-helds are controlling the PC screen), so the audience can see what is going on. We have written a number of papers about various aspects of the applications (three are submitted to CHI'00), but people can get a better appreciation about the dynamics of multiple people interfacing with a PC from a live demonstration.

## ***Description of Relevance to HCI***

This research is about new interaction techniques that span multiple computers, both for individuals and for groups. There has not been much research on how a single user can use multiple input-output devices at the same time, but some of our applications do just that. Other Pebbles applications explore the issues of "Single-Display Groupware," which is when multiple people share a single display, for example projected onto a wall. The PebblesDraw application (presented as a paper at CSCW'98) allows people to use their PDAs as input devices for a shared whiteboard application that they all see projected on the wall. We are now performing some formal human-factors research on the parameters of many of these applications, which further elucidate the HCI issues.

As to the importance of this work, as PDAs become cheaper and more ubiquitous, and as pagers, cell-phones and even watches become increasingly programmable with input / output capabilities, the situation where a person has multiple devices available at the same time will become more and more likely. Most other research projects on hand-held computers focus on how these devices can be used to *replace* a PC, whereas we think it is just as interesting to explore how they can *complement* a PC. This research is also relevant to the whole area of "Smart Environments" (also called "Smart Offices," "Smart Houses," etc.), as people will be carrying their hand-held devices into these smart places, and will want all their devices to work together to provide a seamless, integrated user interface.

### ***Commercial Status***

All of the Pebbles applications are available for free download off of the world-wide web. We are negotiating with some companies about licensing some or all of the Pebbles technology, but we expect everything we present to be free.

### ***Presenter***

The presenter will be Brad Myers, principal investigator of the Pebbles research project. Brad Myers is a frequent presenter at CHI, and was a formal demonstration presenter at CHI'94 (on the un-related Garnet project).

Brad A. Myers is a Senior Research Scientist in the Human-Computer Interaction Institute in the School of Computer Science at Carnegie Mellon University, where he is the principal investigator for the User Interface Software Project, the Demonstrational Interfaces Project and the Natural Programming Project. He is the author or editor of over 190 publications, including three books, and he is on the editorial board of five journals. He has consulted for over 25 companies on user interface design and implementation. Myers received a PhD in computer science at the University of Toronto where he developed the Peridot UIMS. He received the MS and BSc degrees from the Massachusetts Institute of Technology during which time he was a research intern at Xerox PARC. From 1980 until 1983, he worked at PERQ Systems Corporation. His research interests include User Interface Development Systems, user interfaces, Programming by Example, programming languages for kids, Visual Programming, interaction techniques, window management, and programming environments. He belongs to SIGCHI, ACM, IEEE, IEEE Computer Society, and Computer Professionals for Social Responsibility.

## **Audio-Visual Needs**

I will need to project from my laptop in XVGA resolution. It would also be nice if there was some kind of camera that could show the hand-held computers onto the big screen for the audience to see. For example, a regular video camera that I could control so the audience could see what is on the PDA screen.

## **Script Outline**

I would give a brief outline of the goals and background of the Pebbles project (about 5 slides), and then jump right into the demonstration, going through each of the applications in turn (see accompanying CHI-format sheet for a description of the applications). The demonstration of each of the nine applications takes about 2 or 3 minutes (total, about 23 minutes), except for MultiCursor and PebblesDraw which take about 7 minutes. At the end, I will talk briefly about the Pebbles architecture that makes this all possible, future work, and credits.

1. Pebbles Project Title
2. Research Agenda
3. Pebbles Acronym
4. Hand-Held Computers
5. How are they connected
6. Remote Commander
  - 6.1. Controlling the Mouse from the PDA
  - 6.2. Controlling the Keyboard from the PDA
  - 6.3. Floor control issues
  - 6.4. User interface issues on Windows CE devices
7. Scribbling: Multiple users with their own cursors
8. MultiCursor: For special applications
  - 8.1. PebblesDraw shared whiteboard
  - 8.2. Single-Display Groupware issues: shared palettes, multi-user undo, etc.
9. Pebbles Chat
10. Slide Show Commander (Controlling PowerPoint from the PDA)
  - 10.1. Changes made as a result of Contextual Inquiry studies
  - 10.2. Windows CE version
11. Scrolling with the PDA
12. Task Switcher
13. Remote Clipboard
14. Web Assistant
15. Shortcutter
16. Overall Pebbles Architecture
17. Status and Future Work
18. Funding and Credits