Buddy Bugs: A Physical User Interface for Windows® Instant Messenger

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ABSTRACT
Buddy Bugs is a physical user interface to Windows® Instant Messenger (IM), where people are represented by glass bugs on a leaf. A bug lights up and moves about depending on the status of the person it represents. Touching a bug initiates an instant messaging conversation. Buddy Bugs' basic ideas include: making status information of a few key people more readily available; using its physical form as a peripheral display that can be situated appropriately in the environment; and taking advantage of people's spatial memory by having contacts associated with bugs at particular positions on the leaf.

Keywords
Notification, peripheral displays, physical and tangible user interfaces.

INTRODUCTION
Instant messaging systems such as Windows® Instant Messenger (IM) often take the form of a list of contacts that appear in a small window on the display. While very useful, they suffer a few problems.

1. They demand foreground attention: people have to look at them to determine the status of a contact.
2. They compete with other programs on the screen, and as a result are often covered up by other windows.
3. Because the position of a contact usually moves about the list depending on contact's on-line state, finding the status of a particular person means the list must be searched.
4. All people are treated equally in how they are displayed, even though only a subset of the people on the list may be relevance during a period of time.

To overcome these problems, we decided to build a physical user interface [1], where we would take the IM contact information of a few key people off the screen and onto a physical device.

What I Built
After exploring a few different possibilities for a tangible instantiation for MSN Messenger I settled on the metaphor of 'bugs on a leaf', pictured in Figure 1. In its current form, a person can quickly assign a contact (or 'buddy') on the IM list to one of the 3 bugs on a leaf. Each bug then acts as a physical surrogate for that contact. The bug lights when its IM buddy comes online. Blinking and dimming of the light shows the various availability/activity states of a buddy. The bug also turns around (i.e., it rotates up to 180°) depending on how busy the contact is. If one wants to initiate communication with that buddy, they merely tap the bug. Because of this, we deliberately made the bug forms inviting to touch.

Buddy Bugs addresses IM's previously stated problems as follows. First, it acts as a peripheral display that can be situated anywhere in one's environment. As a physical object it melds into the periphery. Even so, people can see the state of the bugs as their glance passes over the leaf or as they walk by it. It can make its information somewhat more salient through the changing lights and movements when a bug rotates. Second, because Buddy Bugs is a physical display, it does not compete with other programs. While there is a question of whether people would in fact want to have such a device in their environment, we made a concerted effort to design the Buddy Bugs to be aesthetically pleasing objects. Our hope is that people would consider it akin to an art piece that they would be willing to keep in their space. Third, because bugs have a

Figure 1, Buddy Bugs

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fixed space on a leaf, people's spatial memory can be used to associate a person with a bug; no searching is required. Fourth, Buddy Bugs deliberately does not show all contacts, and we expect that only one's key contacts would be assigned to a bug.

How I Built It

The leaf is made from papier machiêr dyed to exhibit natural and organic characteristics. Each bug on the leaf is made from hand blown glass in beautiful colours and unique patterns. The leaf is placed atop a base that houses the hardware that drives the system (Figure 2 right); bugs fit over holes in the leaf and connect to the hardware. We also constructed the base out of Plexiglas so that the hardware could be seen (we felt that the novelty of this device deserved that), yet it is done in a way that does not take away from the leaf and the bugs

Each bug contains a small circuit supporting a pressure sensor, two small lights, and a resistor that uniquely identifies it. This is then attached via an RS-232 9-pin serial connector to special hardware that includes a servo motor and special circuit boards and controlling software (called Phidgets) to control everything and to talk to the host computer.

Phidgets, or physical widgets, are special devices made by other members of our lab with the express purpose of making physical user interfaces easy to develop. In particular [2], Buddy Bugs uses three types of Phidgets: the PhidgetServo controls each bug's servo motor, the PhidgetInterfaceKit detects when a pressure sensor is touched and identifies a bug through its resistor, and the PhidgetPower control the brightness of a bug's light. Because one controls Phidgets through a host computer, all we had to do was write software that hooks into IM and controls the physical devices, and that initiates the appropriate IM conversation when a bug is touched. This was fairly easy to do.

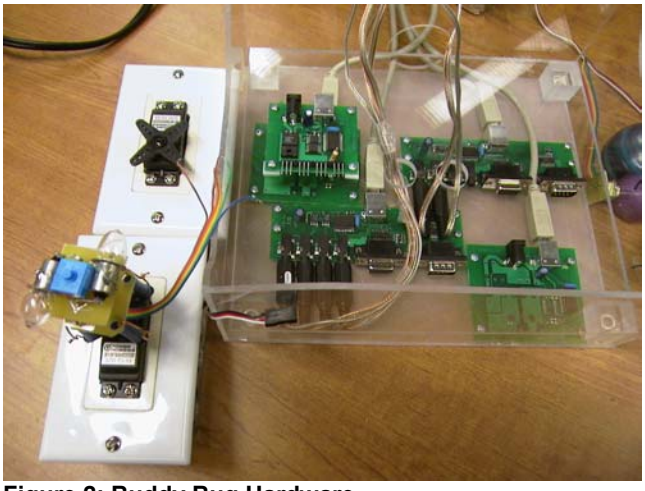

Figure 2: Buddy Bug Hardware

DISCUSSION

Although we have not yet formally evaluated Buddy Bugs, we have some insight into what will likely work and what will not. We believe that the 'bugs on a leaf' will provide a peripheral display, where light and motion attract the user's attention. These two physical cues work very well to quickly attract a person's interest. The look and feel of the system also gives a person a way to personalize their workspace as well as the representation of their buddies.

We also believe that people will remember who each bug represents—both by the look of the particular bug and its spatial location—as long as the association of a bug with a person is somewhat stable. Yet this association will fail if one constantly changes the person assigned to the bug. Another problem is size: the leaf and bugs are large and could get in the way in a person's workspace, or it could limit where it is located. We believe a smaller version would be somewhat better. Also, we use cheap servo motors whose sound can be just on the edge of distracting rather than subtle when the bugs are moved.

We should mention our difficulties due to our inexperience designing physical user interfaces. For example, we started with a cardboard mockup of the base - which we wanted to be as small as possible - to help determine the arrangement the Phidgets, servo motors, and the various cables. We then had a student industrial designer give us access to tools and to help us build the Plexiglas base. Yet our measurements were slightly off in the final version, because Plexiglas 'gives' less than cardboard. In retrospect, we should have built a medium fidelity prototype of the leaf and box to get the precise dimensions.

Finally, the availability of Phidgets meant that we could concentrate on the design of the interface instead of circuit boards and firmware.

SUMMARY

Buddy Bugs is a promising physical interface for IM. Our next step is to evaluate its use by deploying it to various people. As a secondary contribution, Buddy Bugs illustrates the value of using Phidgets to design a hardware system.

ACKNOWLEDGMENTS

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