

Environment Based Messaging

- Away From Person-Specific Message Passing -

Scenario

- Small number of people living together, close social relationships
- Need to coordinate tasks like purchasing, cleaning or meetings
- Displays are distributed in all rooms
- Messages can be sent via the mobile phone to one or more displays
- A person can answer a question or send a simple respond ("I read this message.") by turning or moving the display
- The sender of the message gets the answer on her mobile phone or via a web interface

Setup

- Small **wireless displays** distributed in the environment
- A **transceiver** communicates between displays and a PC
- PC runs **web server**, **database** and control applications
- **Message sending:**
 - To a specific display
 - To a set of displays
 - To all displays of a certain recipient
 - Sending with a web server enables access from PCs and mobile devices
- **Message handling:**
 - Browse through the set of received messages
 - Give one of the predefined answers
 - Input / selection is done by gestures
 - Feedback is given on the display

User Study

- 8 students, aged 21 to 25
- **Task**
 - Browse through 5 last received messages
 - Reply to them with given answers
 - Put back into stand-by mode
- **First session:** No instructions given
 - Most failed to find and execute correct gestures
 - "Not intuitive"
- **Second session:** Quick demonstration and instructions given
 - All users were able to quickly perform the task
 - 39 out of 40 questions answered correctly
 - "Easy to understand and quick to learn"
- **Third session:** Informal interviews
 - Users were able to play with / handle the device without thinking about how to use it
 - All users liked the idea in general, but compared it to the Short Message Service
 - Gestures as input were not seen intuitive and most people suggested to use buttons instead



Typical Usage

A display is standing on a table somewhere. It softly signals that there is a **new message**.



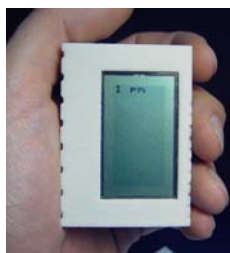
A user recognises the display. He takes it **into his hands** to see his message



The new message is **automatically displayed** ("When will the plumber arrive?"). Three **possible answers** are shown ("1pm", "2pm", "3pm").

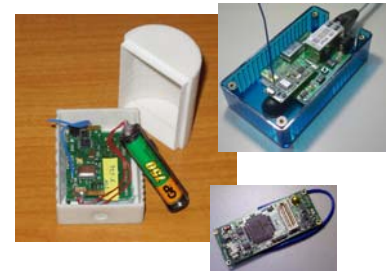


The user decides that he wants to **reply** with one of the **predefined answers**. By **tilting the device** to the left he chooses the answer "1pm". His answer is shown on the display and is sent after a short pause.



Hardware

- LCD Display BT96040, black and white, 5 lines à 16 characters, 40x96 pixels
- Two 2-axes accelerometers to sense orientation and gesture input
- Radio frequency transceiver for wireless communication
- Particle computer unit with PIC microcontroller
- XBridge transceiver converting from Particle wireless communication protocol to Ethernet packets and back



Software

- **User interface**
 - Web server and HTML pages
 - PHP code for dynamic data and database control
- **MySQL Database**
 - All registered users, profiles
 - Messages including their state and possibly answers to them
 - Time information, expiration dates, ...
 - Session management
- **Control applications**
 - Translate user entries into appropriate packets to be sent to the displays
 - Simple gesture recognition algorithm
 - Routing mechanism
- **Particle microcontroller**
 - API to display text at specific locations that can be rotated in steps of 90 degrees
 - Collection, (first) interpretation, and sending of sensor values

Future Work

- Support message reception from SMS
- Support a larger set of displays / devices with no or different reply possibilities
- Investigate how different form factors, designs, descriptions of displays influence the usability
- Perform the same user study again with the same people after some time to see if they still remember the way of interacting they learnt
- Follow other ideas that emerged: E.g., Displays without any response channel; their content can be seen and altered through a web page

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