

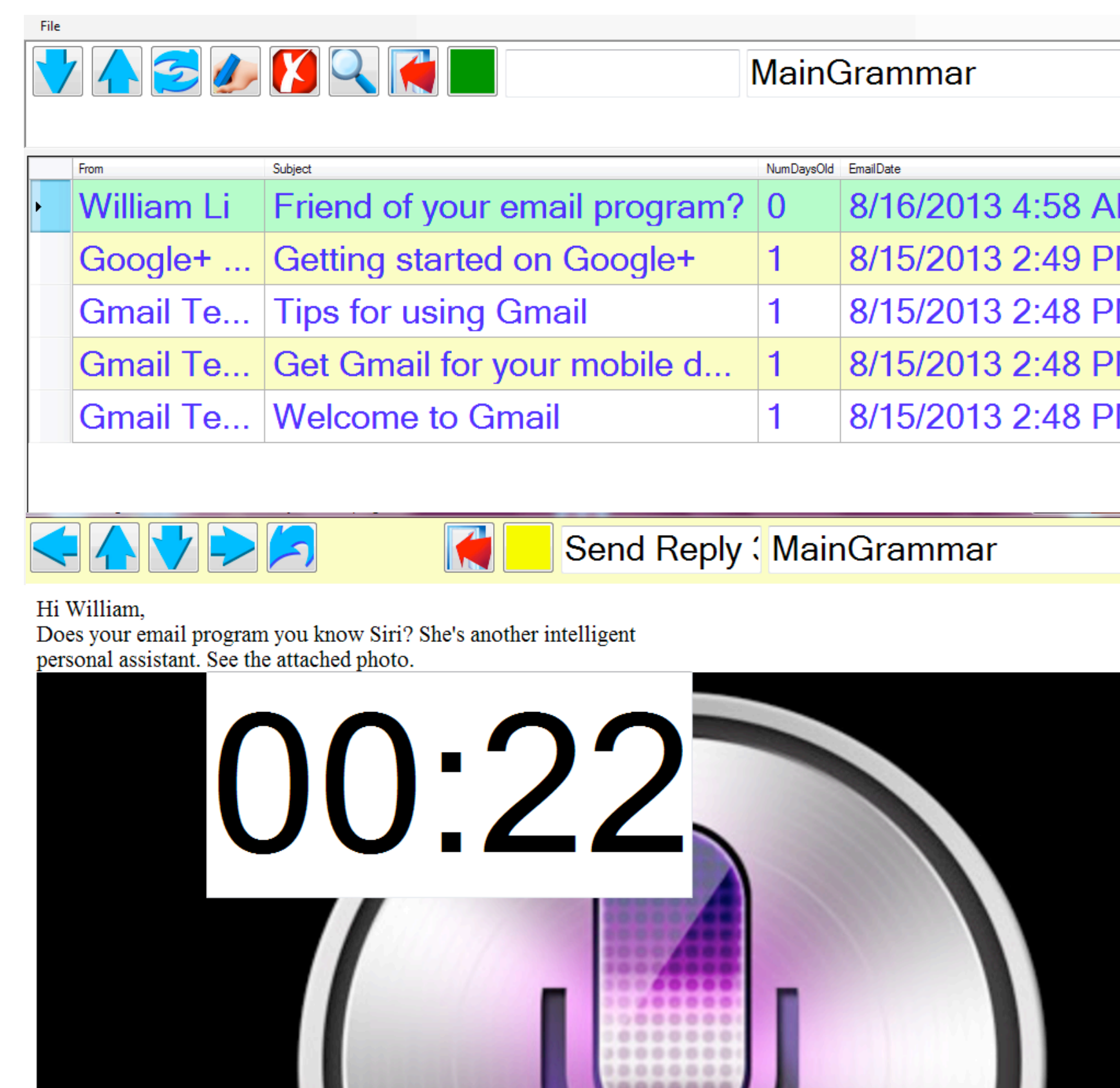
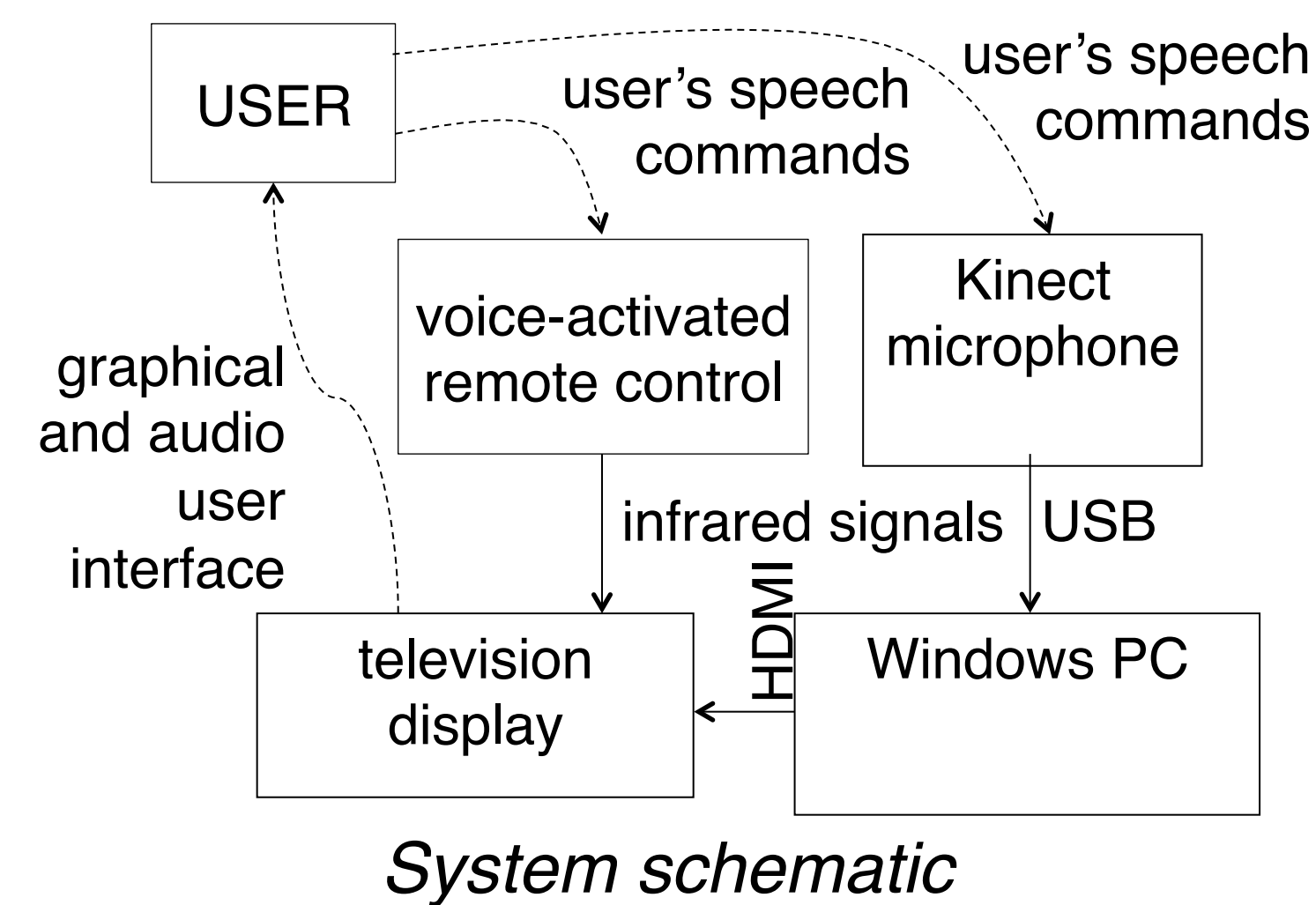
William Li, Don Fredette, Alexander Burnham, Bob Lamoureux, Marva Serotkin, Seth Teller

**What is required to actually deploy speech-based assistive technology and have tangible impact on a user's life? What can we learn from this implementation process?**

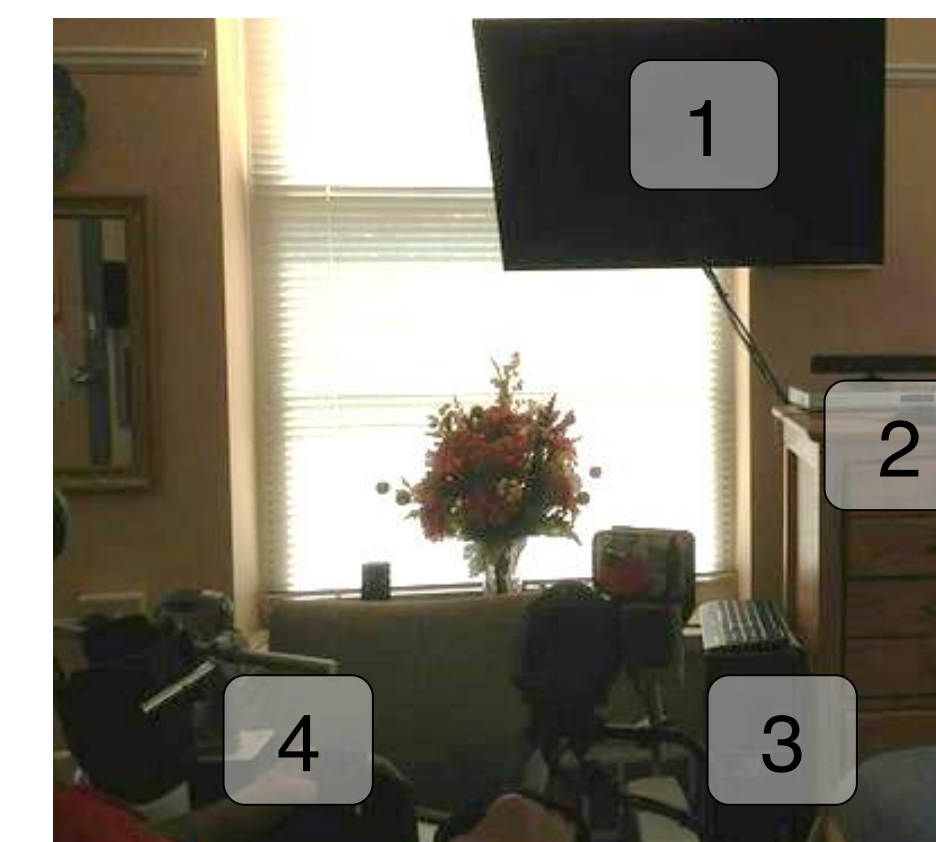
## Target User

- **Goal: Send emails without requiring assistance**
- Middle-aged male with advanced secondary progressive multiple sclerosis (SPMS)
  - Minimal arm control
  - No leg control
  - Optic neuritis
- Difficulty with existing speech recognition systems:
  - Abnormally strained vocal quality
  - Variable pitch control (vocal fry)
  - English as a second language acquired in adulthood
- High cognitive function, good working memory and eagerness to try new assistive technology

## Email Client Design



*Inbox (top) and message with audio reply timer (bottom)*



*Actual bedroom setup with 1) television, 2) Kinect, 3) computer, and 4) wheelchair with voice activated remote control*

## System Usage

- February 2012-June 2013: 460 received / 210 sent messages
- 10-20 messages/week at peak
- Observations on usage:
  - Messages with photos/videos are most highly valued
  - Audio-based email composition is robust to speech recognition challenges
- Email has augmented, not replaced, other communication channels (e.g. telephone)

## Factors for Success

**Design for a single user:** Our central goal was to enable our target user to communicate more frequently with friends and family.

**Multidisciplinary collaboration:** Our team works on AT research, rehabilitation technology, speech-language pathology, speech recognition, and software development.

**Frequent and long-term interaction with the user:** The current system is the product of many years of interacting with our target user and learning from his AT usage patterns.

**Enabling technologies:** The array microphone in the Microsoft Kinect and its integration with the customizable Windows Speech Recognition SDK made our system affordable and technically feasible to implement.

<http://csail.mit.edu>  
<http://thebostonhome.org>