

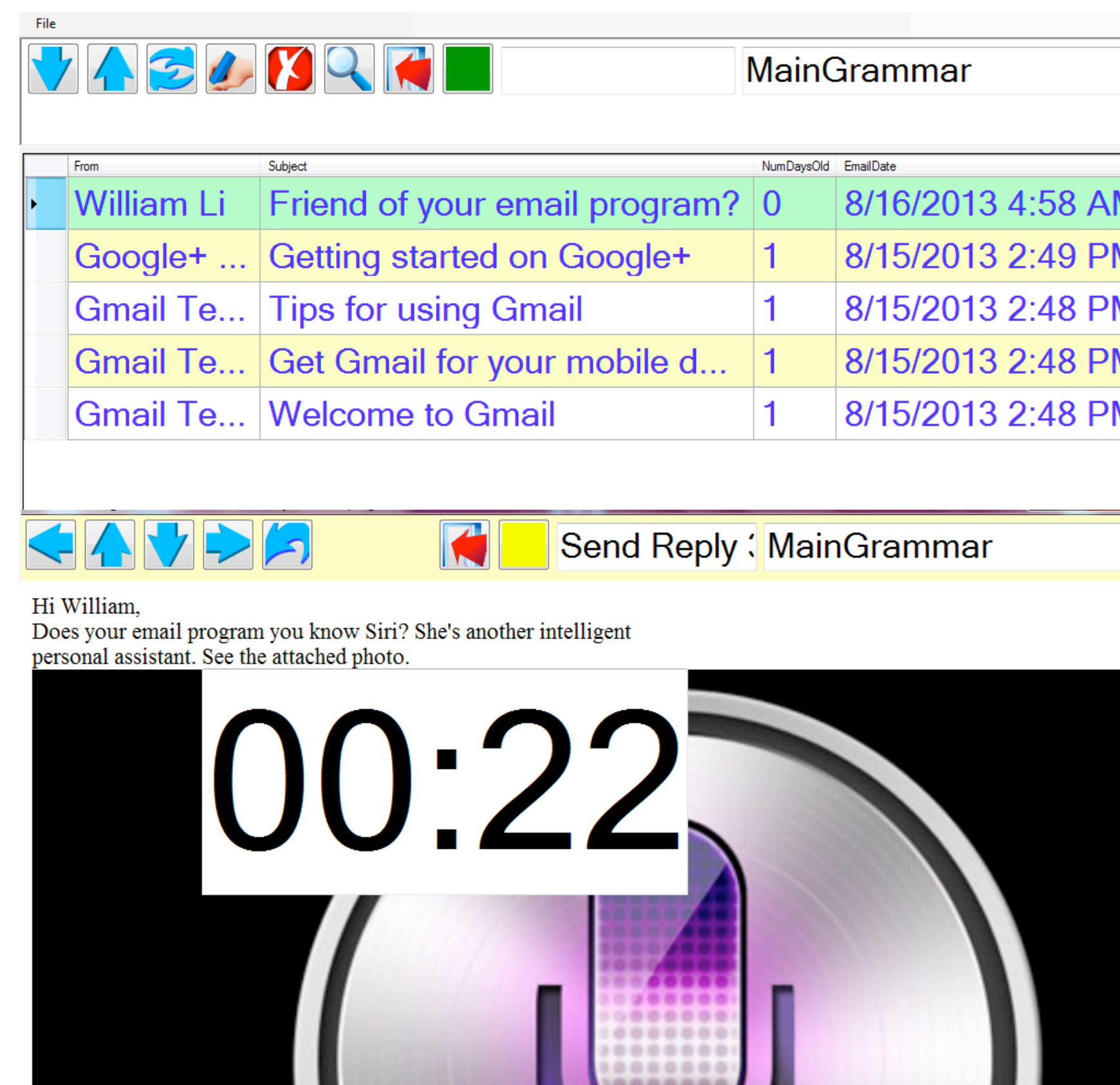
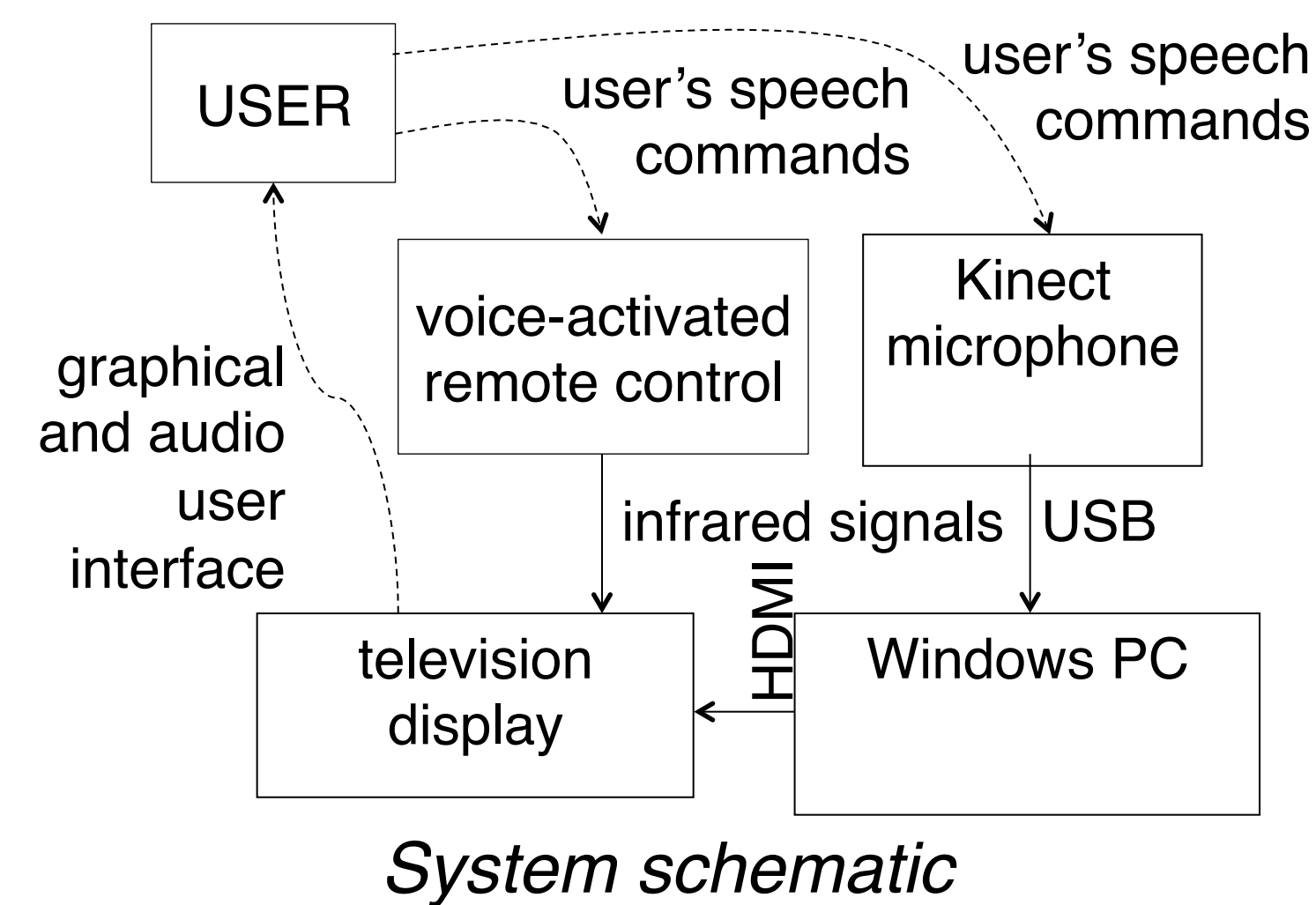
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What is required to actually deploy speech-based assistive technology and have tangible impact on a user's life? What can we learn from this implementation process?

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.

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