Exploring Embodied Approaches for Large Age Gap Sibling Communication through Technology Probes

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Introduction

Communication technologies between family members that are geographically separated is a widely studied topic. However, there has been relatively little research on designing technology for sibling communication, particularly among siblings with a significant age difference. In comparison to other relationships, sibling relationships are unique in that they are typically the longest-lasting family relationships, characterized by a blend of both intense emotional bonds and competitive or adversarial interactions

A previous study provided evidence showing the need to design solutions for large-age gap siblings connection. Building on this, our paper explores embodied approaches to support remote communication between large age gap siblings by focusing on interfaces that children are already familiar with and augmenting them with additional functionality.

[1] Qiao Jin, Ye Yuan, Svetlana Yarosh. 2023. Socio-technical Opportunities in Long-Distance Communication Between the Siblings with a Large Age Difference. In Proceedings of the 2023 CHI Conference on Human Factors in Computing Systems (CHI '23).

Research Questions

We developed two technology probes, Haptic Bubble and Emoji Board, systems utilize embodied interaction, which has been shown to be an effective way to engage children in remote communication. Our work focused on 3 goals were:

- testing the feasibility of the embodied design approach
- collecting information on how siblings use embodied communication technology
- inspiring new kinds of technology to support large gap siblings' needs

Emoji Board

Prototype Overview:
The Emoji Board System allows siblings to communicate using emojis. The younger sibling can scan physical emoji tokens to populate a message to send to their older sibling. The physical system includes a screen to see messages sent and received. From our created web site, older siblings can join the chat room and receive and send messages.

Technical Overview of Emoji Board:
In the Emoji Board system, the older sibling uses virtual setup that consists of a website to receive and send messages. The younger sibling uses a physical setup that consists of laser cut emoji tokens with RFID stickers, an RFID reader, LCD Screen, and two physical buttons.

Haptic Bubble

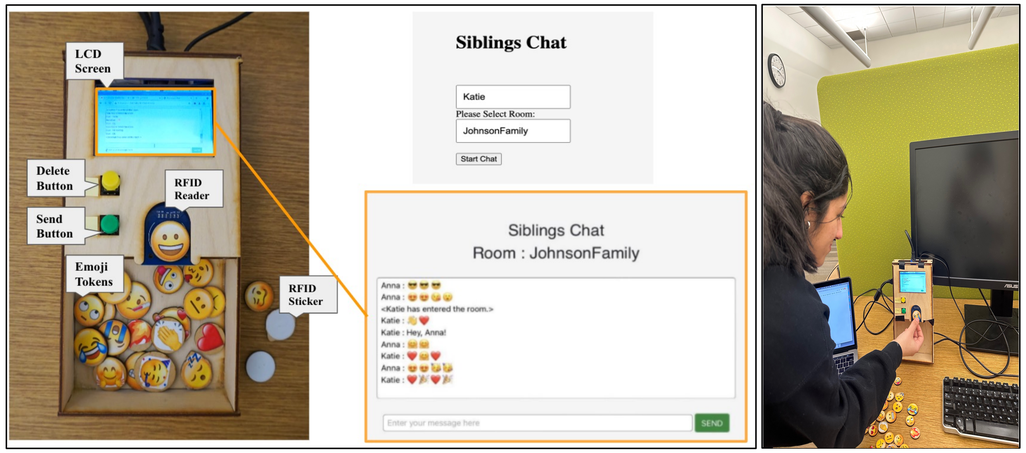
Prototype Overview:
The Haptic Bubble has a little Pop-It toy that younger siblings can push. Each push will trigger a sensor and update a website informing the older sibling of the younger sibling's push. From this website, older siblings can "pop" the younger sibling's toy remotely. The potential of this prototype carries the asynchronous communication giving siblings flexibility yet a fun way to stay in constant contact with each other.

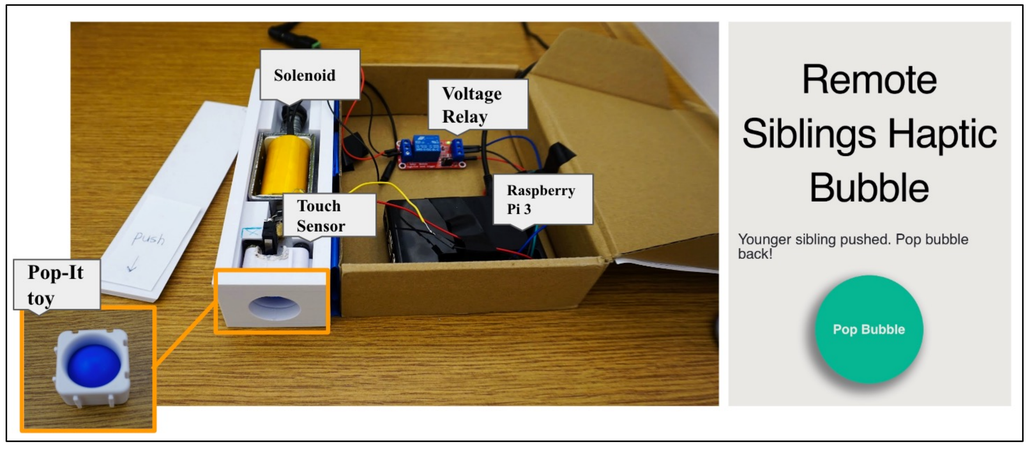
Technical Overview of Haptic Bubble:
Our current model has this Pop-It fidget with a 12V plunger solenoid placed under it, encompassed in a custom 3D printed case. There is a sensor placed under the bubble that triggers when the device is pushed. The bubble-solenoid system is connected via a relay to limit voltage currents sent to the Raspberry Pi. We created a webserver that directly connected buttons on the webpage to control the solenoid.

Preliminary Pilot Studies

We conducted a 45 minute preliminary pilot study for two sibling pairs.

- The first sibling pair (OS1, YS1) are **21** and **11** years old where the older sister has been living on campus and the younger sister at home with their parents for 4 years. Their primary interactions are through the older sibling calling her parents' phones weekly.
- The second sibling pair (OS2, YS2) are brother and sister who are **19** and **12** years old and have been living separately from each other for about a year. Both OS2 YS1 have their own phones and use Discord to communicate frequently.





Results

1. **System Building Goal:** The results showed that younger sibling thought Haptic Bubble and Emoji Board was more attractive than traditional text-based communication. When asked about how YS1 felt while using the Emoji Board, she said "Yeah, it was really fun. Way more fun (than texting)".
2. **Empirical Goal:** During the studies, both pairs were able to engage in communication while using the two probes. We saw a consistent theme of younger siblings enjoying the fact that they could capture their older siblings' attention quicker with the Haptic Bubble.
3. **Design Goal:** When we asked them to brainstorm future technologies about embodied communication, sibling shared ideas ranging from physical bookmarks that could share with older siblings where younger siblings are in a particular book to customized vibrations that feel like a touch to indicate a message from a younger sibling.

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