Alice in Bookland

Robotic Furnishings Delivering Public Library Services Outside During the Pandemic

Jilly Jiaqi Cai
College of Engineering
Cornell University
Ithaca, NY, USA
jc2496@cornell.edu

Jin Ryu
College of Engineering
Cornell University
Ithaca, NY, USA
jfr224@cornell.edu

Elizabeth Vicarte
College of Engineering
Cornell University
Ithaca, NY, USA
ejv34@cornell.edu

ABSTRACT

This project suggests how human-robot interaction might be of service to public institutions during the pandemic crisis. Alice in Bookland aims to ensure a safe environment for children to continue their reading experiences during COVID-19. Due to the lockdown throughout the country, lots of public organizations such as libraries are having a hard time providing their resources, with limited user entrance and open hours. Here, Alice in Bookland complements the situation via providing a safe space outside the library, encouraging readers' healthy reading habits without any undue stress during the pandemic, and raising community awareness of local library resources.

CCS CONCEPTS

• Human-centered computing • Human computer interaction • Interaction devices • Touch screens • Displays and images • Sound-based input/output

KEYWORDS

Human robot interaction; library; covid; LCD; LED; books; architectural robotics; robotics; enclosed space; outdoor space

---

1 Overall Design

Alice in Bookland lets children discover a whole new world inside the books of their choice. It mainly comprises three parts: left cover, guardian owl, and the right cover.

The guardian owl in the middle serves as a child-friendly figure that guides the child through their adventures, like the rabbit in Alice's Adventures in Wonderland.

The left and right covers serve as reconfigurable walls with LCD screens on them. The reconfigurable walls enclose the child by folding into a triangle; the sketch of the overall design can be found in Figure 1 and Figure 2. Inside the Bookland, the LCD screens enhance the child's reading experience by lighting up to match the mood of the story. Following are the functionalities of Alice in Bookland, utilizing the three main structures of the design.

Figure 1: **A photo collage of Alice in Bookland with the local library in the background and a child interacting with it.**

Figure 2: **Alice in Bookland covers fold into a triangle space to provide a safe reading enclosure for the user during COVID-19.**

1 Guardian Owl

When a child first approaches Alice in Bookland, the guardian owl greets them by flapping its wings. Then, the passenger will have two choices, either to keep passing by or to begin their adventure.

2 Into the Bookland

The adventure into the Bookland begins when the passenger accepts the challenge via a button on the left cover. The owl turns 180 degrees and the two walls gently enclose the user in a triangle-shaped pod. Inside, they select a short story or an excerpt provided by the owl via a digital tablet interface. As soon as they make a book selection, the inside screens of the walls light up based on the book's genre and display images that will transport the users into a different land. Each session is limited to 10-15 minutes. Once the owl knows that a certain page has been read, it interacts with the user by asking them book-related questions.

3 Quest and Further Adventure

After the reader finishes reading, they can choose to further their reading experience by accepting a quest from the owl. If they accept, the owl will give them a cue card with instructions that encourages the reader to explore the library. Right before the doors reopen, as a reward, the owl gives the reader a small acknowledgement sticker with their name on it so they can bring it home and remember this journey.

2   Design Process

The three members of the team first interviewed two librarians to validate our hypotheses about the local library's difficulties during COVID-19. We learned three important things:

1. People are not informed of all the services and activities the library provides online since the pandemic beganRight click on the inserted picture and select the **Format Picture** option.
2. People are not informed of the in-person activities that the library has slowly been reimplementing
3. It is difficult nowadays to host the kinds of events they did pre-pandemic due to safety concerns

After the meeting, all three members went through the ideation, prototyping and user study stages to design individual components, addressing various combinations of the librarians' concerns. Given space limitations of this paper, we will only discuss the main features of our individual designs that we will implement in Alice in Bookland.

1.1 Interactive Return Bot. Interactive Return Bot aims to help ESL students learn English in a fun way by making their book returning process special. When a passenger passes by the robot, it rotates 90° and greets by moving its arms. If the passenger agrees to return, it opens its mouth to receive the book. Then, it reads the book's barcode, and asks a simple question from the story. Using a morphological chart in Figure 3, the knitted owl shape was chosen to be the guardian owl of Alice in Bookland. A detailed video of this prototype can be found here: *__link__*.

Figure 3: **Morphological chart showcasing the materials, shapes, and interactions for the guardian owl**

1.2 The Cozy Apple.   The Cozy Apple shown in Figure 4 was initially designed to provide an outdoor event space for local libraries. The four walls have LCDs embedded on the interior that can display images and text that will create the atmosphere of the story as it is being read. We incorporate the moving wall design into Bookland to create an immersive atmosphere for the reader as well as to provide a safe place against COVID-19.

Figure 4: **The Cozy Apple Prototype with moving walls controlled by motors, incorporated into Bookland's cover**

1.3 Alice in Bookland (Original Version).   The original Bookland maps different sections of a physical book into a book-shaped architecture as an alternative interactive reading spot during COVID-19 and encourages readers to explore the local library. The text section is mapped into a bookshelf with books of various genres. When readers pick up a book, the LED lights embedded ceiling showcases different colors to portray the book's mood. Bookland ensures social distancing. The reference section of a book is mapped into scavenger book hunting clues that lead people into discovering the library. Here is a *__video__* showing Bookland's interaction with a person reading.

1.3 Networks of Bodies.   Three ideas were combined based on UX survey results of people's preferred functionalities and SUS survey results of interactivity of the system. We combined different components to create the final version of Alice in Bookland including the guardian owl of the *interactive return bot,* the LED screen, enclosed space hardware of the *cozy apple*, and the book shape and quest feature of the original *Bookland*.

3   Application

1 Scenario: Amy, 12, ESL Student

Amy is a 12-year-old girl who moved to the US one month before the pandemic started. As English is not her mother language, she has been practicing it by reading books and utilizing the ESL program in the local library. However, the program was paused due to COVID and she lost this very valuable resource. She has a school assignment to introduce her favorite English book to classmates; however, she doesn't know where to start. She hears about the Alice in Bookland structure from her other ESL friend and decides to try it out. Amy successfully convinces her mom to let her go because Bookland can create a safe enclosed space for reading. She is mesmerized by the friendly owl that leads her into the "fairy-tale" world of Bookland. She picks her favorite genre of fantasy novel and is introduced to an excerpt of "Charlie and the Chocolate Factory". The LCD screen shows "Welcome to the Willy Wonka World" and the LED lights mimic the colorful candies. The owl asks her simple questions to lead her understanding. She never thought reading would be this easy.

REFERENCES

[1]   __'"Do We Really Need It?'__ Council Leader Questions Library Service after Months of Closure." *The Guardian*, Guardian News and Media, 9 Dec. 2020.
[2]   Kozlowicz, Cathy. __"The Menomonee Falls Public Library Will Be Closed Indefinitely Because of Staffing Shortages Caused by COVID-19."__ *Milwaukee Journal Sentinel*, Milwaukee Journal Sentinel, 4 Dec. 2020
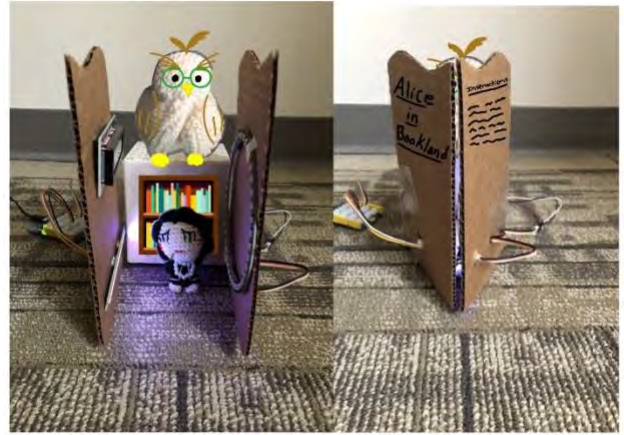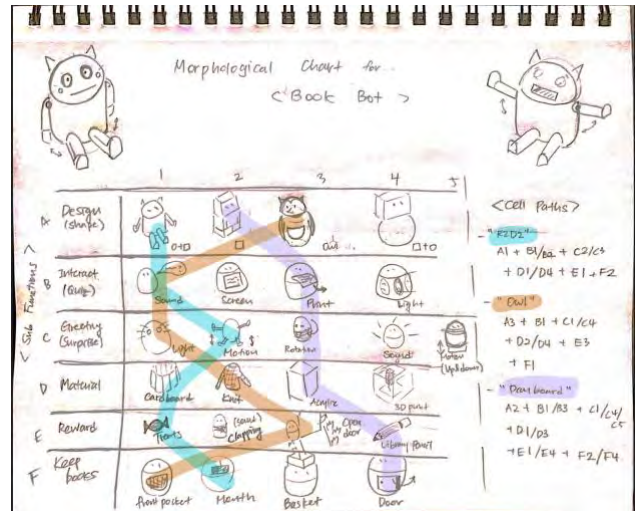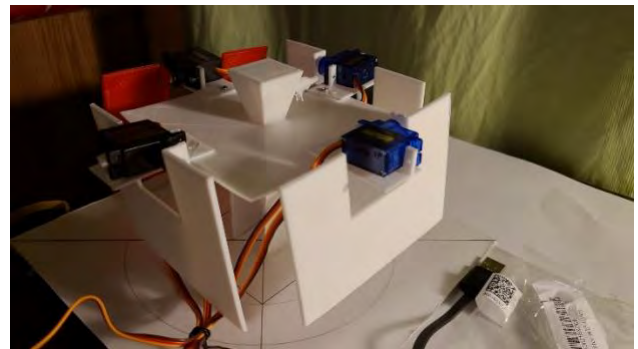
Thumbnail

Figure 1

Figure 2

Figure 3

Figure 4