

Emobie™: A Robot Companion for Children with Anxiety

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Abstract—Emobie™ is a concept for a social robot that provides companionship and comfort to children with anxiety. Emobie helps calm anxious children by responding to their emotions, both reflecting back emotions and helping them to increase coping skills. An additional goal of Emobie is to improve communication between children, parents, and therapists by sharing thoughts and feelings.

Keywords—social robot; robot design; child-robot interaction

I. INTRODUCTION

Anxiety disorders affect one in eight children and are the most common psychiatric disorders in children. Anxiety is treatable but 80% of children with a diagnosable anxiety disorder are not getting treatment. The median age of onset for anxiety disorders is age 6 [1].

Emobie (Fig. 1), short for “emotional being”, is a design concept for an emotional, social robot that provides companionship and comfort to children with anxiety. It does this by listening (through a storytelling application on a phone or tablet) and reflecting back the child’s emotions through expression in eyes, sounds, arms, and stomach. Emobie also helps improve communication between children and their parents and therapists by communicating the child’s emotions.

Social robots have been shown to be more effective than screen-based treatments when providing in-home therapeutic

support [2] due to their embodiment and ability to engage patients in long-term relationships. Paro, a seal robot, was found to reduce stress and improve psychological outcomes for elderly residents in a care house [3]. DragonBot, a furry dragon robot, has shown to be an effective platform for teaching children [4].

Not all children have access to professional therapists. A solution like Emobie is designed to provide support and companionship at home, whether the child is getting professional help or not. Emobie is a low-cost alternative to previous social robot designs.

II. GOALS

Emobie is designed for children age 5 to 10 who are experiencing anxiety. Emobie encourages engagement by listening to children’s stories (via wireless communication with a storytelling application) and reflecting their emotional states (through eyes expression, stomach color, arm movements, and sound).

Emobie provides calming responses (e.g. colors, sounds, and purring) to children when they are experiencing anxiety, sadness, or anger and also teaches them coping skills through the storytelling application.

The goal for Emobie is for children to be able to carry it everywhere they go, building a long-term and meaningful relationship. It helps children to overcome their fears. For parents and therapists, Emobie helps them to better understand and communicate with the children in their lives.

III. FUNCTIONALITY

A. Encourages engagement

Emobie is furry, expressive, and responsive. Emobie is made to be a companion that can travel with a child as they go through life. Emobie is small enough to be carried but also large enough to snuggle (approximately 12” in height).

B. Listens and reflects

Emobie listens to children as they express emotions that the child shares through the storytelling application, which in turn communicates emotions through Emobie. This external

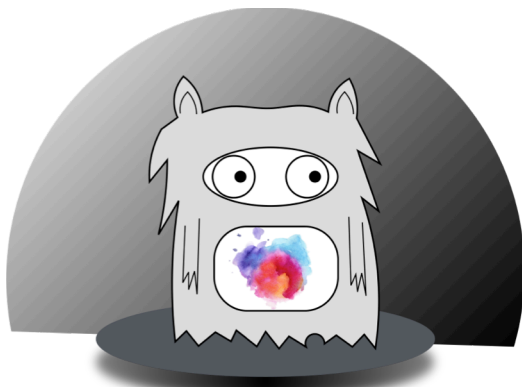


Fig. 1. High-level sketch of Emobie concept.



Fig. 2. Diagram displaying Emobie's emotional states.

emotional feedback loop shows children that Emobie understands them and also that it empathizes with their feelings. Emobie has the ability to express the following emotions (Fig. 2) through eye movements, sound, stomach color, and arm movements.

C. Remembers children's stories

Emobie remembers what children tell it through the text-based storytelling application and can track the child's emotions over time. Emobie also knows coping skills (input by parents and therapists) to suggest to the children when they are feeling anxious, sad, or angry.

D. Facilitates communication

Emobie helps children to express how they are feeling to their parents, therapists, and other caregivers by expressing the emotions that the child is feeling. Emobie can also be used to encourage children to share their stories of stressful events.

IV. DESIGN

A. Design goals

- Fun first – Emobie is a child's new best friend that they will want to carry everywhere they go.
- Autonomous – To be a companion, Emobie should interact with children without an adult operating it.
- Able to learn – Emobie learns the children's emotional states and can even learn new emotional states that are specific to a child (e.g. grumpy).
- Affordable – The materials were chosen to make a social robot accessible to more children.

B. Prototype materials (Fig. 3.)

- Brain – Arduino Uno. Chosen for its lower price point and ability to run Emobie autonomously.
- Eyes – 3.5" TFT 320x480. Screen allows for expressive eye movements.
- Stomach – NeoPixel Jewel covered with molded plastic creates an array of colors to express various emotions.
- Arms – Micro servo (x2). Servos move the arms into set positions depending on Emobie's emotional state.

C. Storytelling application

- Identify emotions – A tablet- or phone-based application will help children to identify their emotions through text-based storytelling and games.



Fig. 3. Low-fidelity Emobie prototype.

- Communicate with Emobie – The application will wirelessly communicate with Emobie, so that Emobie can reflect back the child's identified emotions.
- Platform – The triad of child, application, and Emobie becomes a platform that can then be used for therapy and education, among other purposes.

V. NEXT STEPS

Next we will build the storytelling application that will communicate wirelessly with Emobie. We will conduct an evaluative study to get feedback from children at University of Washington's KidsTeam, an intergenerational co-design group of children and adults developing new children's technologies [5]. Lastly, our goal is to get Emobies to children who could benefit from having a social emotional robot in their lives for education, therapy, and companion purposes.

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