

Therabot™: A Robotic Support Companion

Demonstration

Sarah Darrow, Aaron Kimbrell, Nikhil Lokhande, Nicholas Dinep-Schneider, T.J. Ciufu,
Brandon Odom, Zachary Henkel, Cindy L. Bethel

Mississippi State University

Mississippi State, Mississippi

{sd1209,awk73,npl25,nd194,tbc128,bdo25,zmh68,cbethel}@msstate.edu

ABSTRACT

Therabot™ is a robotic therapy support system designed to supplement a therapist and to provide support to patients diagnosed with conditions associated with trauma and adverse events. The system takes on the form factor of a floppy-eared dog which fits in a person's lap and is designed for patients to provide support and encouragement for home therapy exercises and in counseling.

ACM Reference Format:

Sarah Darrow, Aaron Kimbrell, Nikhil Lokhande, Nicholas Dinep-Schneider, T.J. Ciufu, and Brandon Odom, Zachary Henkel, Cindy L. Bethel. 2018. Therabot™: A Robotic Support Companion: Demonstration. In *HRI '18 Companion: 2018 ACM/IEEE International Conference on Human-Robot Interaction Companion, March 5-8, 2018, Chicago, IL, USA*. ACM, New York, NY, USA, 1 page. <https://doi.org/10.1145/3173386.3177842>

1 INTRODUCTION

Therabot™ is an assistive-robot therapy system designed to provide support to victims of trauma during counseling and home therapy practice. Victims of trauma can benefit from the use of stuffed animals not only as a means of comfort, but also as a grounding tool they can hold, touch, and cuddle [1].

2 ROBOT DESIGN

Therabot™ resembles a stuffed animal in size and feel, but incorporates sensors, actuators, and computational capabilities that allow it to interact with users and provide supplemental support throughout the course of therapy. The current version is the result of a five-year iterative design process, which has incorporated the feedback of several design surveys and studies.

The internal structure of the robot consists of two 3D-printed ABS plastic structures (front and back) connected with a pivoting joint. Proportionally, Therabot™'s frame is designed to mirror a dog's skeleton with minor concessions made for the hardware being used and the design goal of making it approachable as a stuffed animal. Therabot™ contains nine actuated joints, allowing it to achieve life-like motion through its head, legs, ears, and tail.

A system of sensors incorporated into the robot allow it to better understand how a user is interacting with it. Capacitive touch

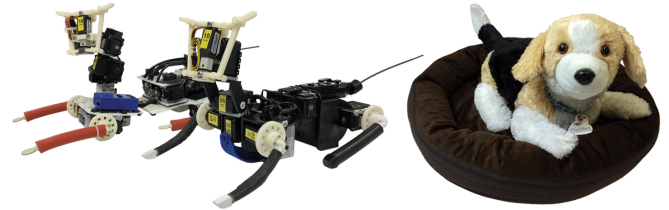


Figure 1: Two iterations of Therabot's™ internal structure and its exterior appearance.

sensors in the robot's fur detect a user's presence and identify different tactile gestures they might use. An inertial measurement unit allows for recognition of Therabot™ being moved, and a light sensor allows for awareness of environment changes such as room lights turning on or off.

A sound localization subsystem allows attending to users and the environment, using phase difference and amplitude between signals from three microphones situated at equal intervals. Each microphone corresponds to left, right and center direction. This task is accomplished by using a phase comparator in a phase-locked loop circuit to measure the phase difference, and using the output voltage from the microphones to measure the amplitude.

The sensing system is used to collect data that enables Therabot™ to effectively respond to stimuli autonomously. The system can be programmed and configured through a variety of interfaces (e.g., clinician interface, patient interface), which use a common software API for interacting with the system.

3 DEMO

This demonstration invites attendees to interact with Therabot™ while highlighting the platform's responsiveness to external stimuli, life-like motion, and control interfaces. We will demonstrate the motion of the legs, ears, tail, and head of the robot. Additionally, the robot will perceive its environment and users through its touch sensors, sound localization, and inertial measurement.

ACKNOWLEDGMENTS

This research was sponsored by the National Science Foundation Under Grant IIS-1249488.

REFERENCES

- [1] Jennifer Donatelli. 2006. Stuffed animals help pacify sexual assault victims. (January 12, 2006 2006).

Permission to make digital or hard copies of part or all of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and the full citation on the first page. Copyrights for third-party components of this work must be honored. For all other uses, contact the owner/author(s).

HRI '18 Companion, March 5-8, 2018, Chicago, IL, USA

© 2018 Copyright held by the owner/author(s).

ACM ISBN 978-1-4503-5615-2/18/03...\$15.00

<https://doi.org/10.1145/3173386.3177842>