Introducing the Cuddlebot: A Robot That Responds to Touch Gestures

Jeff Allen
Department of Computer Science
University of British Columbia
Vancouver, BC
jephalun@cs.ubc.ca

Laura Cang
Department of Computer Science
University of British Columbia
Vancouver, BC
laura.cang@gmail.com

Karon E. MacLean
Department of Computer Science
University of British Columbia
Vancouver, BC
maclean@cs.ubc.ca

ABSTRACT

We present the 'Cuddlebot', a cat-sized lap robot equipped with a full-body fabric pressure sensitive touch sensor which we use to recognize gestures. The Cuddlebot responds to different gestural input by moving its head and back, purring, and varying its breathing rate. Our research explores Cuddlebot's stress-mitigating effect on patients and children. We demonstrate our current gesture recognition system, wherein users can connect sensed gestures to response behaviours.

Keywords

HRI, touch-based gestures, flexible touch sensor, robotic behaviors, behavior authoring

1. INTRODUCTION

We present Cuddlebot, a therapeutic lap robot equipped with a touch sensor and covered in fur (Figure 1). In Cuddlebot's first appearance, we focus on its highly flexible touch and pressure sensor and associated gesture recognition system. A simple behaviour authoring tool will allow users to connect sensed gestures to response behaviours.

The Cuddlebot can move its head and tail and adjust its purring and breathing in potentially complex responsive combinations. Purring varies in rate, amplitude and roughness. A flexibly mounted ribcage expands and contracts to provide a breathing motion varying in rate, amplitude and symmetry. The head moves in two degrees of freedom, and the back can arch and straighten. Behaviors can be stored on the robot or remotely on a tablet controller.

To enable interactivity, we classify data from touch-based gestures in realtime as a subset of pre-selected gestures. When gestures are recognized, they can be used to trigger specific behaviors based on the interaction's designed objective, e.g. helping a distressed child to self-calm.

The Cuddlebot's behavior mapping tool, a first version of a more elaborate authoring system eventually to be used by a designer (an engineer, a caregiver or a Cuddlebot's own child user) is presently a simple webpage GUI that connects wirelessly to the robot from a tablet.

Figure 1: The Cuddlebot shown with fur covering.

2. DEMONSTRATION DESCRIPTION

During a demonstration visitors can author simple behaviors, and explore the gesture recognition accuracy by physically interacting with the robot in natural ways – e.g. stroking, patting, poking, squeezing. A visitor will be able to experience the system's response to their gestures (e.g. possible gesture classifications listed on screen in realtime), author simple robot behaviours, and experiment on the effect of linking different behaviour responses to specific gestural inputs. For demonstration purposes, the sensor may be either laid flat on the table ... AND/OR installed on one or more robots, to maximize efficiency with which multiple visitors can be accommodated.

3. DEMONSTRATION REQUIREMENTS

We will require a table with room for two people to sit behind. One demonstrator will manage the gesture recognition and the touch sensor, while the other handles the behavior authoring. We will bring two laptops, a tablet, 2-3 touch sensors, and 2-3 Cuddlebots (one as a backup). We will require two power bars.

HRI 2015 Portland, Oregon USA