iCat: an animated user-interface robot with personality

Albert van Breemen

Philips Research
Eindhoven, The Netherlands

albert.van.breemen@philips.com

Xue Yan

TU Delft
Delft, The Netherlands

y.xue@ewi.tudelft.nl

Bernt Meerbeek

TU/e
Eindhoven, The Netherlands

b.w.meerbeek@tue.nl

Abstract

We developed a robotic research platform called "iCat" for studying social human-robot interaction. The platform consists of the robotic character "iCat", which is a desktop user-interface robot with mechanically rendered facial expressions. Recently, Philips Research made this platform available for universities and research laboratories to stimulate the momentum in Human-Robot Interaction research [5].

1. Introduction

This demo demonstrates our prototype personal robot "iCat" (see figure 1). iCat is a generic research platform for studying various aspects of Human-Robot Interaction. The

Figure 1. Hardware setup of the "iCat".

robot has a height of 38 [cm] and lacks mobility, so that we can solely focus on the robot-human interaction. The iCat has 13 servos to move different parts of the head in order to create facial expressions (see figure 2), a stereo microphone to determine the direction of sound and a build-in webcam. Furthermore, iCat can be connected to a home network to control devices (e.g. VCR, TV) and to use the Internet. During this demo an interactive application will be shown, during which the user can interact with the iCat (using touch, speech and vision).

iCat's task is to recognize users, build profiles of them and handle user requests. The profiles are used to personalize domestic functions performed by the robot. For instance, different light and music conditions are used for every individual user asking iCat to create a 'relaxing ambience'. In order to learn rich user-profiles, a good social relationship between the iCat and the user is required, because both should understand each other and be willing to spend time in teaching each other things about themselves.

iCat's appearance and behavior are carefully designed to create this social relationship with its owner. First, the appearance of the iCat has been attuned to the domestic environment of consumers. Cats are already accepted as domestic animals and have a high "cuteness" level. Secondly, animation principles are applied to this robot in order to increase its life-likeness [2]. A dedicated robot animation engine [3] generates the believable (animated) robot behaviors.
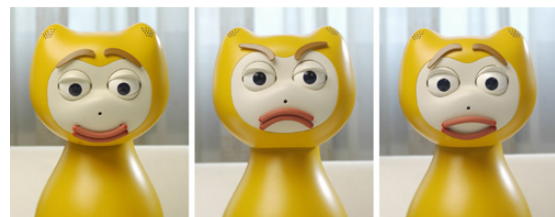

Figure 2. Some facial expressions. From left to right: happy, angry, surprised.

Figure 3. Various studies have been performed on how users interact with the iCat.

We developed a software platform, called Open Platform for Personal Robotics (OPPR) [4], for integrating the individual cognitive software components that make up the iCat software system. This framework allows a component-based software setup and provides runtime flexibility, which means that during runtime the system's behavior can be probed and software modules can be added or removed. This greatly speeds up the development of new applications for the iCat. Furthermore, OPPR contains graphical tools to create the animations for the robot.

Various user studies have been performed in a test facility called HomeLab [1] (see figure 3). During these studies users needed to perform a task while interacting with the iCat, such as playing TicTacToe (with children) or programming a VCR. These studies show measurable differences in effectiveness and enjoyability of the tasks the users had to perform for differently programming personalities of the iCat.

2. References

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