An Embodied Conversational Agent as a Lifestyle Advisor (Demo Paper)

Cameron Smith, Daniel Charlton,
Li Zhang, Marc Cavazza
University of Teesside
School of Computing
Middlesbrough, United Kingdom
+44 1642 218121
{c.g.smith, d.charlton, l.zhang,
m.o.cavazza}@tees.ac.uk

Jaakko Hakulinen, Markku Turunen
University of Tampere
Department of Computer Sciences
Tampere, Finland
+358 3 3551 8559
{Jaakko.Hakulinen,
Markku.Turunen}@cs.uta.fi

ABSTRACT
Persistent Embodied Conversational Agents (ECA) can be used to assist users in their daily activities. We introduce the Health and Fitness Companion (HFC), which is a conversational system aimed at promoting a healthier lifestyle. The system is embodied using the Nabaztag™ device, a wireless plastic rabbit supporting multimodal input and output. The HFC integrates a spoken dialogue system previously developed by some of the authors, and a cognitive model, based on Hierarchical Task Network (HTN) planning, which enables the ECA to reason on the user activities and generate plans for recommended activities. A typical demonstration scenario consists in two short conversation sessions between the HFC and the user. During the first the HFC helps the user to plan her day ahead, while the second involves reporting the activities actually carried out. The system has undergone early tests with generic users, which have demonstrated its usability and stability (89% successful dialogue completions).

Categories and Subject Descriptors
H.5.1 [**Information Interfaces and Presentation**]: Multimedia Information Systems.

General Terms
Algorithms, Human Factors.

Keywords
Embodied Conversational Agents, Planning, Human-Computer Dialogue, Assistive Systems.

1. INTRODUCTION
Embodied Conversational Agents (ECA) technologies can support many applications among which are assistive and advisory systems [1]. The concept of a Companion [4] refers to an ECA supporting user modelling and natural language conversation so as to provide advice and assistance on the user's activities. We have implemented a first prototype of such a system, which is designed to promote a healthier lifestyle, the Health and Fitness Companion (HFC). The HFC is embodied via a commercial device known as the Nabaztag™, a plastic tabletop rabbit connected to the Internet via a wireless network.

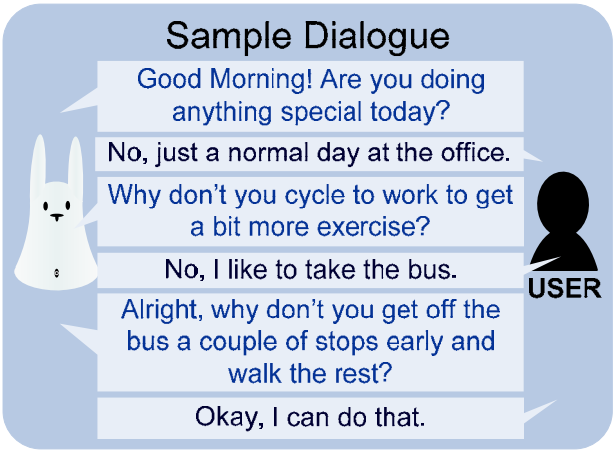

Figure 1: Example Dialogue Recognised by the System

2. SCENARIO AND USER SESSIONS
The HFC is designed to remain at home while the user leaves in the morning and returns in the evening. As such, the demonstration will comprise two short spoken dialogue sessions (7 dialogue turns on average). The first one represents the morning discussion between the user and the HFC, during which the user will plan her day ahead. This involves several topics such as transportation to work, choice of lunch, evening leisure activities and finally dinner. The HFC enquires about the user's plan to build a corresponding activity model, while at the same time offering suggestions to maximise the healthy nature of activities (physical exercise, food intake). An example conversation (from the working demo) is represented on Figure 1. The second dialogue session, representing an evening conversation, reports on the actual activities carried out and plans the remainder of the day. An important feature is that reporting can take place at variable stages of the day. During the demonstration, the user speaks in an external microphone (Fig 2) while the rabbit uses Text-To-Speech and its built-in expressive mechanisms (flashing LEDs and rotating ears).

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Figure 2: The Demo Environment Showing the Nabaztag™

3. TECHNICAL APPROACH

The HFC integrates a spoken dialogue system and a cognitive model generating task-based representations of user activities. A specific wireless server software (JNabServer) has been developed for integration with the Nabaztag™, to replace the native system.

The spoken dialogue system is based on the Jaspis dialogue architecture [3], and uses the Loquendo™ ASR for speech recognition (UK English). We have chosen a habitable language approach for speech recognition and have defined a speech recognition grammar of 354 rules. The cognitive model is based on an HTN Planner implemented in Common Lisp and communicating with the dialogue system via TCP sockets. The standard HTN formalism has been extended to include semantic categories in its methods as a basis for integration with the dialogue system. This makes it possible to understand sequences such as: "Would you like to cycle to work?" – "No, it's raining", by including weather conditions in the pre-conditions of certain HTN methods (those dealing with travel options).

The system operates through several cycles of planning and dialogue (Figure 3). The Planner initially generates a default user activity model, as well as ad hoc dialogue controllers which support acquisition of specific user preferences via dialogue. During dialogue, the activity model is updated by a re-planning step taking into account new preferences and information acquired through dialogue. When reporting about activities, the cognitive model searches the activity model and updates its tasks as completed or failed (this supports evaluation of user lifestyle and new default values for the next day).

The system has been tested with over 30 subjects, and achieved dialogue completion scores of up to 89% within this limited scenario. For a sample of 24 dialogues the level of utterance success was over 80% and 67% were completed with a satisfactory task completion (that is over 80% of the activity model correctly instantiated). It constitutes an end-to-end prototype of a physical ECA, based on a device which is known for its potential as a persistent, ubiquitous computing interface [2].

4. ACKNOWLEDGMENTS

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Nabaztag™ is a trademark of Violet™, who is thanked for authorizing the development by some of the authors of the local web server "jNabServer" used in these experiments.

5. REFERENCES

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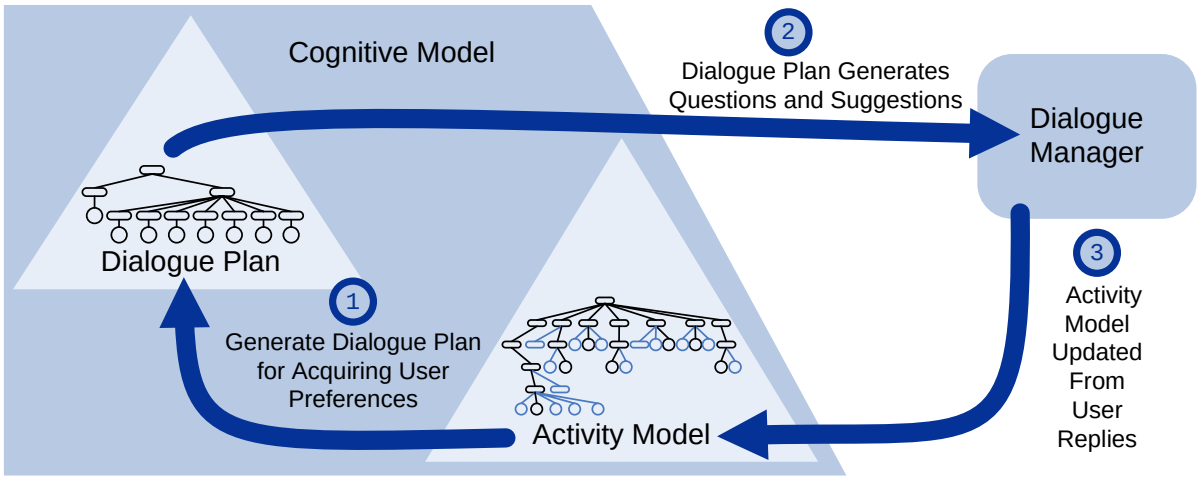

Figure 3: Generating User Activity Models: Planning and Dialogue Cycles.