



## Project InCA (Internet Conversational Agent)

### Putting a face to the Internet

Smart mobile phones and personal digital assistants (PDAs) have become portable electronic secretaries, helping people to access and share information regardless of their location.

But the experience of using these devices is constrained by inadequacies in their user interface. The desire to keep the devices small has meant that the input facilities - keyboards and touch screens - have been made small also, and using these devices is generally an unnatural and impersonal experience.

The desire for higher quality interaction has led Smart Internet researchers to explore the potential of voice recognition and synthesis systems as an alternative user interface. But rather than simply substitute the function of a screen and keyboard with voice control and output systems, the Natural Adaptive User Interface (NAUI) team has adapted the concepts of natural language systems to create a conversation agent. The goal is to create the most natural possible interaction between user and device. The concept has then been taken one step further, with researchers creating a digital 'face', complete with animated expressions and gestures, to represent the interface between the user and their network resources.

#### The ultimate personal assistant

The result is InCA (Internet Conversational Agent), a prototype PC and PDA-based user interface application. The project leader for InCA, University of NSW's Dr Mohammed Waleed Kadous, says speech is a very comfortable interface for users of mobile devices, and is especially appropriate in situations where people are busy with their eyes and hands. The addition of a natural language conversation agent allows the user to use conversational English to request and receive data and information. The use of animated facial expression increases the user's comfort level further still, through simulating the experience of talking to a 'real' assistant.

InCA is a network-based application, adhering to a vision of having a single virtual personal assistant that could be accessed through a wide range of devices with different interfaces.

**"The ultimate vision is of having a virtual personal assistant where the only difference to having a real one is that you can't have that face to face communication."**

Natural language technology means that InCA is able to respond accurately to a request even when it is asked in a variety of ways. This also reduces the learning curve for users of the system, as they are not required to memorise menu structures or specific commands in order to access information.

## Understanding the English language

Waleed says most natural language systems are constrained by a pre-set 'grammar', or list, of statements, with the system unable to interpret words or commands that fall outside of the grammar list. The system developed for InCA uses a speech recognition system from IBM to interpret and record every spoken word. The system's conversation agent then processes this input and analyses it for commands. Thus InCA can be far more specific in understanding the things that are being said to it, and can still translate statements that it doesn't inherently understand.

## You looking at me?

Waleed says the use of a digitised human face was intended to help inject some of the naturalness that a person experiences in person-to-person communication into the computer interface. Designed by Smart Internet researchers, the facial animation system provides for movements of the face's mouth and eyes that are sufficient to provide clean visual cues to the user. When the user speaks, the InCA face raises its eyebrows. When it is searching for or retrieving information, its eyes look to one side.

Waleed says the face assists people in creating a conversational environment. This is especially important for user groups who are not yet familiar with smart phone or PDA technology.

*"While people from a technical background did not see the need for a face, our group's previous work with teenage girls found their reaction was completely different, and the social aspect became very important, that there was a character there. And they much preferred the face than its absence."*

## A commercial future

Functions demonstrated with InCA include managing e-mail and appointments, and accessing Internet-based information such as weather reports and world news. An application has also been developed to assist people navigating around a university campus. Waleed says other possible applications could include checking stock prices or booking travel arrangements. There is also potential for this technology to assist groups such as the visually impaired or elderly, with access to transport timetables over a wireless network, for example.

Technology such as InCA will lead to the development of systems that are able to interact with users in a natural way through whatever mode is most appropriate to the situation.

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