Aware ICT

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Abstract: Pervasive Computing research has shaped a wide spanning research area at the boundaries of computer science and behavioral science, with an impressive outreach to how humankind is experiencing information and communication technologies in every breath of an individuals life. The explosive growth and now globe-spanning availability of data networks, and at the same time the radical miniaturization of ICT electronics and their embedding into literally everything, have lead to reversing the principles of how humans interact with computers. While in the age of "personal computers" the interaction with computers was Mostly user initiated, Pervasive Computing attempts for computer system (or in general ICT) designs that relief users from continuous, focussed and attentive interactions via text-input and visual-output devices. Instead, such systems implement implicit interaction principles, where information about a certain situation and observed user behaviour is taken as input, and unobtrusive provision of services or assistance is the output. In other words, the system itself employs mechanism to become "aware" about the situation, the context of it's operation, the user, etc., and responds with services accordingly.

A crucial prerequisite of an ICT system to be “aware” is the ability to autonomously sense and perceive, recognize, and even anticipate phenomena and their consequences in the context of its operation. Early signs of “aware ICT” are reflected in research contributions we have made over the past decade, starting with systems being aware about the physical situation they are operated in (“context-aware ICT”), and later on with systems being aware about the user and his activities (“activity-aware ICT”). More recent trends tend to make ICT systems aware about the social state of an individual (“socially-aware ICT”), and even the affective state and the emotional expressions of a user (“emotion-aware ICT”). Recently we have started to work on ICT systems able to estimate the level of attention an individual allocates to certain sources of information, and to shape the flow of information aligned with the cognitive attention capacity of the recipient (“attention-aware ICT”).

Towards "Aware ICT", in general we build on multi-sensor based machine learning, recognition and knowledge processing technologies. Implementing algorithmically advanced and computationally efficient software-frameworks for multi-sensor based recognition chains is crucial for the acceptance of aware ICT systems. To demonstrate some of the abilities of aware ICT, I will present our recent research prototypes in the domain of Recognition Architectures and Opportunistic Sensing (EU FP7 FET projects OPPORTUNITY, SOCIONICAL), Networked Embedded Systems and Energy Efficiency (FFG Projects PowerIT, PowerSaver, ZiT Project Sports Community Token), Human Computer Confluence (EU FP7 FET project HC2), Complex Systems and Coordination Architectures (EU FP7 FET project SAPERE), and Fundamentals of Collective Adaptive Systems (EU FP7 FET Projects PerAda, FoCAS, SAPERE).

**BRIEF BIOGRAPHY**

Alois Ferscha received the Mag. degree in 1984, and a PhD in business informatics in 1990, both from the University of Vienna, Austria. From 1986 through 2000 he was with the Department of Applied Computer Science at the University of Vienna at the levels of assistant and associate professor. In 2000 he joined the University of Linz as full professor where he is now head of the department for Pervasive Computing and the speaker of the JKU Pervasive Computing Initiative.

Currently he is focused on Pervasive and Ubiquitous Computing, Networked Embedded Systems, Embedded Software Systems, Wireless Communication, Multiuser Cooperation, Distributed Interaction and Distributed Interactive Simulation. He has lead international EU funded projects (EU FP7, FET: SAPERE, HC2, PANORAMA, SOCIONICAL, OPPORTUNITY; EU FP6, FET: BeyondTheHorizon, InterLink, CRUISE), but also national projects (DISPLAYS, SPECTACLES, PowerSaver, WirelessCampus, MobiLearn) research, and holds tight cooperation with industrial stakeholders (SIEMENS Project...