



# Ambient Communication Experience (ACE)

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## ABSTRACT

*Ambient Information Systems (AIS), permit a mode of expression that can easily exist at the level of subconscious realisation. Principles of cognition are usually aggregated under the main auditory, visual and often innovative tactile sensory impetus. AIS are designed principally for the aesthetic communication of non-critical information. This research focuses on the development of an Ambient Communication Experience (ACE) system. ACE is a synchronisation framework to provide co-ordinated connectivity across various environmentally distributed devices via sensor data mapping. The intention is to facilitate location-independent and application-responsive screening for the user, leading to the concept of technologically integrated spaces. Technologically integrated spaces have the potential to change our perception of information and our behavioural interactions associated with its provision. The aim is to deliver contextual information without the need for direct user manipulation, and engagement at the level of peripheral perception.*

*Keywords: Ambient Interfaces; Context Awareness; Data Mapping; Sensors; Ubiquitous Computing*

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## INTRODUCTION

Mankoff and Anind (2003) define the development of ubiquity as relying on the concept of user periphery; as any individual's full attention can only be factored to a few applications at any given time. They characterise the success of ambient displays,

or ambient information systems as having the capacity to modify the awareness of the user. In turn, these systems have the potential to adapt the behaviour of individuals based on the embodied information of the display. Often ambient information bears relevance to only a few individuals, at any given time; therefore the consideration of

aesthetics is elementary to such designs, especially when incorporated in work spaces. Ferscha, Emsenhuber, Schmitzberger and Thon (2006) place critical importance on the values of 'purpose', 'contextual relevance' and 'perceivable cohesion' in the conceptual structuring of awareness information. Ambient systems should remain secondary to the primary work task, yet still be easily comprehensible. Within the context of moving information from the periphery to the centre, another important factor is that of user cognitive state (Mankoff & Anind, 2003). Cognitive state is reflective of the users' in situ and the systems ability to augment their consciousness through sensory perception and cognitive behavioural interactions. System activity is operating on users' multimodal senses below the threshold of consciousness, requiring only subconscious recognition (Baars & Mc Govern, 1996). Screen based media and associated physical architectural space provide the medium for investigative studies in this area. The behavioural characteristics (as defined by Pousman & Stasko, 2006) of ambient information systems include the following:

- The presentation is of non-critical information.
- Information that can move from the periphery to the centre of the user's focus.
- The concentration is on 'the tangible' in the form of real objects in the environment.
- AIS provide non-distracting subtle changes reflecting information updates.
- AIS should in essence be aesthetically pleasing and environmentally suitable (Pousman & Stasko, 2006).

They further elaborate on the design space of AIS by defining the dimensions that create it: (i) reflecting on the information capacity of the system; (ii) the possible notification level of the design; (iii) representational fidelity from within the product; (iv) the aesthetic emphasis of the presentation (based on the work of Ferscha et al., 2006). Finally they propose an evaluation framework based on these dimensions (see Pousman & Stasko, 2006).

## MOTIVATION

The main motivation for this research is to provide sensor-activated communication. This will enable contextualised content viewing. Mobile devices offer convenient communication capabilities and have the potential to create intermediary support for the user and their environment enhancing an intelligent space. The ACE system's function is in the autonomous realisation of a user's presence through Radio Frequency IDentification-RFID readings with the expected objective of delivering contextual personal preferences permitting implicit interaction within the system. This communication will permit a many to many (n:n) exchange via shared distributed devices utilised in smart architectural space enabling the creation of surround and fluid protean displays. The 'ambientROOM' project is an example of such but incorporating a broad range of various interactions from light patches, soundscapes and water ripples. The aim of 'ambientROOM' is to extend and augment Human Computer Interaction beyond computer screens (Wisneski, Ishii, Dahley, Gorbett, Brave, Ullmer & Yarin, 1998). Carbonell (2006) reflects on ambient interface

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