

Keynote Talk Abstract

From Robotics to Pervasive Computing Environments

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In “Towards A New Architecture”, a ground breaking text of the modern movement in building architecture written in the 1920's, Le Corbusier famously remarked that, "*A house is a machine for living in*". This talk explores how, some eighthly years later, in the pervasive computing era, such a metaphor finds an even stronger resonance as modern digital homes contain a myriad of sensors, effectors, and computer based appliances plus networks making them even more akin to machines. Moreover, the talk takes Corbusier's metaphor further by arguing that "*pervasive computing environments, such as digital homes, can be regarded as robots people live within*"!

The motivation behind exploring this view is that in order to realise the full potential of the pervasive computing vision, numerous difficult scientific problems need to be solved, such how to model complex environments involving a mixtures of people, machines and natural phenomena, how to work with noisy, imprecise and incomplete sensing, how to undertake computation in real-time on relatively small processors, how to effect communication and collaboration between multiple units and how to program these networked systems to do the users' bidding.

To these ends, this talk will discuss how mobile robot architectures function, show video footage of robots solving problems akin to those in pervasive computing) and explain how mobile robot techniques can be applied to create pervasive computing systems, to solve the problems described above. In particular, the talk will discuss how *behaviour based architectures* together with machine learning can be used to create flexible self-programming embedded-agents that can be integrated into computationally compact pervasive computing artefacts. Examples of projects utilising behaviour based embedded-agents will be presented and results showing that such embedded-agents can self-program pervasive computing living environments, in the form of a smart room (the iDorm) consisting of some 30 networked devices, to meet a particular individuals needs in one to two days. The talk will also examine the role of emotion detection (affective computing) and how it can improve the performance of pervasive computing systems. Finally the talk will conclude by reflecting on privacy and ethics might affect the design and market acceptance of pervasive computing systems.