

## Invited talk

# Cooperative Systems of Physical Objects

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### Abstract

Notions of 'smart objects' often conjure up images of everyday items that begin to have a fantastic life of their own. In contrast, physical objects that are beginning to be integrated and deployed in computational infrastructures typically have little or no autonomy as computing objects. They reside at the periphery of such systems, and may be able to locally interact through sensors and actuators while being reliant on backend infrastructure to process what is observed and to decide what is actuated. In this talk we consider systems of physical objects that are more autonomous and independent of infrastructure but no less focussed on practical deployment and application. The systems we think of are decentralized (all computing embedded in the physical objects), highly contextualized (physical objects have a priori meaning and

affordance), and variable in configuration (resulting from physical use and movement of objects). The individual objects in such systems are naturally limited in the extent to which they can interact with the world: how they are manipulated and configured is dependent on what they physically afford and support, and what they sense and affect is inherently local. The general challenge we explore is how physical objects can form cooperative systems capable of richer interactions with their environment. The specific challenges we consider include how objects can cooperate to model activity and assess situations in their environment, how objects can establish their spatial configuration through cooperative sensing, and how we may build interfaces that exploit ad hoc composition of physical interface components.