The next generation of computing systems will be embedded everywhere in the physical world and will penetrate every domain of our daily life. These next generation systems will be dynamically connected to form ad hoc networks of embedded systems. Developing services and applications on top of this huge ubiquitous computing environment is constrained by the lack of proper programming models and system support to address its volatility, heterogeneity, and scale.

This talk will present Spatial Programming and Smart Messages, a programming model and its corresponding system architecture for outdoor distributed computing. Spatial Programming is a location-aware programming model that enables programmers to easily develop distributed applications over dynamic networks of potentially mobile embedded systems. To support Spatial Programming, we have used Smart Messages, a system architecture based on execution migration and self-routing. A prototype system has been developed to demonstrate the feasibility of the proposed solutions.

This talk will describe our experiences with building outdoor distributed applications over ad hoc networks of PDAs and Smart Phones running our prototype. The talk will also present TrafficView and EZCab, two distributed applications for intelligent transportation systems. These applications have been tested in real-life traffic scenarios that use only short-range wireless communication.

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