snBench

Virtualization and Programming Support for Video Sensor Networks

Azer Bestavros
http://www.cs.bu.edu/~best

Computer Science Department
Boston University

Abstract

Newly constructed or upgraded public structures – such as airports, hospitals, schools, malls, garages, and transit systems, to name a few – feature a wealth of networked sensors and actuators that are physically embedded therein, comprising what we term as a Cyber-Physical Infrastructure (CPI) that supports the various uses of these spaces. CPIs installed in public spaces are likely to be shared by a number of independent constituents in support of a diverse set of existing and envisioned CPI applications. While the power of most sensing-oriented networks lies in their refinement and optimization to achieve a singular task or goal, the premise of CPIs lies in their flexibility and programmability. Toward this end, we have developed snBench – an application development, deployment, and execution architecture oriented toward enabling accessible programming, efficient rollout, and extensible CPI component capabilities.

snBench provides the programming and run-time infrastructure necessary for developers to specify and deploy truly distributed applications over a heterogeneous network of Sensing Elements (SEs) and of Computing Elements (CEs). snBench offers the means via which applications may (1) locate, monitor, and query SEs and CEs for services they support, and (2) initiate, control, or otherwise use such SE and CE services. In addition to supporting these functionalities, snBench provides basic run-time resource management services for QoS support, including real-time scheduling and admission control functionalities. While the architecture snBench and most of its services target generic sensing modalities, our immediate target has been the Sensorium infrastructure at Boston University – a network of fixed video cameras of various capabilities used for monitoring and tracking purposes.

In this talk, I will present an overview of the snBench architecture, highlight its research challenges and the research topics it catalyzes, and discuss our first-generation design and implementation of snBench, which has been integrated into our software engineering curriculum at Boston University, and has been used to develop a host of security and surveillance applications atop video sensor networks.

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