Summary

Viptos (Visual Ptolemy and TinyOS) is a joint modeling and design environment for wireless networks and sensor node software.

Graphical Development. Viptos allows developers to design TinyOS programs by constructing block and arrow diagrams, given any standard library of nesC/TinyOS components.

Code Generation. Viptos automatically transforms the diagram into a nesC program that can be compiled and downloaded from within the graphical environment onto any TinyOS-supported target hardware.

Simulation. Viptos provides interrupt-level simulation of actual TinyOS programs, with packet-level simulation of the network, while allowing the developer to use other models of computation available in Ptolemy II for modeling the physical environment and other parts of the system.

Background

Viptos is built on Ptolemy II, a graphical modeling and simulation environment for embedded systems, and TOSSIM, an interrupt-level discrete event simulator for homogeneous TinyOS networks.

A TinyOS program consists of a graph of components written in an object-oriented style using nesC, an extension to C. Viptos includes the full capabilities of VisualSense, a Ptolemy II environment that can model communication channels, networks, and non-TinyOS nodes. Viptos presents a major improvement over VisualSense by allowing developers to refine high-level wireless sensor network simulations down to real-code simulation and deployment, and adds much-needed capabilities to TOSSIM by allowing simulation of heterogeneous networks.

Performance Evaluation

Example: Display sensed light level on LEDs

Example: Multihop Routing

Generated nesC code

Original nesC source code

Generated MoML code

ncapp2moml harvests TinyOS nesC application files and converts them into Viptos MoML model files.

nc2moml harvests TinyOS nesC component files and converts them into Viptos MoML class files.

Example: Display sensed light level on LEDs