

# WIRELESS SENSOR NETWORKS IN GAMING

Panagiotis Kikiras

*Department of Computer and Communications Engineering  
University of Thessaly, Volos, Greece*

kikirasp@inf.uth.gr

Leonidas Perlepes

*Department of Computer and Communications Engineering  
University of Thessaly, Volos, Greece*

leperlep@inf.uth.gr

Georgios Stamoulis

*Department of Computer and Communications Engineering  
University of Thessaly, Volos, Greece*

georges@inf.uth.gr

**Abstract** In today's model of computing, we interact directly, one-to-one, with our desktop PCs, mobile phones, and personal digital assistants. In the near future though, the majority of computers will be embedded deep in the world around us, hidden inside our homes, roads, farms, hospitals, and factories. When we are in control of hundreds or thousands of computers each, it will be impossible for us to interact directly with each one. The time has come to transition from interactive to proactive computing. These proactive computers will anticipate our needs and sometimes act on our behalf. Wireless sensor networks represent this paradigm shift in computing.

## 1. Introduction

A wireless sensor network (WSN) is a wireless network consisting of spatially distributed autonomous devices that use sensors to cooperatively monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants, at different locations. WSN have become popular due to their brilliant prospects, to be useful in a wide variety of environments, like monitoring of environmental attributes, intrusion detection, and various military, civilian applications and video games.

In video games we can use WSN nodes as game controllers. A game controller is an input device used to control and govern the movement or actions of an entity in a video or computer game. A controller is typically connected to a video game console or a personal computer. The type of element controlled depends upon the game, but a typical one would be the players character actions and movements. Below we will describe how we create a game controller using WSN nodes.

## 2. Tmote Sky Board Speculations

For the purposes of this application we need motions measurements. The hardware which was used was a selection of MICA2 Motes from Crossbow Technology Inc. Specifically the Motes used were MPR400CB model with CC1000 900mhz data radio. The sensor boards used were MTS310CA which enable the mote to measure Light and Temperature and are supplied with Microphones, Sounders, Tone Detection Circuits, 2-Axis Accelerometers, and 2-Axis Magnetometers. The base station interface unit, MIB510CA model, is RS232 based and serves two main purposes:

- 1 It allows the user to reprogram any mote by plugging the mote directly into the base

- 2 It operates as part of the root node interface giving the PC a data conduit on to the radio based sensor network.

### 3. Software and Application Architecture

The architecture of the system is based on java open source software and comprises of three parts:

- 1 The sensors software. It deals with the instructions of the hardware that control sensing behavior, such as sampling and reporting frequency, is implemented in NesC programming language and its services are offered by TinyOS.
- 2 The Collection software. It is responsible for receiving the node measurements and forwarding them, through the Serial Forwarder interface, to the video game.
- 3 The measurement representation tool .It is the main interaction point between the game and the sensor network and undertakes to control the game according to measurements.

### 4. Game Examples

The video games we use in order to test our system are based on java open source software.

- **The Moving Table:** In this case the player controls the tables angle with a mica2 board, trying to point the moving ball in the black hole.
- **The Breakout game:** In this case the player uses the mica2 board to control the movable paddle. With this paddle the player tries to bounce the ball upward and prevents the ball to touch the bottom of the screen.
- **A Flight Simulator:** In this case the player uses the mica2 board to control a plane. The plane flights according to the measurements of the 2-axis Accelerometer of mica2 board.
- **Pong game:** Pong is based on table tennis. In this case there are two players with a mica2 board each, controlling a paddle, trying to bounce the ball backward to the other players paddle. The interesting with this game is the need of 2 players simultaneously, which requires the ability to recognize measurements from different by our system.