



SPINE: Signal Processing In Node Environment

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SPINE (*Signal Processing In Node Environment*) is a framework for the distributed implementation of signal processing algorithms in wireless sensor networks.

It provides a set of on node services that can be tuned and activated by the user depending on application needs.

SPINE is released as Open Source project under LGPL 1.2 license and is available on line at <http://spine.tilab.com>.

The SPINE framework has two main components, namely node and server side.

The sensor node component, designed in TinyOS environment and written in nesC language, includes several utilities for signal processing such as data storage buffers, mathematical function libraries and common feature extractors used in signal processing. Furthermore, it includes also a communication protocol to transfer processed and raw data with the coordinator. The SPINE framework has been structured to be platform independent and may work with different platforms running TinyOS 2.x. In this way commercial boards (Telosb with SPINE sensor board, MicaZ with mts300 and Shimmer are already supported) as well as proprietary ones may use SPINE functionalities, once interfaces with the sensors are implemented. Existing SPINE functionalities (e.g. on node signal processing capabilities) can easily be configured by the SPINE coordinator (server side) and new ones can be introduced as far as they implement the defined Function interface.

The server side component consists of a Java-based interface that an application running on the WSN network coordinator can use to manage the sensor nodes or make service requests. SPINE provides a lightweight Java API that is easily portable to devices of various capabilities that can be used as coordinators, such as a PC or a mobile phone. The server node acts as the coordinator of the sensor network and manages the network, set up and activate on node services depending on the application requirements and more.

SPINE framework has been used for signal processing intensive applications such as Body Sensor Networks (BSN) ones with different kind of sensors (e.g. accelerometers, gyros, body temperature, ECG etc) but its flexibility and modularity make it suitable for developing any kind of applications that requires sensors' data processing.