

**ENHANCING REAL TIME CAPABILITIES OF NANO-RK FOR
TELOSB PLATFORM**

CSC714-FALL 2011 PROJECT PROPOSAL

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TEAM MEMBERS

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MOTIVATION

A wireless sensor network consists of spatial distributed autonomous sensors to monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion or pollutants and to cooperatively pass their data through the network to a main location. The development of wireless sensor networks was motivated by military applications such as battlefield surveillance. These networks are used in many industrial and consumer applications, such as industrial process monitoring and control, machine health monitoring, and so on.

Nano-RK is a fully preemptive reservation-based real-time operating system (RTOS) that can be used in wireless sensor networks. It includes a light-weight embedded resource kernel (RK) with rich functionality and timing support using less than 2KB of RAM and 18KB of ROM. Nano-RK supports fixed-priority preemptive multitasking for ensuring that task deadlines are met, along with support for CPU, network, as well as, sensor and actuator reservations.

Nano-RK currently supports full functionality for the Firefly sensor networking platform as well as the MicaZ motes. Our aim is to enhance the capabilities of Nano-RK for the Telos Rev. B platform (TI MSP430F1611). Motes that are generally used in wireless networks require radio stack to communicate with other motes in the network. Sensors are required to collect data from the environment they are posted in. These two components are critical for the usability of a mote in a sensor network. This project aims at implementing the radio stack and light and temperature sensor modules for Nano-RK on the TI MSP430F1611 platform

PROBLEM DESCRIPTION

Telos Rev.B platform has the following components, chipcon CC2420 (radio transceiver), photo synthetically active radiation sensor (light sensor), temperature sensor along with other sensors. Currently Nano-RK doesn't support the above mentioned components for Telos Rev.B platform. Our project goal is to provide support for the radio transceiver, light sensor and temperature sensor components for the TI MSP430F1611 platform under Nano-RK. Along with the above support our aim is to implement the power save mode under Nano-RK for this platform.

OUTLINE

Due to the time constraints for project completion, our goal is to first implement the radio stack for NanoRK. On completion of the radio stack implementation we propose to implement modules for the light and temperature sensors. Then we will attempt to provide support for the power save mode (sleep mode) for NanoRK on this platform. To implement the above functionalities we will first study the data sheets of the component along with those of Telos Rev.B platform specific hardware to implement the radio stack and enabling other sensors.

Along with them we will also be referring to other similar embedded operating systems (MantisOS), which have the above modules implemented for the Telos Rev. B platform. Also we will be referring to the implementation of radio stack in Nano-RK for a different platform (TI MSP430x5438).

TIMELINE

October 24

Project proposal submission

October 24 - November 1 (Devendra and Krishna):

Study required data sheets and refer to implementation of Radio stack for TI MSP430x5438

November 1 - November 8 (Devendra and Krishna):

Completion of radio stack module in Nano-RK

November 8 - November 16 (Devendra):

Completion of Light & Temperature sensor modules in Nano-RK

November 8 – November 16(Krishna):

Completion of power save mode module in Nano-RK

November 16 - November 23(Devendra):

Testing the code for radio communications, light sensor and temperature sensor functionality with the same test cases as in HW1

November 16 - November 23(Krishna):

Testing the code for radio communications and power save mode.

November 23 – November 29 (Krishna and Devendra):

Writing final report and project presentation

WEBSITE

<http://www4.ncsu.edu/~kkolla/CSC714/proj.html>

REFERENCES

- *Nano-RK: an Energy-aware Resource-centric RTOS for Sensor Networks*, 26th IEEE International RealTime Systems Symposium RTSS05 (2005) by Anand Eswaran, Anthony Rowe, Raj Rajkumar.
- MSP430x1xx Family Data Sheet

- MSP4301611 Part Specific Data Sheet
- Nano-RK website www.nanork.org
- Mantis OS website www.mantisos.org
- Wireless Sensor Networks http://en.wikipedia.org/wiki/Wireless_sensor_network
- CSC 714 Lecture Slides