Abstract
The new EnHANTs prototype will be controlled by a KMote, which is a sensor network module implemented on TelosB platform with a MSP430 MCU. The MSP430 is an ultra-low power RISC mixed-signal micro-processor from TI. To program and communicate to the KMote, an ARM architecture based Raspberry Pi (RPI) is used as a gateway between the PC and the prototypes. The software drivers are modified to support the Energy Harvesting Module (EHM) and the Ultra-Wideband Impulse Radio (UWB-IR) on the new platform.

New EnHANTs System Diagram
- Main PC (Java GUI)
- Switch
- Raspberry Pis
- EnHANTs Prototypes
- KMote Uploading Board
- MSP430 Microprocessor (at bottom)
- UWB Board v1
- Ethernet Port
- USB Port
- Flexible Photovoltaic
- UWB Antenna
- Thin-film Battery
- EHMv6

KMote Adapting Boards
- Previous Microcontroller: ATM128 MCU on MICA2 mote, with one 51-pin connector
- KMote: MSP430 MCU, with two 30-pin connectors
- KMote Adapting Boards are built for testing the pin configuration from the MICA2 mote to the KMote. They are a pair of separated boards, one connects to the RPI through USB port, the other connects to the MSP430 MUC for programming

Communication with the Gateway and Serial Forwarding
- Objective: To communicate with multiple tags simultaneously and efficiently, the RPI is used as the gateway between the PC and the prototypes
- Implement TinyOS tool-chains on the Raspberry Pi gateway
- Bootstrap load (bsl) build files to program the MSP430 microcontroller
- Develop serial data forwarding method between the EnHANTs prototype and the RPI, the RPI and the PC in both directions (dashed line)

EHM Driver Implementation
- Objective: Read dynamic battery value and solar cell value from EHM
- Develop new external sensor module and configuration for the MSP430 MCU
- Build new interface for the KMote to communicate with the EHM and to transmit data through 1-Wire
- Implement ADC ports configuration on the MSP430 MCU
- Integrate and test data transmission method using Java GUI

UWB-IR Transceiver Driver Implementation
- Objective: Transmit and receive serial data using the UWB-IR transceiver between multiple EnHANTs prototypes
- Modify the previous Timer Controls and the Interrupt Controls of ATM128 MCU to support the new MSP430 MCU
- Improve the physical layer driver to apply data transmission through the current UWB Impulse Radio
- Test the transmitting behaviors and the timing sequence using the new driver controlled by the MSP430 MCU
- Next step work: Implement communication two prototypes in both sending and receiving part.

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