MansOS: Easy to Use, Portable and Resource Efficient Operating System for Networked Embedded Devices

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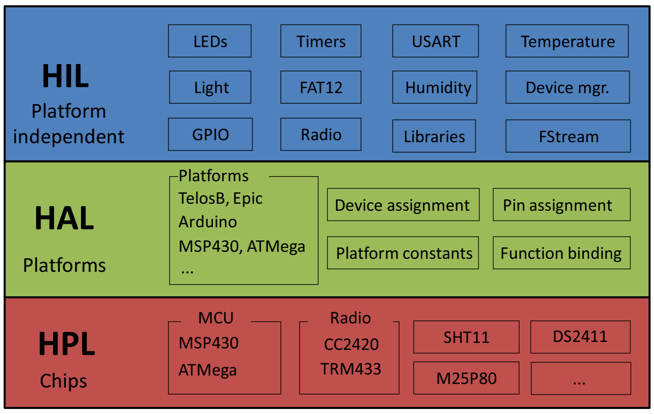
Often software for wireless sensor networks (WSNs) is developed using a specific event based operating system (OS) such as TinyOS. However, this requires steep learning curve for the new developers. Other operating systems for embedded devices have limited support for new hardware platforms. Our goal is to provide an operating system for resource constrained devices that is easy to use for researchers and developers familiar with C programming language and Unix operating system concepts. In addition, we provide a framework for agile portability to new hardware platforms.

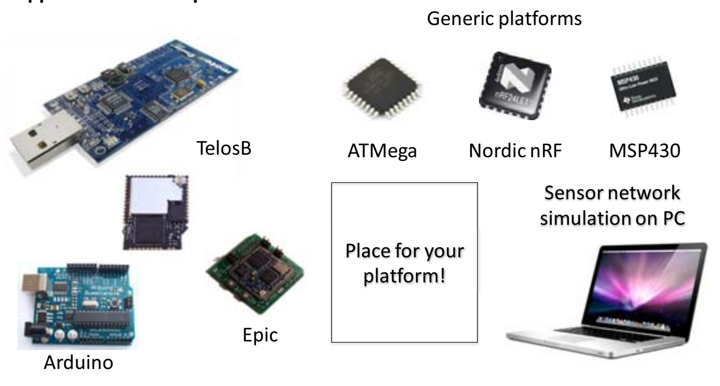
MansOS Features:

- Plain C programming
- Resource efficiency
- Easy portability
- TelosB, Epic, Arduino platforms
- Generic platforms: ATMega, MSP430
- Nordic platform under development
- Mote simulation on PC
- Unix paradigms: sockets, threads
- Development environment for Linux, MacOS, Windows(Cygwin)

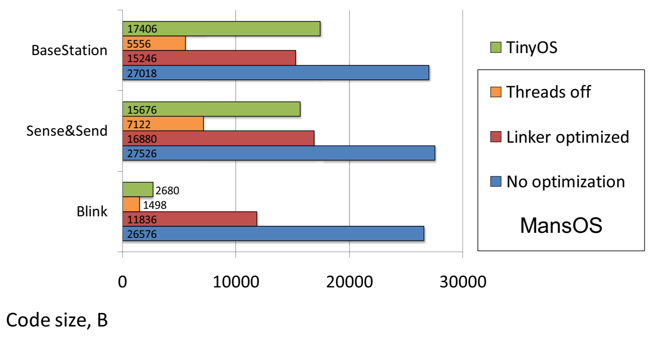
MansOS Architecture



Supported hardware platforms:



MansOS code size optimizations compared to TinyOS



SenseAndSend app example with threads and sockets

```
#include "stdmansos.h"
#include "socket.h"

// the port number we will use
#define PORT 45
```

Receive light reading from another mote, display it on LEDs

```
void listenForData() {
    uint16_t receivedLight;
    MosSocket_t *socket;
    socketCreate(&socket, &receivedLight, sizeof(receivedLight));
    // bind socket to the specified port
    socketBind(socket, PORT);
    while (1) {
        socketRecv(socket);
        setLeds(receivedLight);
    }
}
```

Periodically sense light and broadcast it over radio

```
static void senseAndSend(void) {
    MosSocket_t *socket;
    socketCreate(&socket, NULL, 0);
    while(1) {
        uint16_t light = readLight();
        socketSend(socket, NULL, PORT, &light, sizeof(light));
        // put thread to sleep for a second
        msleep(1000);
    }
}
```

Entry point for the application

```
void appMain(void) {
    // use simple CSMA-type MAC
    initSockets(MAC_SIMPLE, 0);
    // spawn a thread for listening
    defaultThreadCreate(listenForData);
    // go to sending loop in the current thread
    senseAndSend();
}
```

MansOS used for apple tree monitoring

MansOS used for lynx monitoring: mote attached to "experimental lynx"

http://mansos.net

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