Mote Runner Platform Long Range IoT

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Environment

- Distributed simulation
- VM-based OS
- Familiar tools & programming languages
 - Eclipse, Web Browser
 - Java and C#
- Modular libraries
 - Communication protocols
 - I²C, SPI, ADC, GPIO



Environment









- Highly optimized byte-codes
 - Java card experience
 - Built-in delegate support for WSN
- Target platforms (8/16/32-bit)
 - Minimum 64 KB Flash, 4 KB RAM
 - Atmel ATmega1281, TI MSP430, ARM Cortex M3
 - Off-the-shelf motes (e.g. IMST WiMOD)
- System libraries
 - Communication protocols
 - Built-in over-the-air programming and management⁵



Source Level Debugging

- Sensor Feeding
- Script-based testing environment

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File Edit Navigate Search Project Run Window Help		
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Caunch_Blink [Saguaro Simulation] Saguaro debugger System Thread [02-00-00-00-AF-27-F0] (Suspended (breakpoint at line 31 in Blink)) \$taticsinit() line: 31 Loader.non_virt\$nextData(Loader, byte[], uint, uint) line: 579 MOMA.handleLipData(int, byte[], uint) line: 185 LIP.dispatch(int, byte[], uint) line: 1239	Clear motes	♥ Image: Second system ● ● Blink [line: 31]
U Blink, java 🔅		
<pre>// create a new timer object timer = new Timer();</pre>		
// turn off all LEDs initially		
allLedsOff();		6
<pre>// initialize object required for callback blink = new Blink();</pre>		U



Web-based

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Netview

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- Data Visualization
- Developer tools

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Status:

From:

Events:

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Saguaro: None

Live-Scroll:

To:

Netview

Stop

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Netview

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Timeline



Radio & Comm.

- Applications shielded by system API
- Wireless
 - IEEE 802.15.4 (custom,6loWPAN,ZigBee)
 - Radio chips (RF23x, CC2x) @ 2.4 GHz & 800 MHz
 - Virtually any chip with an SPI/I2C/UART
 - Bluetooth, WiFi
- Wired
 - USB (HID), Serial, Ethernet
- MQTT integration
 - MQTT-S using (TDMA) protocol



- ISM: 433/470-510, 868, 902-928 MHz
- Adaptive data rate: 300 bps 100 kbps
- Relatively low TX/RX current: ~10-12mA
- 2-way communication w/ good interference immunity: spread-spectrum w/ FEC
- Range w/ line-of-sight: >10 km
- Low-cost parallel channel GW
- End-to-end security: secure channel from device to application server

Long Range IoT How To Connect Billions of Devices?



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