Intro to the Workshop and to the IoT training kit

Marco Zennaro
T/ICT4D Laboratory
ICTP-Italy
WSN options

IPv6-based

Gateway-based
WSN options

- Open WSN
- Proprietary WSN
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<tr>
<th>Open WSN IPv6-based</th>
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### WSN options

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The table shows options for Wireless Sensor Network (WSN) technologies. IPv6-based indicates the use of the IPv6 protocol, while Gateway-based indicates a network architecture that includes a gateway for connectivity to other networks.
Open Hardware

Open-source hardware consists of physical artifacts of technology designed and offered by the open design movement.

Hardware design (i.e. mechanical drawings, schematics, bills of material, PCB layout data, HDL source code and integrated circuit layout data), in addition to the software that drives the hardware, are all released with the FOSS approach.
Arduino

Arduino is an open-source electronics prototyping platform based on flexible, easy-to-use hardware and software.

http://www.arduino.cc
Why Arduino?

Arduino is:

- Inexpensive
- Quite easy to learn
- Flexible
- Good for sensing and controlling
- Great for use in education
Software

The programming language is based on **wiring** and in terms of syntax (almost) identical to C++.

The development environment is based on **processing** - both wiring and processing are **open source** components.
Hardware

Arduino boards are based around Atmel processors (ATM168, ATM328).

8 bit controllers (new DUE board is first with 32 bit)
16 / 8 Mhz
Approx. 32k of memory for code
Run on 3.3, 5 (and up) Volts
Hardware

[Diagram of an Arduino board with labeled parts: RX+TX LEDs, Pin 13 (L) LED, Digital Pins, FTDI USB Chip, USB Jack, Power LED, Reset Button, ICSP Header, Microcontroller, Power Selection Jumper, Voltage Regulator, Power Jack, Power Pins, Analog Input Pins, Made in Italy label, and a website URL for Arduino.]
Arduino compatible boards

List of Arduino compatible boards
Arduino shields

Pin usage details for 317 shields from 125 makers, and counting!

List of Arduino compatible shields
Arduino shields

Self-balancing Skateboard

Self-balancing machines shield
From Arduino to WSN

- external sensors
- wireless
- batteries
Squidbee by Libelium
Squidbee by Libelium
Squidbee by Libelium
Seeeduino
Seeeduino
Seeeduino
Smart Citizen Kit
Smart Citizen Kit
Smart Citizen Kit

SECOND LAYER - SENSORS BOARD

TEMP + HUMIDITY
DHT22

CO
MICS-5525

NO2
MICS-2710

SCK BASE
SOCKET

SOUND

LIGHT

2C
SOCKET
Smart Citizen Kit
Smart Citizen Kit
SODAQ Mbili
The Atmega 1284P is the ‘big brother’ of the 328P.

128kB flash for your programs (that’s 4x more than the 328P)
16kB memory (that’s 8x more!)

Two hardware serials (allowing USB and the Bee module to work at the same time).
SODAQ Mbili - features

Micro SD card slot has been added for storage (as well as the existing 16Mb Flash memory).

A super-capacitor has been added for the Real Time Clock. This allows the RTC to remain ticking (for several days) after the battery has been removed.

The board still runs on 8MHz and at 3.3V.
Grove switched row now switches. Additional I/O lines have been added, in total there are: 6 analog lines, 10 digital lines, two serial ports and the I²C which are available through the Grove sockets.
Grove system

The Grove system is a modular, safe and easy to use group of items that allow you to minimise the effort required to get started with microcontroller-based experimentation and learning.
Grove system
Grove units: button
Grove units: LED
Grove units: Temperature
Grove units
SODAQ Mbili - Xbee

Switchable power supply for the GPRSbee. Allowing for better control and complete power down of the GPRSbee module (saving several μAmps).
Xbee
IoT training schedule

The schedule and training material (pdf of lectures, code examples, etc) are available here:

http://wireless.ictp.it/rwanda_2015/

We will have 3 hours in the morning (9-12:30, with a tea break at 10:00) and 3 hours in the afternoon (14-17:30, with a tea break at 15:30).

The workshop is hands-on! Please make sure you test, experiment and learn!
"What we have to learn to do, we learn by **doing**."

Aristotle
Thanks

Marco Zennaro
mzennaro@ictp.it

http://wireless.ictp.it