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EMBEDDING SUCCESS

Internet of Things

Internet of Things

Scenario



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Scenario

The training session will help bring up a solution for the development of an Internet of Things, addressing :

- Sensor: temperature sensor, humidity, accelerometer, LED
- Gateway: Linux platform relaying sensor and actuator data to the server
- Server: Linux server receives the data, database and storage web service to display information

Internet of Things

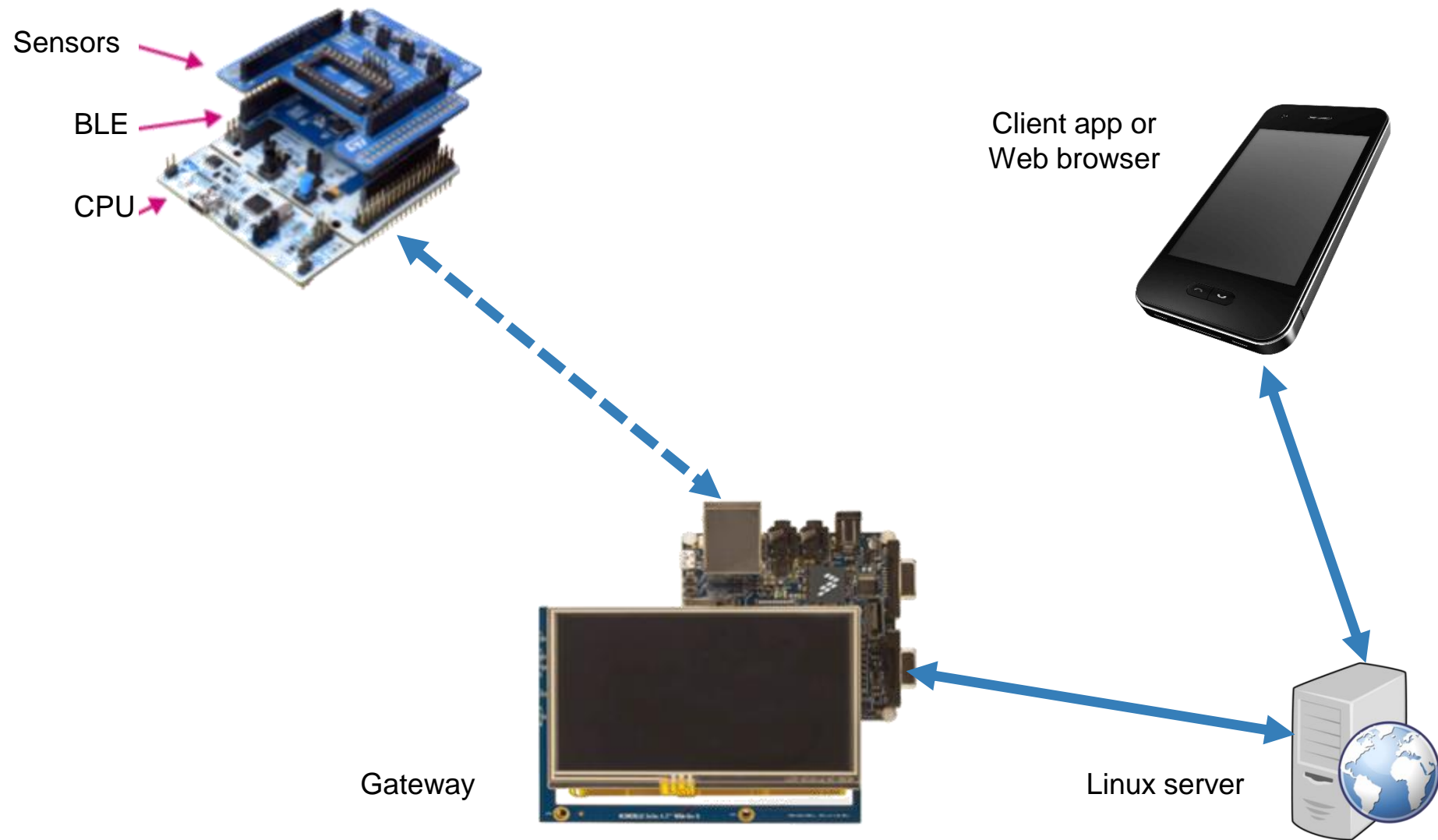
Practical case



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Scenario



Technologies

Sensors <-> Gateway

- BLE Communication

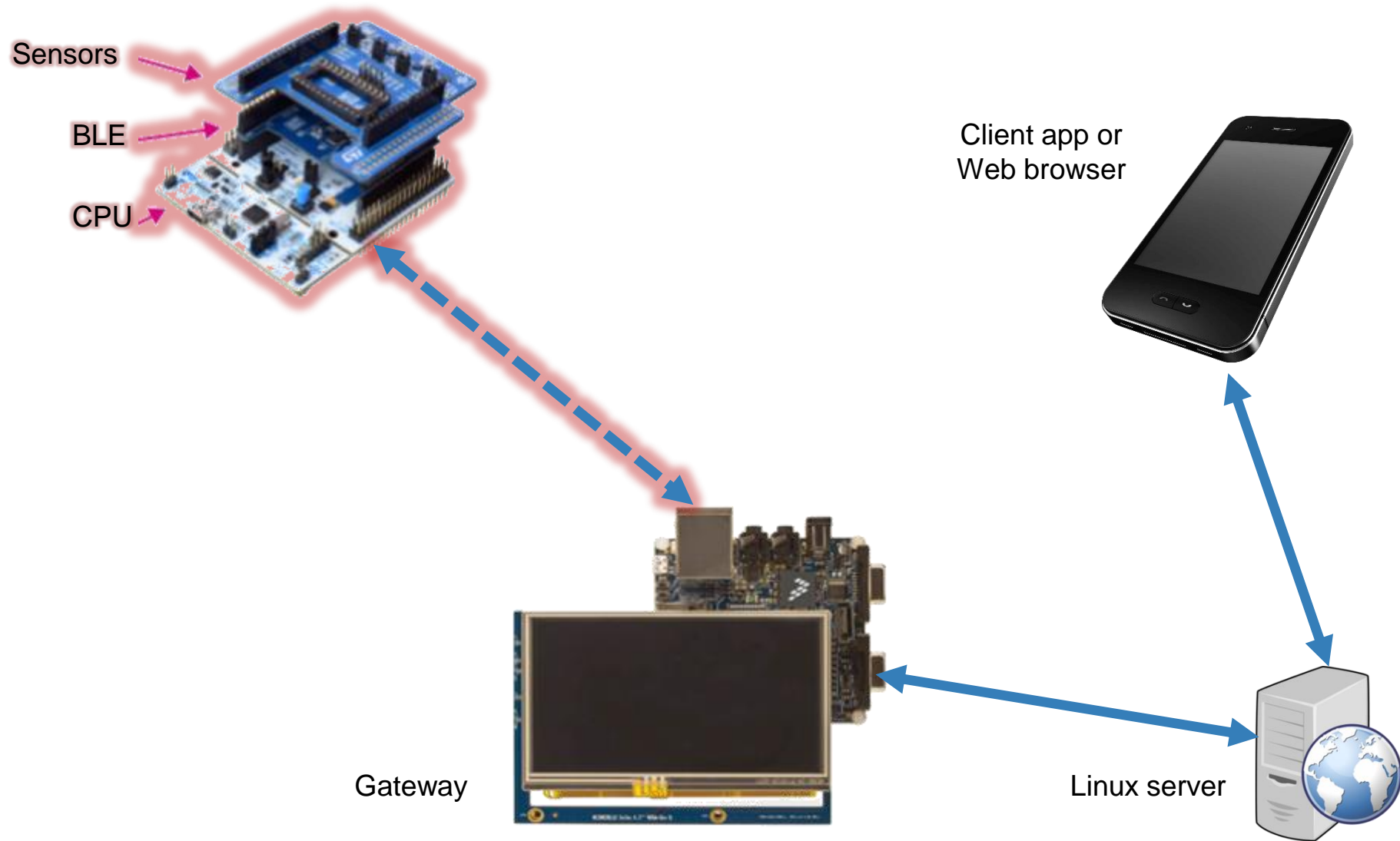
Gateway <-> Server (cloud)

- MQTT

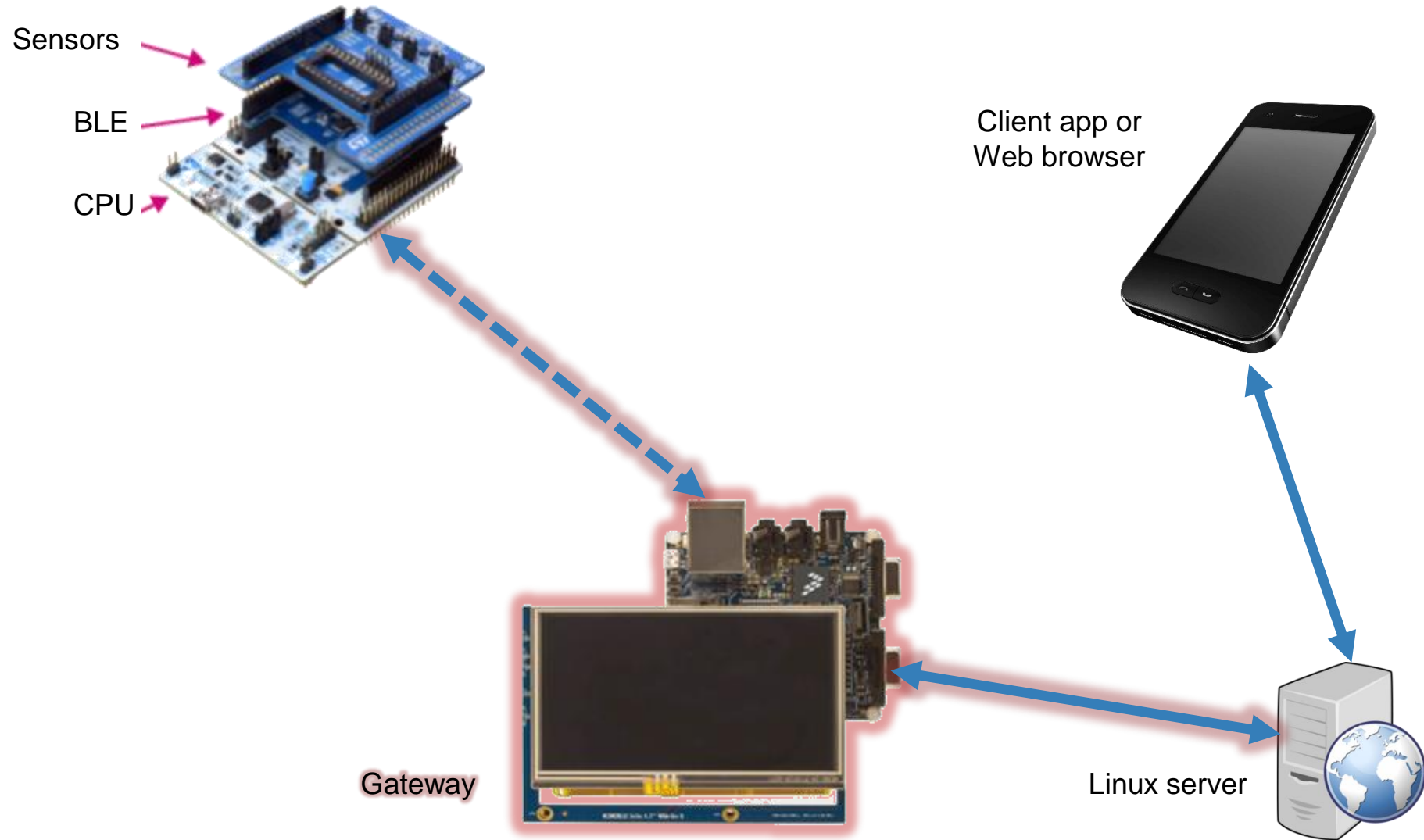
Server <-> Client web

- HTTP, HTML5, JavaScript

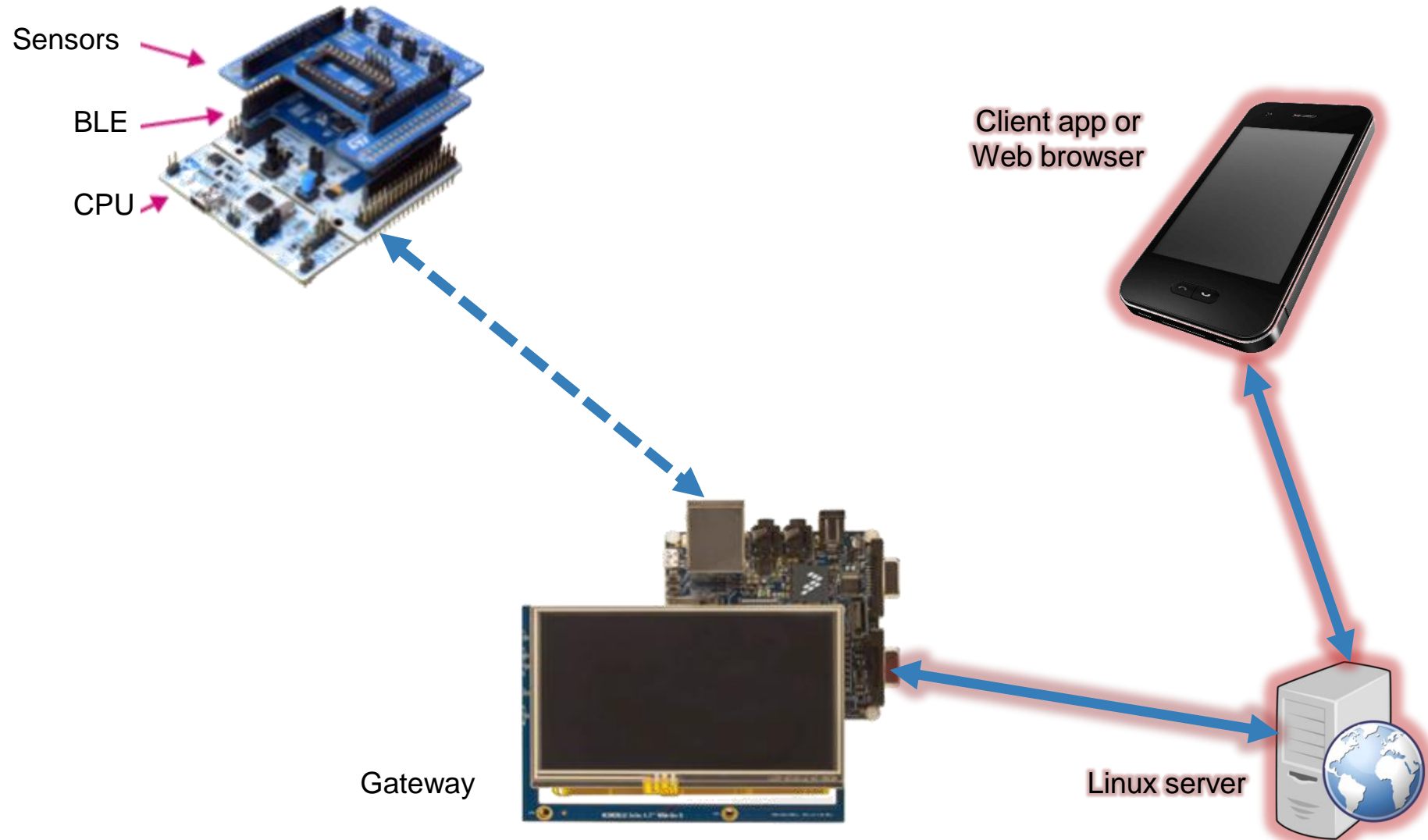
Day 1



Day 2



Day 3



Internet of Things

Sensors and actuators



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Sensor system

Main board STM32L053R8

- Cortex M0+ 32 Mhz
- 64 KB Flash, 8KB RAM
- « Arduino » expansion port
- User LED

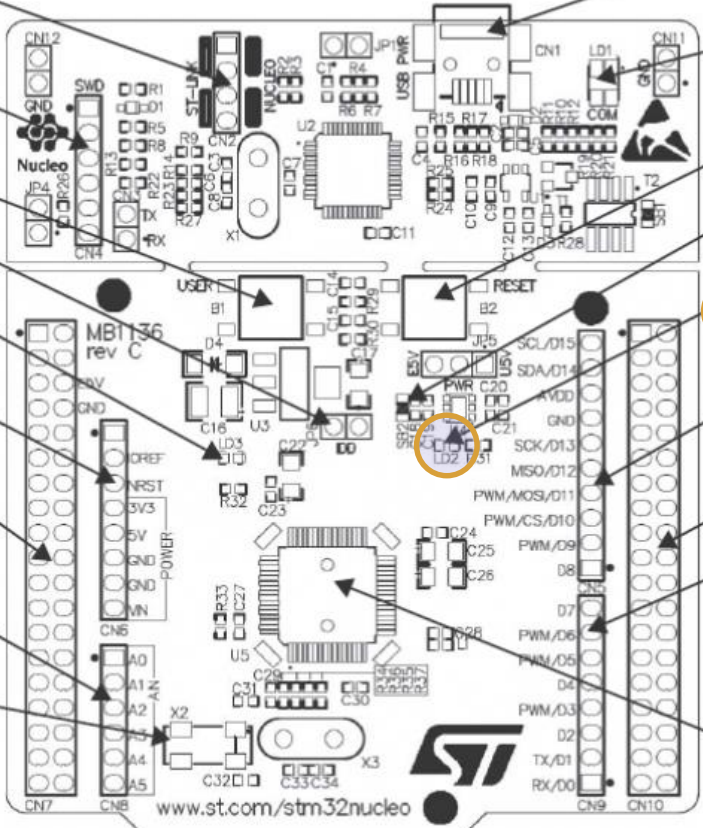
Bluetooth Low Energy Nucleo Expansion

- Bluetooth 4.0
- Certified Module

Sensor MEMS Nucleo Expansion

- Thermometer, Hygrometer, Pressure
- Accelerometer, Magnetometer

A detailed view of the Raspberry Pi 2 Model B, showing its various components like the CPU, RAM, USB ports, and GPIO pins. The board is populated with numerous electronic components, including a large black integrated circuit (the SoC), several smaller chips, capacitors, and resistors. It features two USB ports, a micro-USB port for power, and a 40-pin GPIO header. The board is populated with numerous electronic components, including a large black integrated circuit (the SoC), several smaller chips, capacitors, and resistors. It features two USB ports, a micro-USB port for power, and a 40-pin GPIO header.



X-NUCLEO-IKS01A1

Hardware description

- The X-NUCLEO-IKS01A1 is a motion MEMS and environmental sensor evaluation board system.
- It is compatible with the Arduino UNO R3 connector layout, and is designed around ST's latest sensors.

Key products on board

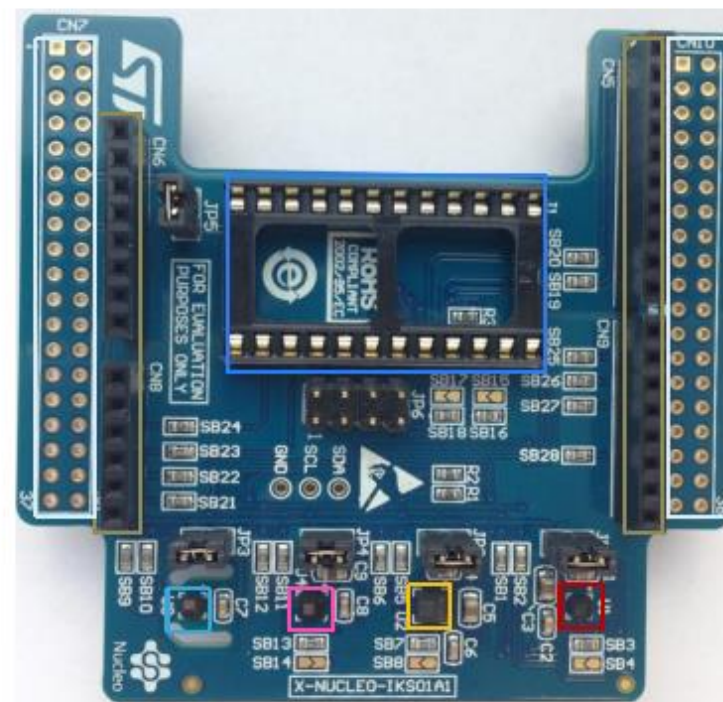
LSM6DS0: MEMS 3D accelerometer ($\pm 2/\pm 4/\pm 8$ g) + 3D gyroscope ($\pm 245/\pm 500/\pm 2000$ dps)



LIS3MDL: MEMS 3D magnetometer ($\pm 4/\pm 8/\pm 12/16$ gauss)

LPS25HB: MEMS pressure sensor, 260-1260 hPa absolute digital output barometer

HTS221: Capacitive digital relative humidity and temperature

DIL 24-pin: Socket available for additional MEMS adapters and other sensors (UV index)



- | | | |
|---|---|--|
|  HTS221 |  LSM6DS0 |  ST Morpho connector** |
|  LPS25HB |  LIS3MDL |  Arduino UNO R3 connector |
| | |  DIL 24-pin |

X-NUCLEO-IDB05A1

X-NUCLEO-IDB05A1 hardware description

- The X-NUCLEO-IDB05A1 is a Bluetooth Low Energy (BLE) evaluation and development board system, designed around ST's SPBTLE-RF Bluetooth Low Energy module based on BlueNRG-MS.
- The BlueNRG-MS processor hosted in the SPBTLE-RF module communicates with the STM32 Nucleo developer board host microcontroller through an SPI link available on the Arduino UNO R3 connector.

Key products on board

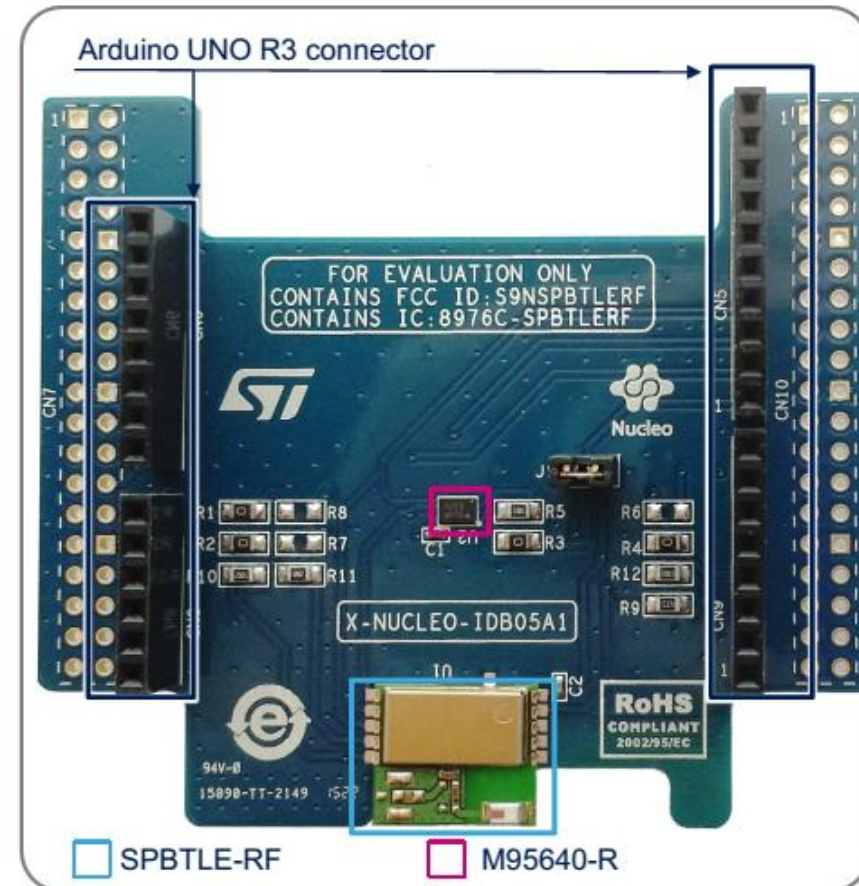
SPBTLE-RF

Bluetooth Low Energy, FCC and IC certified, module based on Bluetooth® Low Energy wireless network processor BlueNRG-MS, BLE4.1 compliant.

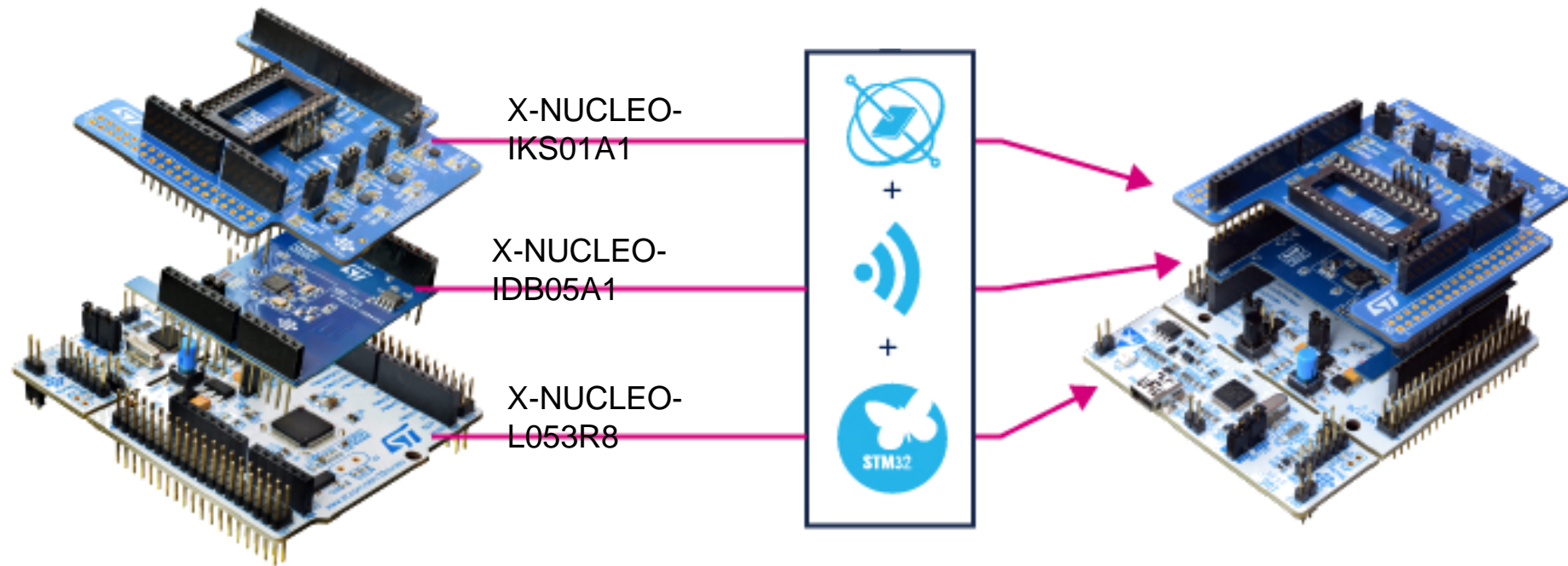
SPBTLE-RF integrates a BALF-NRG-01D3 balun and a chip antenna. It embeds 32 MHz and 32.768 kHz crystal oscillators for the BlueNRG-MS.

M95640-R

64-Kbit serial SPI bus EEPROM with high-speed clock interface



Architecture



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Lab 01



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Items

Virtual Machine including:

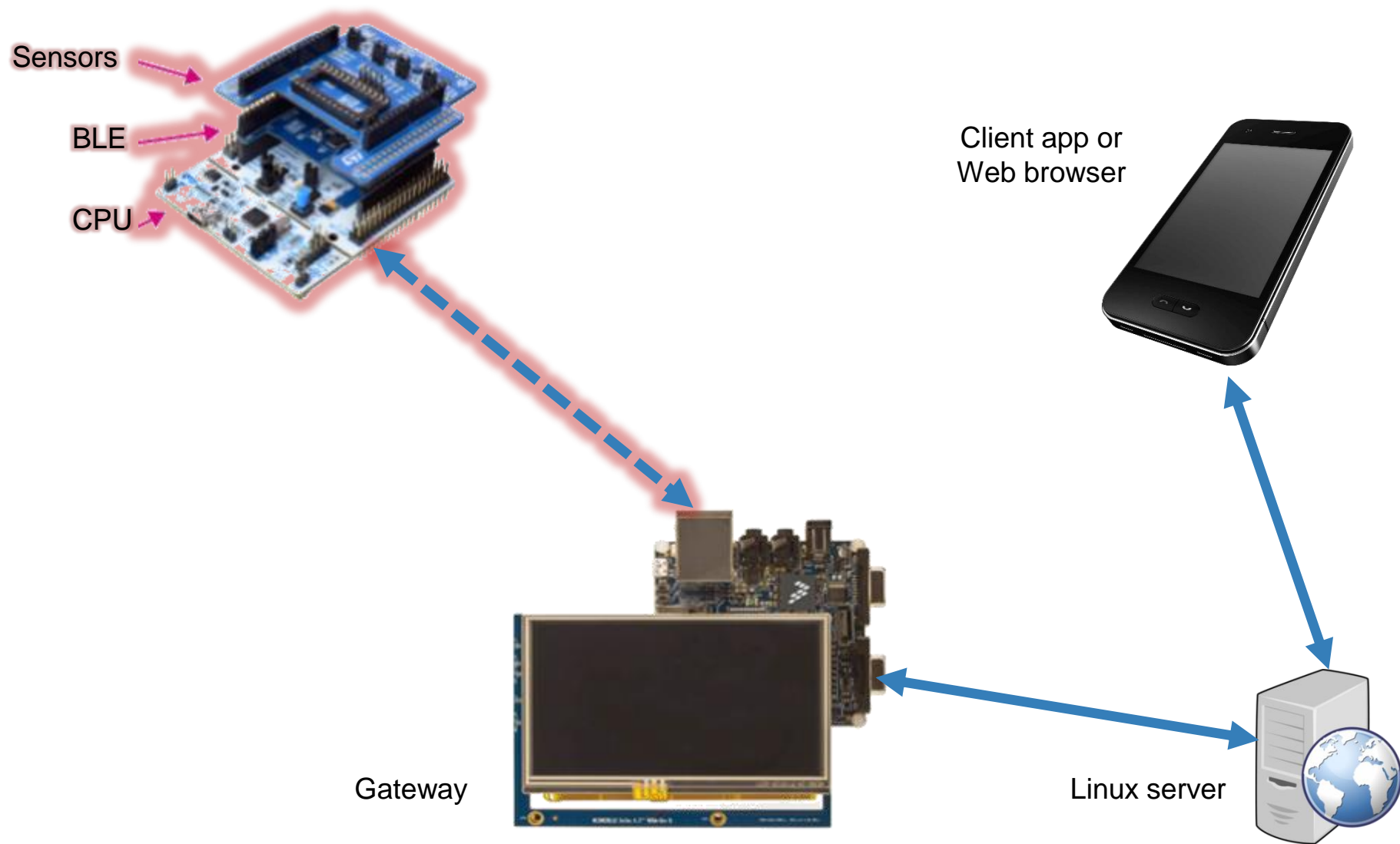
- Integrated Development Environment
- Source files
- Instructions

STM kit to assemble

Lab Files : <https://files.witekio.com/dl2332824966>



Lab 1





Internet of Things

Lab 02



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Items

Virtual Machine including:

- Integrated Development Environment
- Source files
- Instructions

Raspberry Pi 3 as a Gateway

Lab Files : <https://files.witekio.com/dl8109455474>

Wifi Access:

- Id : iot-wifi@ynov.com
- Password : SJ3BZm@9

Automatic Connexion instructions : <https://ubuntuforums.org/showthread.php?t=249654>



Lab 1

