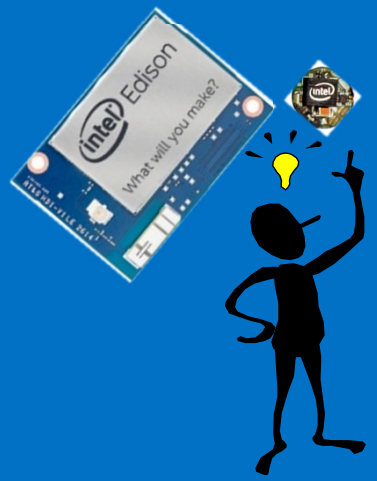
Wearable Technology Show 2015

intel®



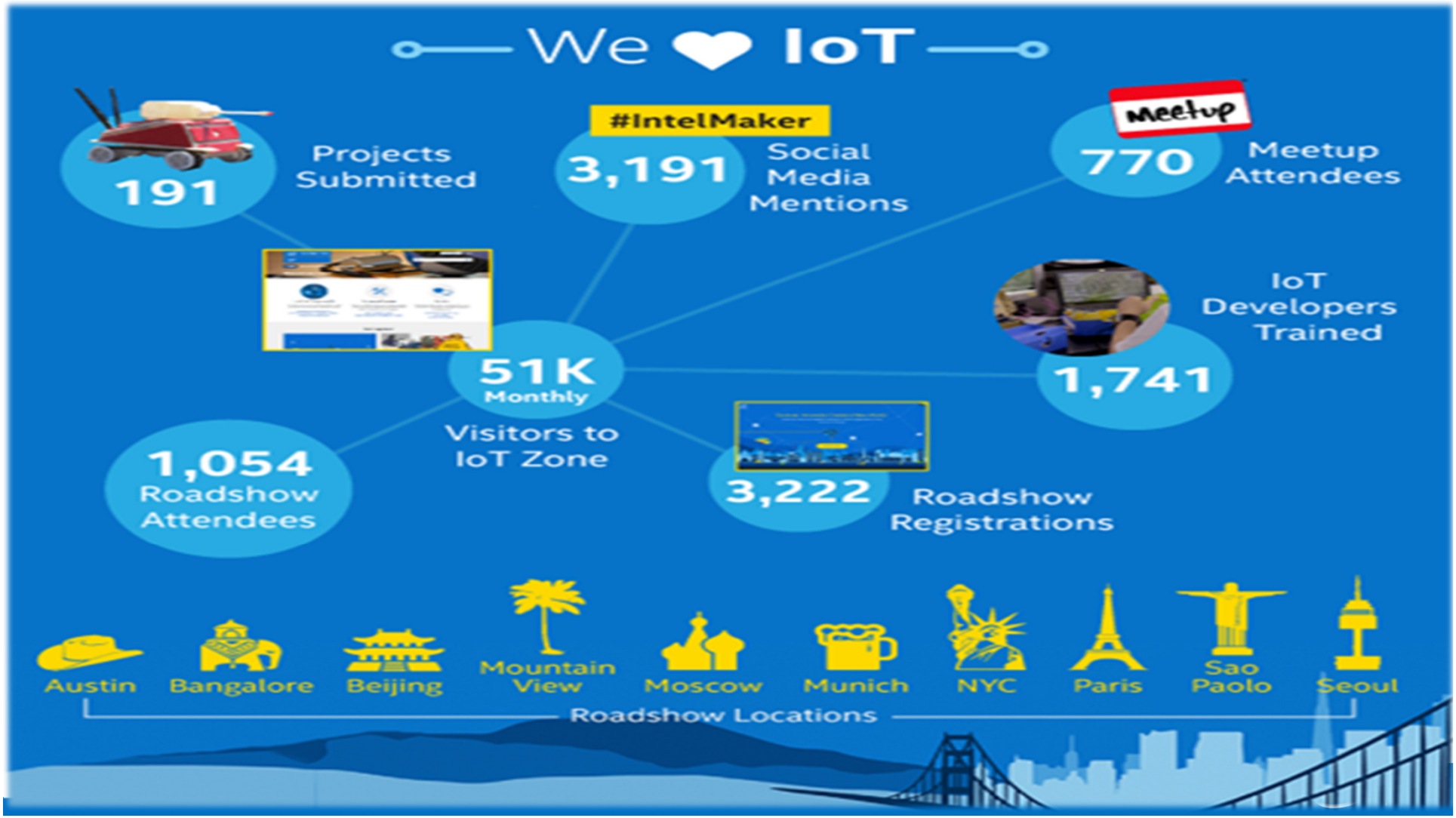
Intel® IoT & Wearable Overview

Nandkishor (Nandu) Sonar

Intel® Corporation

March-2015


AGENDA
• Intel® IoT Platforms Overview
• Development environment
• Libmraa & UPM libraries
• Cloud Analytics overview
• Hackfest kick-off


We ♥ IoT
191
Projects Submitted
#IntelMaker
3,191
Social Media Mentions
Meetup
770
Meetup Attendees
51K
Monthly
Visitors to IoT Zone
1,741
IoT Developers Trained
1,054
Roadshow Attendees
3,222
Roadshow Registrations
Austin
Bangalore
Beijing
Mountain View
Moscow
Munich
NYC
Paris
Sao Paolo
Seoul
Roadshow Locations

Intel® Galileo and Edison™

Students Hobbyist Maker	Pro-Maker & Entrepreneur	Consumer IoT	Light Ind. IoT
			*No extended temp or life* 

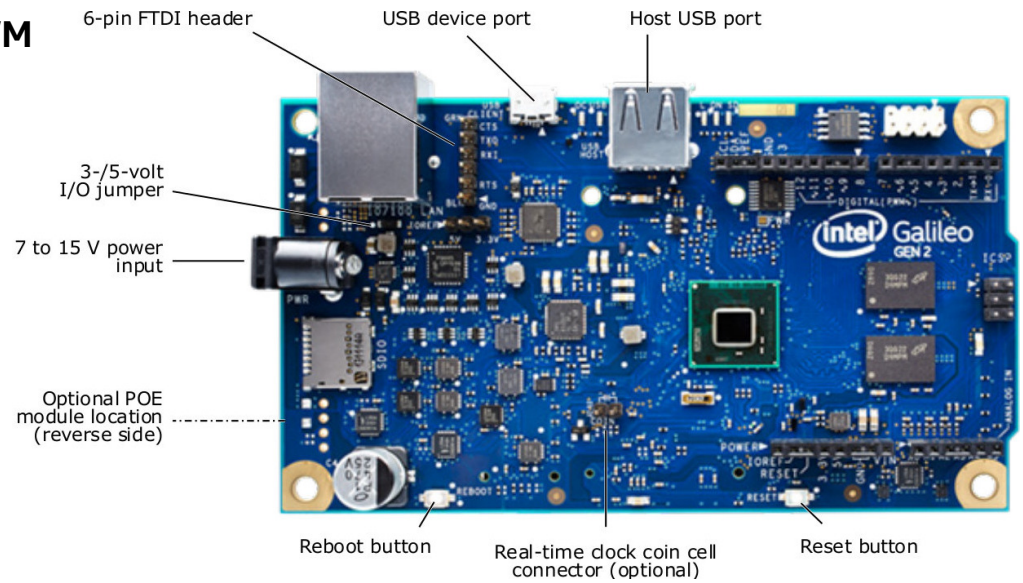
Hardware	**Intel® Galileo and Edison Module + Derivatives**
	Expansion Boards
Software	**Yocto Project Poky Linux* + Various Runtimes, IDE & Developer Tools**
Cloud	**Developer cloud solution and partner-based solutions for scale**
Support	**Managed on-line community, trouble ticketing, drawings, schematics, datasheets, code libraries, webinars, etc.**
Ecosystem	**ISVs, Incubators, Crowd Source funders & SIs**

Intel Galileo Development Board

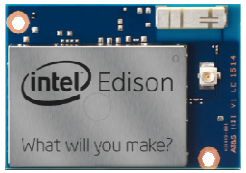
- Designed for students, makers and electronics enthusiasts / hobbyist
- General Embedded headless applications and Gateways

Board I/O: Compatible with Arduino Uno

- 20 digital I/O pins including 6 pins **10-bit PWM**
- 6 analog inputs
- 2 UART (RX/TX)
- 1 I2C
- 1 ICSP 6-pin header (SPI)
- USB device connector (Host)
- Micro USB device connector (client)
- SD Card connector
- DC power jack (7V – 15V DC input)



Intel Edison module



- Desingened to be wireless with compute performance and low power!
- For inventors, entrepreneurs, and consumer product designers to rapidly prototype.

Board

- 22nm 2 core Intel® Atom™ Core™ @ 500MHz
- 1 Intel® Quark™ MCU @ 100MHz
- 35.5 × 25.0 × 3.9 mm
- 1 GB RAM (LPDDR3, 2ch @ 800 MT/s)
- 4 GB eMMC
- Wi-Fi (a/b/g/n) + BT 4.0 + antenna
- 40 GPIOs : UART, I2C, SPI, I2S, PWM, USB 2.0, SD card, clock out, GPIO

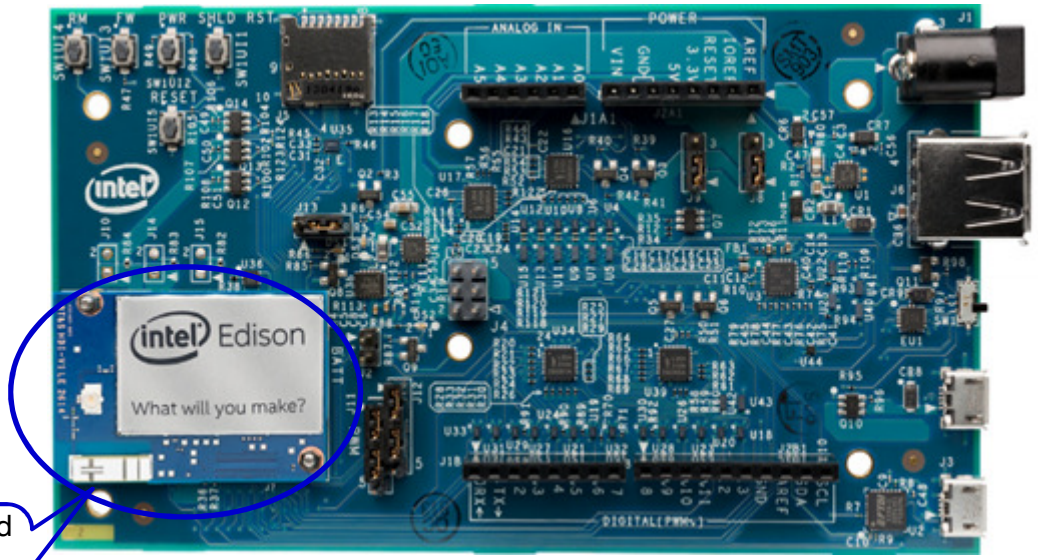
Software

- Default OS: Yocto* 1.6 Linux*
- Right now: 3.10.17 kernel
- OTA upgradable
- **libmraa**: IO abstraction layer
- **UPM**: sensor libraries

Intel Edison Development Boards: Arduino* expansion

Board I/O: Compatible with Arduino* Uno (except only 4 PWM instead of 6 PWM)

- 20 digital I/O pins including 4 pins as PWM outputs
- 6 analog inputs
- 1 UART (RX/TX)
- 1 I2C
- 1 ICSP 6-pin header (SPI)
- Micro USB device connector
- Micro USB device (connected to UART)
- SD Card connector
- DC power jack (7V – 15V DC input)



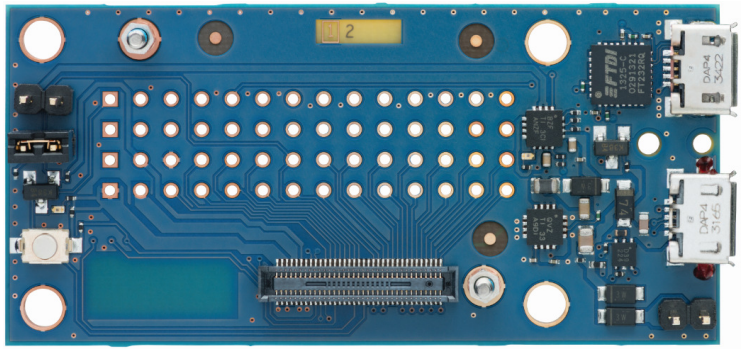
Board to board Press-fit connection (Hirose DF40)

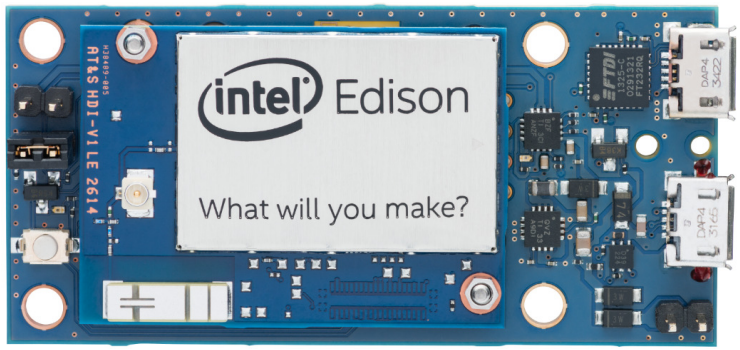
Intel Edison Development Boards: Breakout board

61mm x 29mm x 12mm (2.4 x 1.1 x 0.5 inches)

Board I/O:

- Exposes native 1.8V I/O of the Edison module
- 0.1” grid I/O array of through-hole solder points
- USB OTG with USB Micro Type-AB connector
- USB OTG power switch
- Battery Charger
- USB to device UART bridge with USB Micro Type-B connector





Grove* Starter Kit Plus - Intel IoT Edition

1	Base Shield v2
2	Grove - Buzzer V1.1
3	Grove – Button
4	Grove-LED v1.3
5	Grove - Sound Sensor_V1.2
6	Grove - Rotary Angle Sensor
7	Grove-Touch Sensor
8	Grove - Smart Relay
9	Grove-Light Sensor
10	Grove - Temperature Sensor_V1.1
11	26AWG Grove Cable
12	Mini Servo
13	9V to Barrel Jack Adapter - 126mm
14	DIP LED Blue-Blue
15	DIP LED Green-Green
16	DIP LED Red-Red
11	Grove - LCD RGB Backlight

Target audience and developer path

	Visual Developer	Arduino* Developer	JavaScript Developer	C / C++ Developer	Wind River (*Galileo only*)
Target Audience	Beginner	Maker	Intermediate	Advanced	Advanced Professional
OS / Boot Image	Yocto Project Poky Linux*	Yocto Project Poky Linux* (SPI)	Yocto Project Poky Linux*	Yocto Project Poky Linux*	VxWorks*
IDE Dev Env	Wyliodrin* Web	Arduino* IDE Win / Mac/ Linux	XDK Win/ Mac/ Linux	Eclipse* Win/ Mac / Linux	WR Eclipse* Win / Linux
Programming Language	Visual Python	Arduino* Sketch C++	JavaScript (Node JS)	C/ C++	C / C++
Tools/ Libraries	Wyliodrin*	Arduino* Libraries	Intel® XDK	ISS	Work Bench / ISS
Cloud	IoT Cloud Analytics Widget	IoT Cloud Analytics	IoT Cloud Analytics Mashery/ 3rd party	IoT Cloud Analytics Mashery/ 3rd Party	WR Cloud

Intel® IoT Developer Kit

A complete solution for creating IoT applications targeted for Intel® IoT platforms such as Intel® Galileo board and Intel® Edison board.

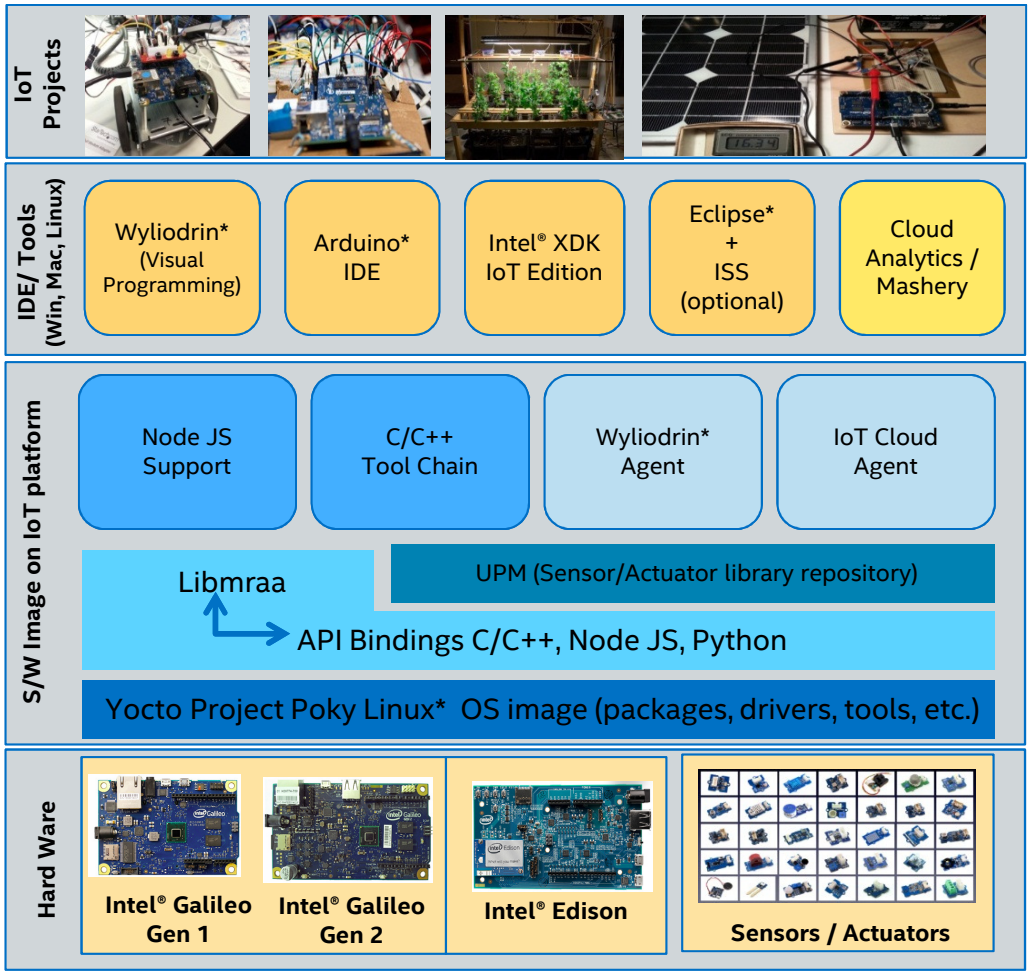
- Multiple IDEs (XDK, Eclipse, Wyliodrin*, Arduino*)
- Cloud analytics & data management
- Mashery IoT Restful APIs

- Multiple Programming Languages (JavaScript, C/C++, Arduino* Sketches, Visual programming)

- APIs that shields H/W complexity (libmraa)
- Sensor libraries with API bindings (UPM)

- Open & Standard - Yocto Project Poky Linux* OS
- Supports full range of Linux tools and libraries

- Full x86 support (Scale from Intel® Quark™ SoC to Intel® Core™ processor)
- Intel® Galileo (Gen1/ Gen 2), Intel® Edison

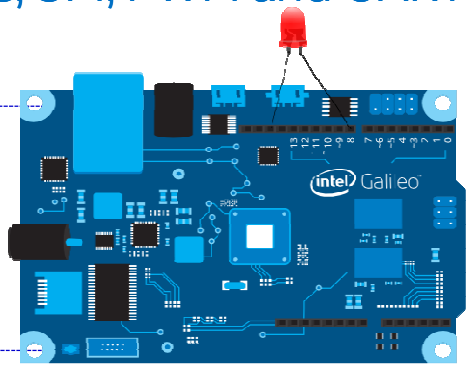


libmraa

I/O abstraction library to facilitate easy access to GPIO, I2C, SPI, PWM and UART

C API

```
mraa_gpio_context gpio; // Pointer to GPIO context
gpio = mraa_gpio_init(8); // Create GPIO context for pin 8
mraa_gpio_dir(gpio, MAA_GPIO_OUT); // Set GPIO direction to output
mraa_gpio_write(gpio, 1); // Write to GPIO
mraa_gpio_close(gpio); // Close GPIO if we are the owner
```



C++ API

```
Maa::Aio* a0;
a0 = new mraa::Aio(0); // Create AIO object for pin0
std::cout << a0->read() << std::endl;
```

Python API

```
from mraa import * # Import mraa library
x = Gpio(8) # Create a GPIO object for pin 8
x.dir(DIR_OUT) # Set GPIO direction to output
x.write(1) # Write to GPIO
x = "memory is not my problem!"
```

JS (node.js) API

```
var m = require("mraa") # Import mraa module
var x = new m.Gpio(8) # Create GPIO pin 8 object
x.dir(m.DIR_OUT) # Set GPIO direction to output
x.write(1) # Write to GPIO
```

UPM (Useful Packages for Mraa)

Sensor library using libmraa for easy sensor access

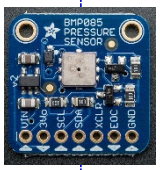
Example of UPM Modules

Temperature Sensor

```
// Create the temperature sensor object using AIO pin 0
upm::GroveTemp* temp = new upm::GroveTemp(0);
// Print the value of temprature reading in deg. centigrade
std::cout << temp->value() << std::endl;
```

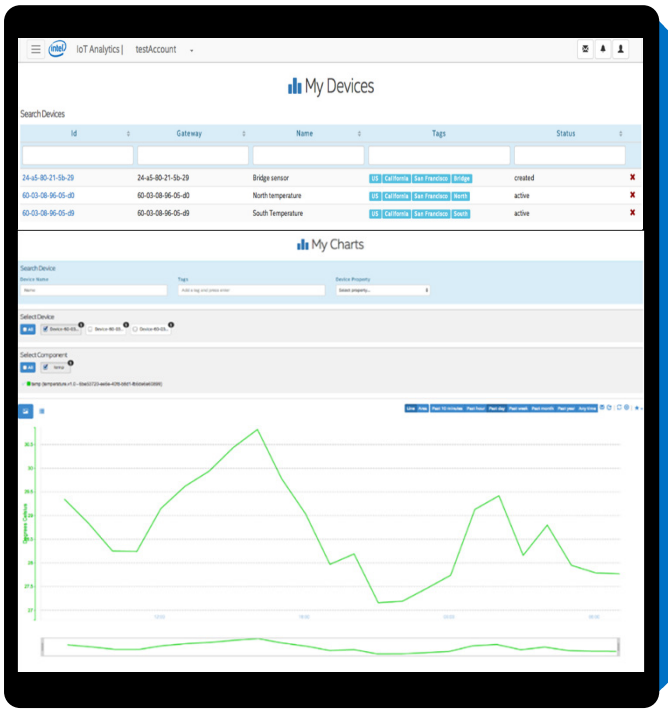
Atmospheric Pressure Sensor

```
// Create an object of type GY65(bmp085) on i2c bus 0
upm::GY65 *sensor = new upm::GY65(0, 0x77);
//print temp. pressure & Altitude
std::cout << sensor->getTemperature()<< std::endl;
std::cout << sensor->getPressure() << std::endl;
std::cout << sensor->getAltitude()<< std::endl;
```



Intel® IoT Analytics - www.enableiot.com

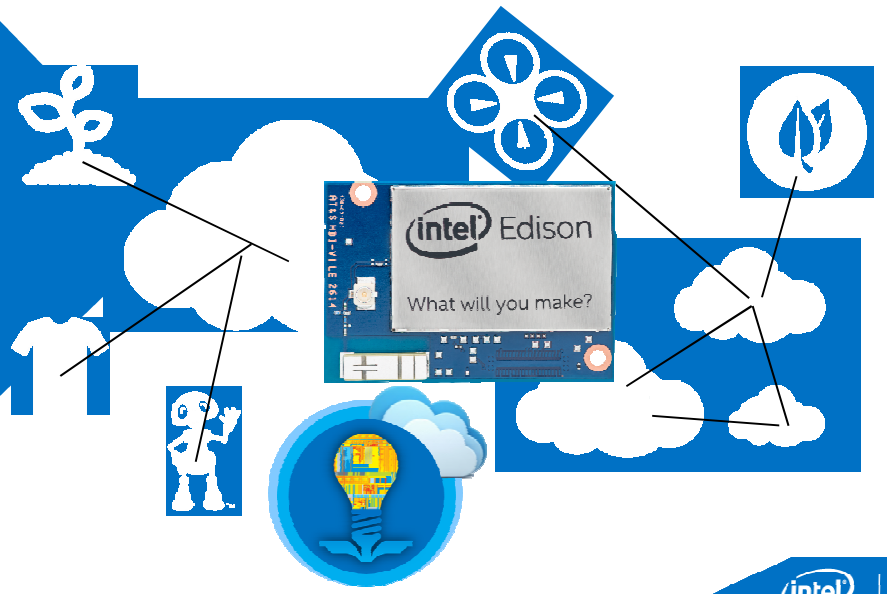
- RESTful API
- iotkit-agent (UDP / TCP)




```
#! /usr/bin/env python
import socket
import sys

UDP_PORT = 41234
sock = socket.socket(socket.AF_INET, socket.SOCK_DGRAM)

sock.sendto('{"n":"' + component +
'","v":"' + value + '"}', ('localhost', UDP_PORT))
```



Resources

- Intel® Edison: http://www.intel.com/content/www/us/en/do-it-yourself/edison.html
- IoT Developer Zone : https://software.intel.com/en-us/iot
- libmraa: https://github.com/intel-iot-devkit/mraa
- UPM: https://github.com/intel-iot-devkit/upm
- Documentation:
  1) Libmraa: http://iotdk.intel.com/docs/master/mraa/
  2) UPM: http://iotdk.intel.com/docs/master/upm
  3) NodeJS: https://www.npmjs.org/package/mraa
  4) Python: http://iotdk.intel.com/docs/master/mraa/python
  5) Cloud Analytics: https://software.intel.com/en-us/intel-iot-developer-kit-cloud-based-analytics-user-guide

Next steps

1. **Visit Hackfest Github**: https://github.com/srware/wearable_technology_show_2015
2. **Develop & exhibit your demo – Ensure your IoT/ Wearable solution should be:**
   - ✓ **Innovative**
   - ✓ **Business viable / sustainable.**
   - ✓ **Using Intel® Edison key features (performance, Wi-Fi / BTLE connectivity, small size).**
3. **Wed-11-Mar @ 15:00 every team will get 5 minutes to exhibit the demo.**
4. **Win awesome prizes on Wed-11-Mar ~16:00**

We'd Love To See You Again...Maker Fairs/Hackfests

Event	When	Where
Make 'n' break Hackathon	28-29 March	Bucharest
Maker Faire Paris	2-3 May	Paris
Maker Fare Dublin	25 July	Dublin
Maker Faire Rome	16-18 October	Rome
CodeMotion	9-12 April	Milan

We'd Love To See You Again...IoT Events

Event	When	Where
Intel IoT Roadshow	Mar 14 - 15	Milan
CeBIT	Mar 16 - 20	Hannover
Internet of Things Conference	Mar 23 - 26	Hannover
Machine to Machine and Objets Connecte	1 – 2 April	La Defense, Paris
Intel IoT Roadshow	June 12 – 13	London
Hannover Messe	April 13-17	Hannover

Thanks!

Backup