



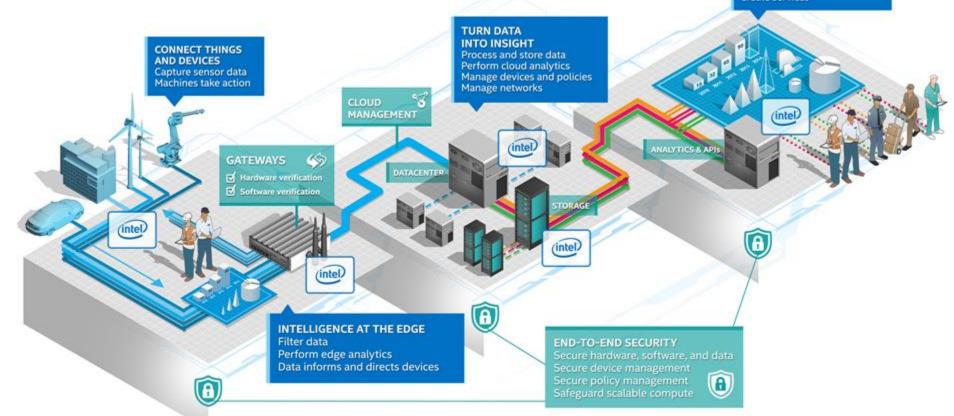




The Intel® IoT Platform is an end-to-end reference model and family of products from Intel—that works with third-party solutions—to provide a foundation for seamlessly and securely connecting devices, delivering trusted data to the cloud, and delivering value through analytics.

VISUALIZE DATA AND MONETIZE INSIGHT

Provide actionable information Automate operations Create services



Students and Hobbyists



Intel® donated 50,000 Arduino* compatible development boards featuring Intel® architecture to 1,000 universities around the world over 18 months.

"If we are not a part of The maker movement, we are going to miss the future of where computing is going."

Intel CEO Brian Krzanich at Maker Faire Rome

Software and Hardware Compatible with





Web Developers



Developers can leverage their experience building for the Web to deploy IoT Applications.

Intel® XDK IoT Development Environment Build NodeJS®* Applications Leverage Open Source Projects (npm) Debug remotely



Entrepreneurial Professionals



Professional tools for people and companies building products.

- Professional Tools
- Eclipse* C++ IDE
- Debug Projects Remotely
- Ready to go Templates
- Integrates with cloud APIs

Build proof of concept and deploy real-world products on the same hardware platforms.



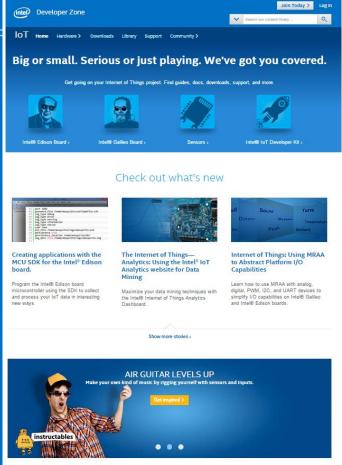


Collaborate. Learn. Share. Succeed.



Intel_® Developer Zone is where developers are tapping into everything they need to successfully bring their connected ideas to life.

Software tools and testing equipment —
Code samples and how to guides —
Dev Kits, hardware, sensors and more —
Forums, online events and meet-ups —
Peer review and expert insights —
A global community —



software.intel.com/iot

Intel — Hardware for the Internet of Things (intel

Intel[®] Edison[™] - Small, Powerful & Adaptable Hardware



- 22nm Dual core Intel[®] Atom[™] Core [™] CPU @ 500MHz
- 32-bit Intel[®] Quark[™] MCU @100 MHz
- Integrated Wi-Fi, Bluetooth Low-Energy* (LE).
- $35.5 \times 25.0 \times 3.9 \text{ mm}$
- 1 GB of RAM, 4 GB of Storage
- 40 multiplexed GPIO interfaces with expansion board options for total project design and flexibility.
- Software: OS: Yocto* 1.6 Linux*

OTA upgradable

libmraa: IO abstraction layer

UPM: sensor libraries



Intel® Edison™ Development Boards: Arduino* expansion



Board I/O: Compatible with Arduino* Uno

- 20 digital I/O pins including 4 pins as PWM
- 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)

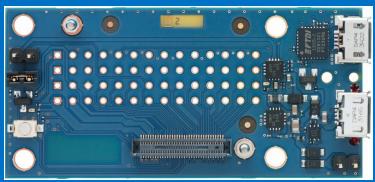
Intel® Edison™ Development Boards: Breakout board

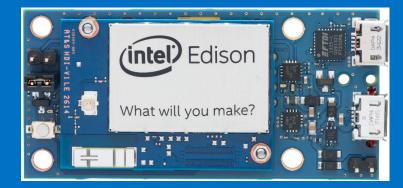


Board I/O:

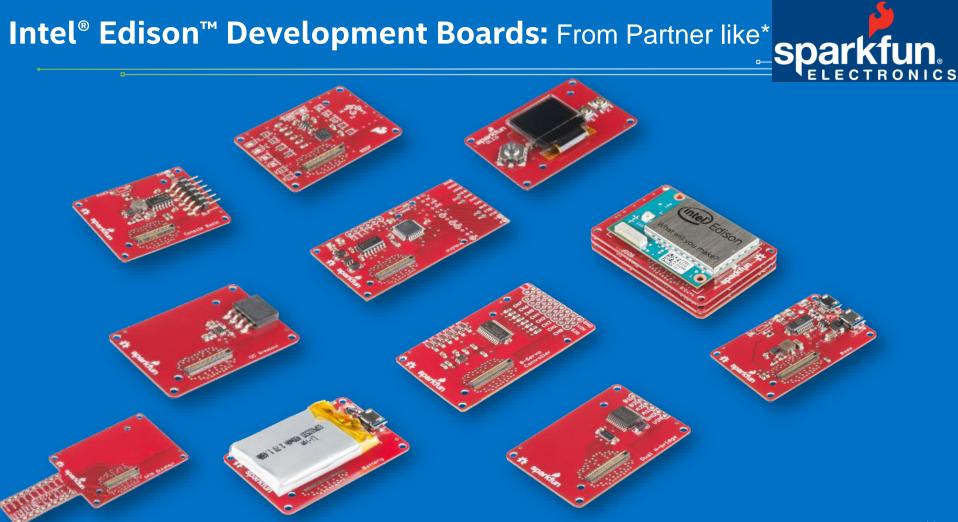
- Exposes native 1.8V I/O of the Edison™ module
- 0.1" grid I/O array of through-hole solder points
- USB OTG with USB Micro Type-AB connector
- USB OTG power switch
- Battery Charger
- USB to device UART bridge with USB Micro Type-B connector

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









Sensor Kit: Starter Pack



Grove* Start kit Plus

Base Shield v2

Grove - Buzzer V1.1

Grove - Button

Grove-LED v1.3

Grove - Sound Sensor_V1.2

Grove - Rotary Angle Sensor

Grove-Touch Sensor

Grove - Smart Relay

Grove-Light Sensor

Grove - Temperature

Sensor_V1.1

26AWG Grove Cable

Mini Servo

9V to Barrel Jack Adapter -

126mm

DIP LED RGB

Grove - LCD RGB Backlight



Home Automation

Gas Sensor(MQ2)

Moisture Sensor

Speaker

Flame Sensor

Infrared Reflective Sensor

<u>Infrared Temperature Sensor</u>

<u>Encoder</u>

Smart relay

Air quality sensor



Environment & Agriculture Transportation & Safety

Gas Sensor(MQ5)

Moisture Sensor

Water Sensor

Dust Sensor

Digital Light Sensor

UV Sensor

Dry-Reed Relay

LED Bar

1/4" Water Flow Sensor

6V mini water pump



GPS

I2C Touch Sensor

Alcohol Sensor

Infrared Reflective Sensor

IR Distance Interrupter

Robotics

Hall Sensor

Single Axis Analog Gyro

Thumb Jovstick

3-Axis Digital Compass

Line Finder

Voltage Divider

IR Distance Interrupter

Gear Stepper Motor with Driver, Dry-Reed Relay

Nunchuck, MOSFET







* Other names and brands may be claimed as the property of others.

Intel. IoT Developer Kit Components



IDE Options

for Win, Mac, and Linux

- Intel® XDK IoT Edition
- Eclipse IDE + optional ISS
- Arduino IDE
- Wyliodrin
 (Visual Programming)

Additional Tools

- Cloud Analytics
- Mashery

Upload and run applications on

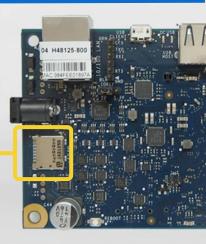
Yocto-based Linux OS

Included libraries:

- LibMraa
 API bindings for C/C++, Node JS, Python
- UPM Sensors/actuators library repository

Built in support for:

- NodeJS
- C/C++ Tool Chain
- Wyliodrin Agent
- IoT Cloud Agent





Intel® IoT Developer Kit Components



IDE/ Tools (Win, Mac, Linux) **Eclipse* IDE** Wyliodrin* Cloud Intel XDK (Visual **Arduino* IDE** Analytics / IoT Edition ISS Programming) Mashery (Optional) S/W Image on IoT platform C/C++ Wyliodrin* IoT Cloud NodeJS* Support **Tool Chain** Agent Agent UPM (Sensor/Actuator library repository) LibMraa API Bindings: C, C++, NodeJS*, Python*, Java* Yocto based Linux OS image **Intel Edison** Intel Galileo Hard Ware **Arduino** Gen 1 & 2 **Development Board Board Sensors / Actuators**

^{*} Other names and brands may be claimed as the property of others.

libmraa



common

I/O abstraction library to facilitate easy access to GPIO, I2C, Analog, SPI, PWM and UAR1

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 Modules	C++ API Classes	NodeJS, Python API Modules / Classes
gpio	Gpio class	Gpio
i2c	I2c class	I2c
aio	Aio class	Aio
pwm	Pwm class	Pwm
spi	Spi class	Spi
uart	Uart class	Uart

common

C++ API

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

Python AP

```
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!"
```



```
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
```

common

UPM (Useful Packages for Mraa)



Sensor/Actuator library using libmraa for easy sensor access to 1104 sensors

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;</pre>
```

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;</pre>
```

Intel[®] Cloud Analytics

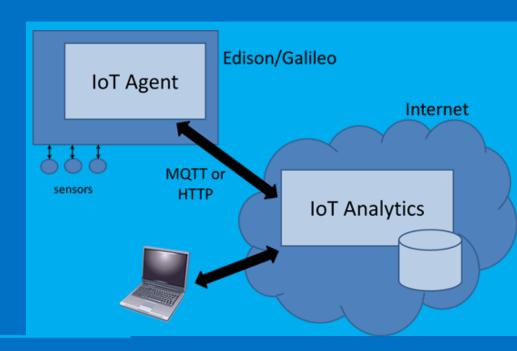


Cloud service for the "Internet of Things"

Primary functionality:

- Collects data from devices/sensors
- Triggers actions
- Visualizes data
- Analyses data

Available for free: http://enableiot.com/ Github: https://github.com/enableiot



Other Supported Cloud Services*









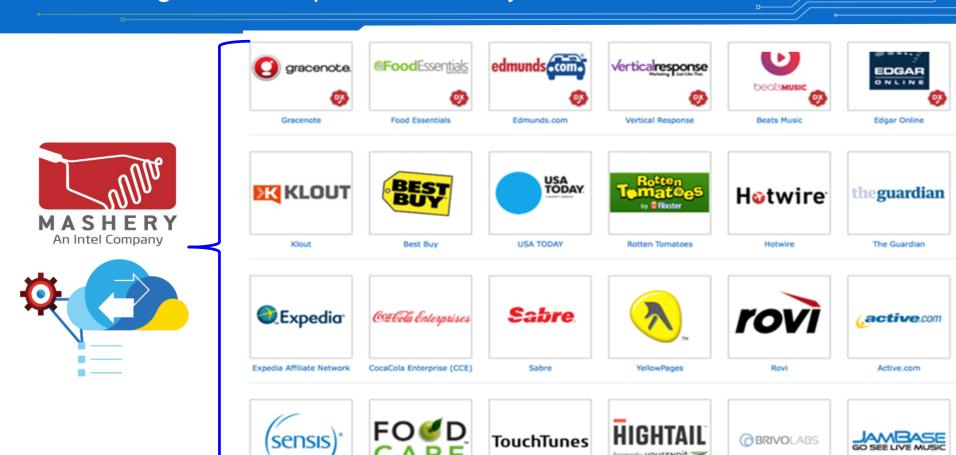






API Management - http://dev.mashery.com/







Demo Overview

Muzzley* Cloud Controlled LED Strip



The Intel® Galileo or Edison™ board enables creativity, innovation and fun for all those who love to develop and work with new technology...

- This demo uses Intel® Galileo or Edison™ board connected to LED strip and Muzzley* cloud via mobile phone to control LED strip and view the status.
- Simply power up your Intel® Galileo board, securely pair up your mobile device with the Muzzley* services and voila! Enjoy the full control over your own maker application even from remote locations. Easy to create and use control widgets for UI application.
- Ready to use, full source code and documents available at: https://github.com/muzzley/muzzley-intel-iot-led-strip.





Hackathon Heads up

Hackathon Prerequisites – Save your time...



- Install Intel® Edison Board Installer: https://software.intel.com/iot/downloads
- Use provided USB key for installation and documents

Useful 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
- Instructables: http://www.instructables.com/id/Tweet-with-your-Intel-Edison/
- Guides: https://github.com/intel-iot-devkit/edison-guides/wiki
- Documentation:
 - 1) Libmraa: http://iotdk.intel.com/docs/master/mraa/
 - 2) UPM: http://iotdk.intel.com/docs/master/upm
- 3) NodeJS: http://iotdk.intel.com/docs/master/mraa/node/modules/mraa.html
- 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



Thanks!



Backup Slides

Intel[®] Quark Technology - The world just got smaller



Intel® goes big by going small, with the first ever Intel® Quark tech product.

Intel® Quark SoC X1000 is the low-power, micro-core solution making the technologies of the future the reality of today, by extending Intel architecture into emerging technology — from the Internet of Things to wearable computing to tech yet to be imagined.



