SENSORS AND ACTUATORS
INDUSTRIAL IOT

Software and Services Group
IoT Developer Relations, Intel

Quotes from the New England Journal of Medicine

CYBER-PHYSICAL

Cyber-Physical Systems (CPS) are integrations of computation, networking, and physical processes.

Physical processes affect the computation model of the process and vice-versa.

The economic impact of cyber-physical systems is vastly greater than what has been realized. Major investments are being made worldwide to develop the technology.

SENSORS FOR PRODUCTS THAT ENHANCE WORKER SAFETY

[DAQRI Brings Augmented Reality to Industry]

The DAQRI Smart Helmet* powered by Intel allows wearers to overlay maps, schematics, and thermal images to effectively see through walls, pipes, and other solid objects.

[Epson Offers Augmented-Reality-Ready Smart Glasses]

MOVERIO* smart glasses are powered by an Intel Atom® processor.The BT-350 is designed for multi-user, augmented reality applications, such as remote support, arts & culture, enterprise drone, and subtitling & translation.

[Fujitsu Improves Worker Management]

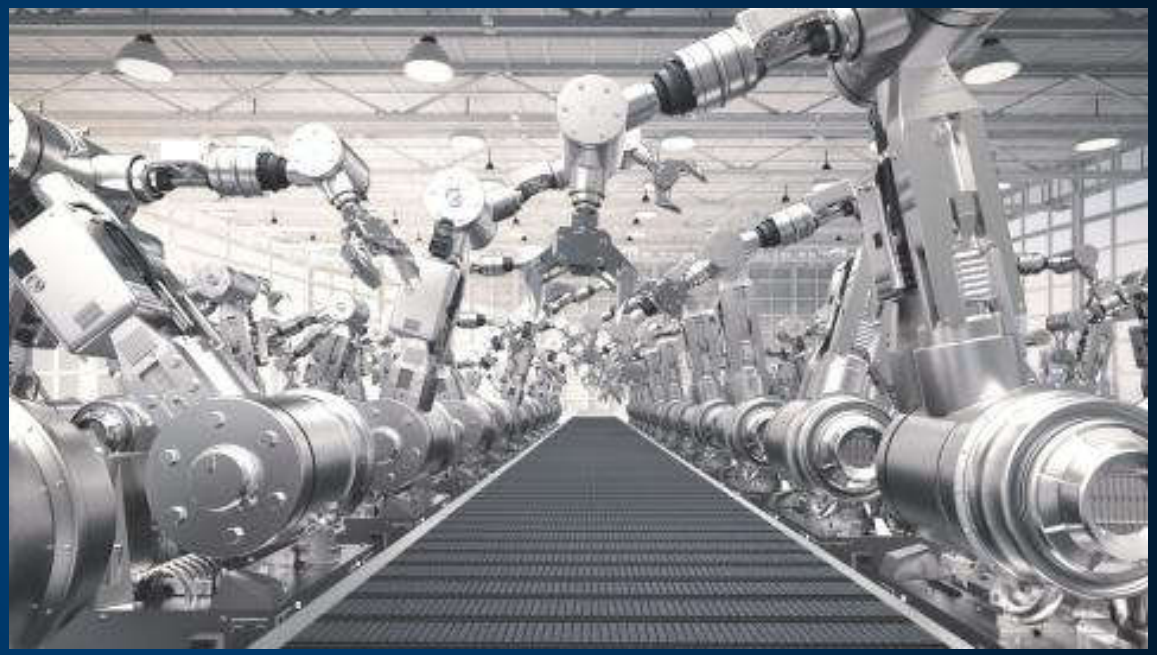
Fujitsu's UBIQUITOUSWARE* is an industrial worker management platform enabling data acquisition from a wide variety of sensors. An Intel® architecture-based IoT gateway gathers, filters, and applies local analytics.

[KNAPP Aims at Zero Defects]

The KNAPP IVII Headset* is an Intel-powered wireless, smart worker wearable solution with a unique see-through display that gives workers access to both real and virtual information.

SENSING FOR AUTOMATION AND ROBOTICS

- Intel® architecture-based connected worker solutions bring essential capabilities, including:
- Continuous environmental monitoring and alerts, both locally on the gateway, and in the remote command center
- Immediate, one-to-one “over the shoulder” coaching by remote experts
- Timely access to contextually relevant, critical information while on the job
- Contextual augmented-reality-based training on site.



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INDUSTRIAL SENSORS

MRAA - AN I/O LIBRARY FOR THE INTERNET OF THINGS

Provides I/O abstraction across both Intel and non-Intel (community added) MCU boards, UNIX boards and IoT Gateways.

X86

Minnowboard

NUC

UP2 Board
Intel® NUC
UP* and UP Squared*
Arduino* and Genuino* 101

ARM

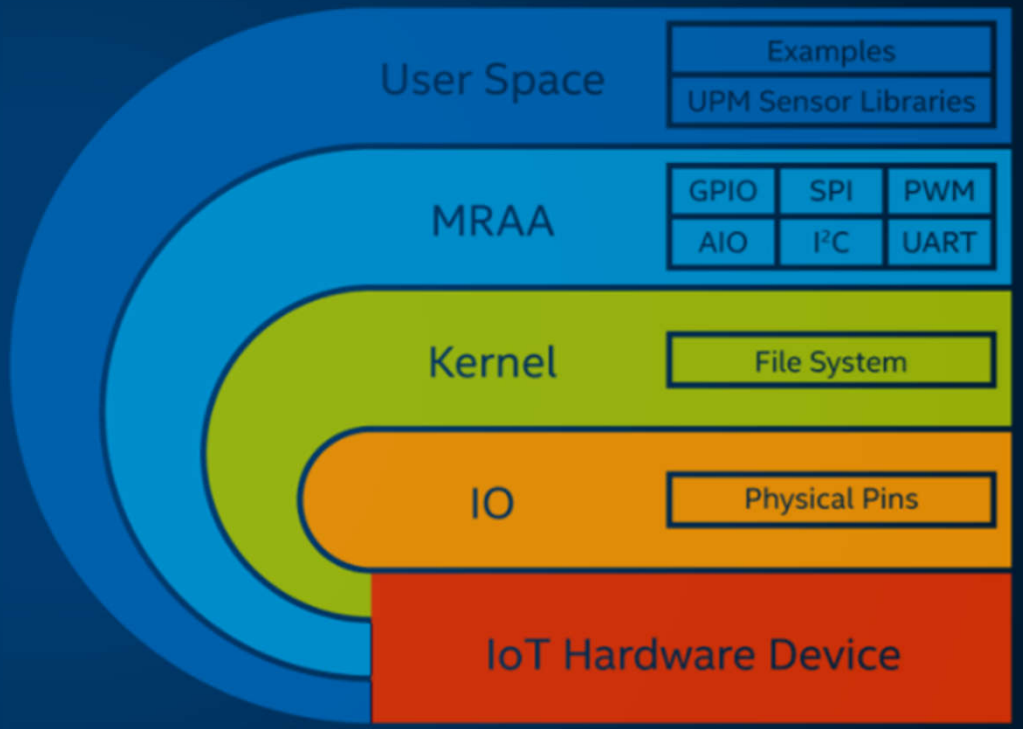
Raspberry Pi

Banana Pi

Beaglebone Black

phyBOARD-Wega

96Boards



https://github.com/intel-iot-devkit/mraa

INTRODUCING INTEL IOT DEVICE LIBRARIES: MRAA AND UPM

libmraa aka “MRAA”: https://github.com/intel-iot-devkit/mraa

- Open Source IO Libs (UART, SPI, GPIO, I2C, AIO)
- Provides higher level abstraction making hardware IO easier to use from userspace
- Enables portability between devices
- Supports Intel® Galileo and Intel® Edison boards, MinnowBoard MAX, etc.

UPM: https://github.com/intel-iot-devkit/upm

- High level library repository of sensor drivers
- Sensors/Actuators using libmraa
- Making it easy to control
- Expanding support to Industrial grade sensors

UPM and MRAA make it easy to build IoT projects!

MAKING SENSORS AND ACTUATORS ACCESSIBLE

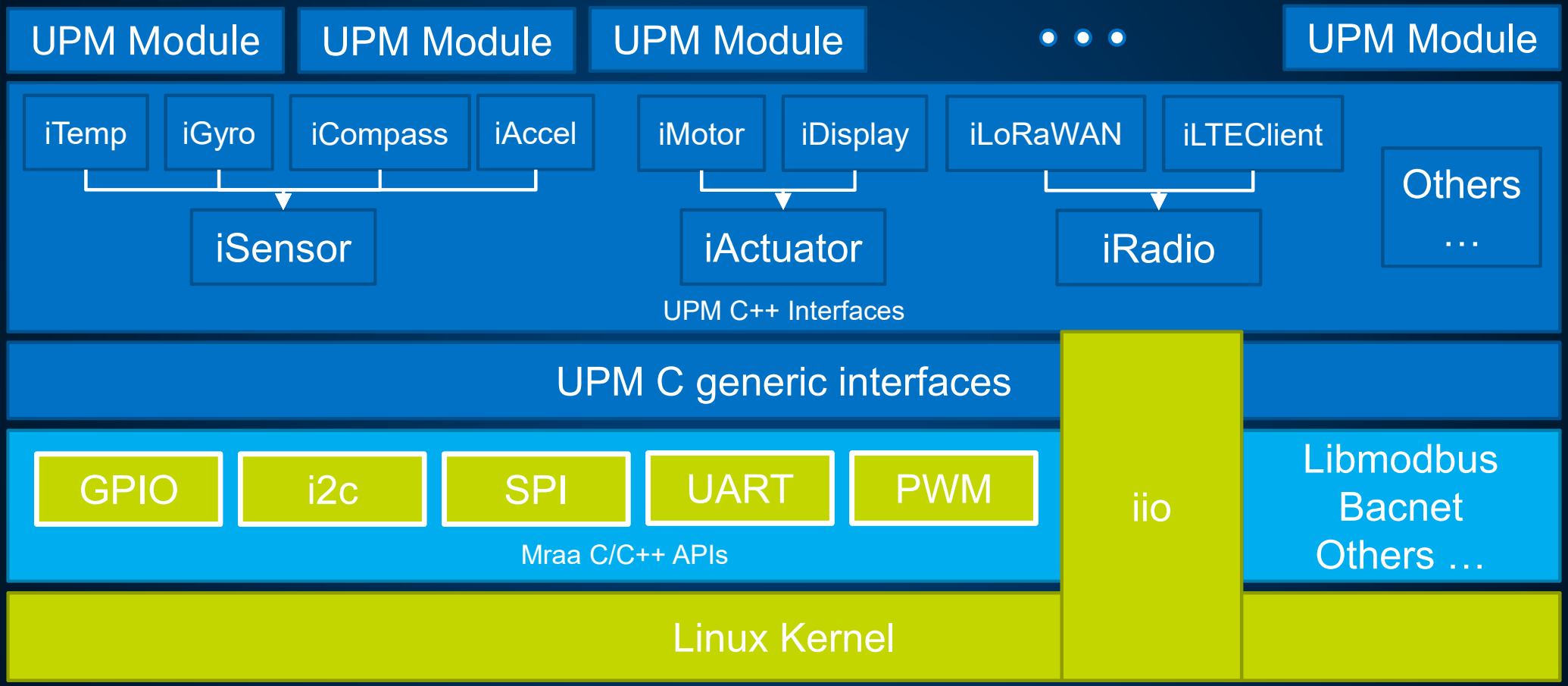
Support for Multiple Operating Systems

Support for Multiple Languages

Maker Sensors

Industrial Sensors

MRAA & UPM – ARCHITECTURE

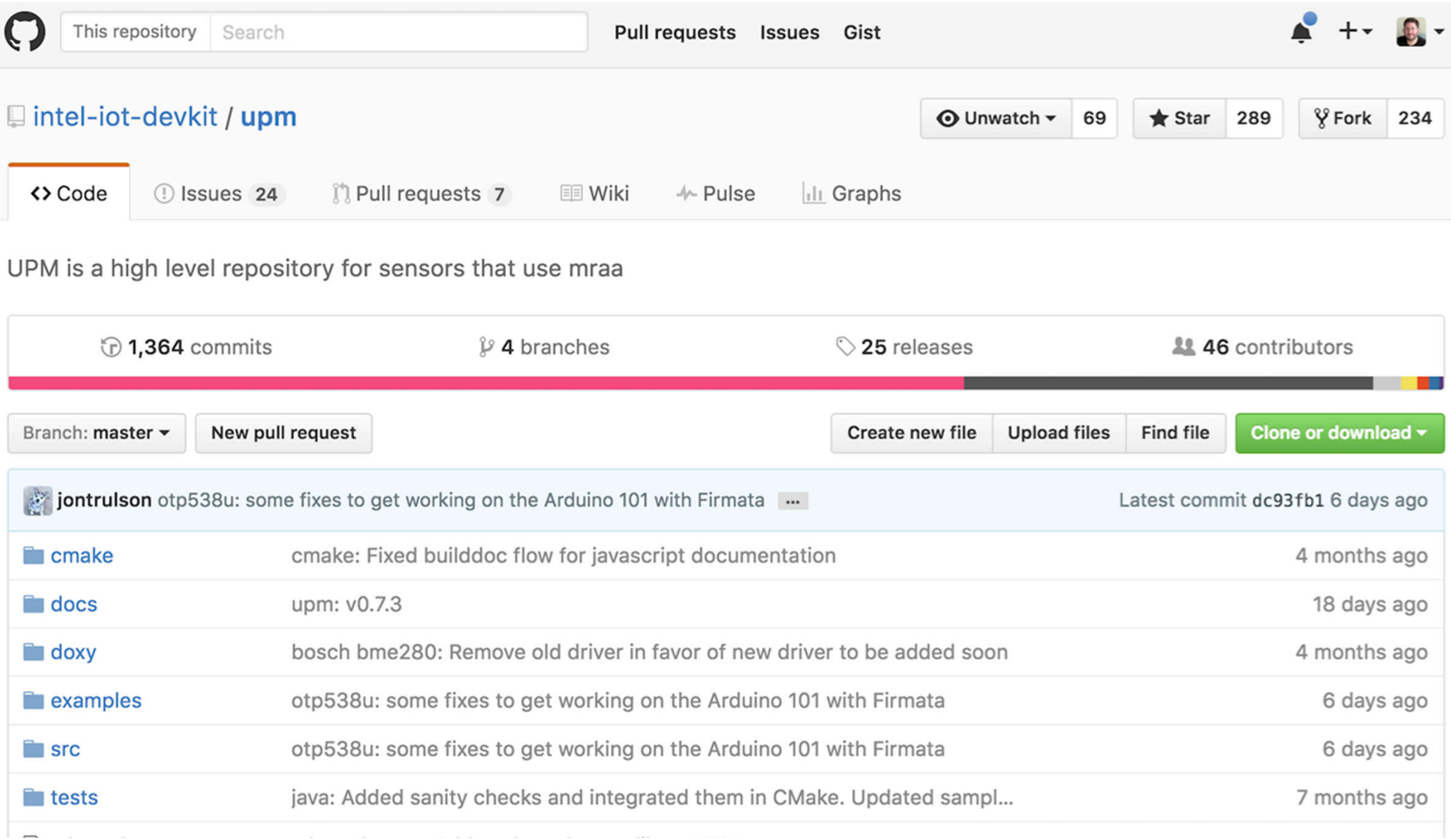


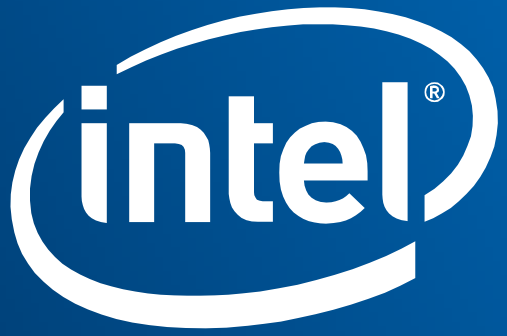
NODE.JS CODE FOR TEMPERATURE SENSOR

```
// Load Grove module
var groveSensor = require('jsupm_grove');

// Create the temperature sensor object using AIO pin 0
var temp = new groveSensor.GroveTemp(0);
console.log(temp.name());

// Read the temperature ten times, printing both the Celsius and
// equivalent Fahrenheit temperature, waiting one second between readings
var i = 0; var waiting = setInterval(function() {
        var celsius = temp.value();
        var fahrenheit = celsius * 9.0/5.0 + 32.0;
        console.log(celsius + " degrees Celsius, " );
        console.log(Math.round(fahrenheit) + " degrees Fahrenheit, " );
        i++;
        if (i == 10) clearInterval(waiting);
}, 1000);
```

Node.js Code for Relay

```
// Load Grove module
var groveSensor = require('jsupm_grove');

// Create the relay switch object using GPIO pin 0
var relay = new groveSensor.GroveRelay(0);

// Close and then open the relay switch 3 times,
// waiting one second each time. The LED on the relay switch
// will light up when the switch is on (closed).
// The switch will also make a noise between transitions.
var i = 0;
var waiting = setInterval(function() {
        if ( i % 2 == 0 ) {
                relay.on();
                if ( relay.isOn() ) console.log(relay.name() + " is on");
        }
        else {
                relay.off();
                if ( relay.isOff() ) console.log(relay.name() + " is off");
        }
        i++;
        if ( i == 6) clearInterval(waiting);
}, 1000);
```


This repository
Search
Pull requests
Issues
Gist
intel-iot-devkit / upm
Unwatch 69
Star 289
Fork 234
Code
Issues 24
Pull requests 7
Wiki
Pulse
Graphs
UPM is a high level repository for sensors that use mraa
1,364 commits
4 branches
25 releases
46 contributors
Branch: master
New pull request
Create new file
Upload files
Find file
Clone or download
jontrulson otp538u: some fixes to get working on the Arduino 101 with Firmata ...
Latest commit dc93fb1 6 days ago
cmake cmake: Fixed builddoc flow for javascript documentation 4 months ago
docs upm: v0.7.3 18 days ago
doxy bosch bme280: Remove old driver in favor of new driver to be added soon 4 months ago
examples otp538u: some fixes to get working on the Arduino 101 with Firmata 6 days ago
src otp538u: some fixes to get working on the Arduino 101 with Firmata 6 days ago
tests java: Added sanity checks and integrated them in CMake. Updated sampl... 7 months ago


intel