Introduction to the Internet of Things

Why?

We want to receive more data

We want to control stuff

We want to automate

We want to make things faster

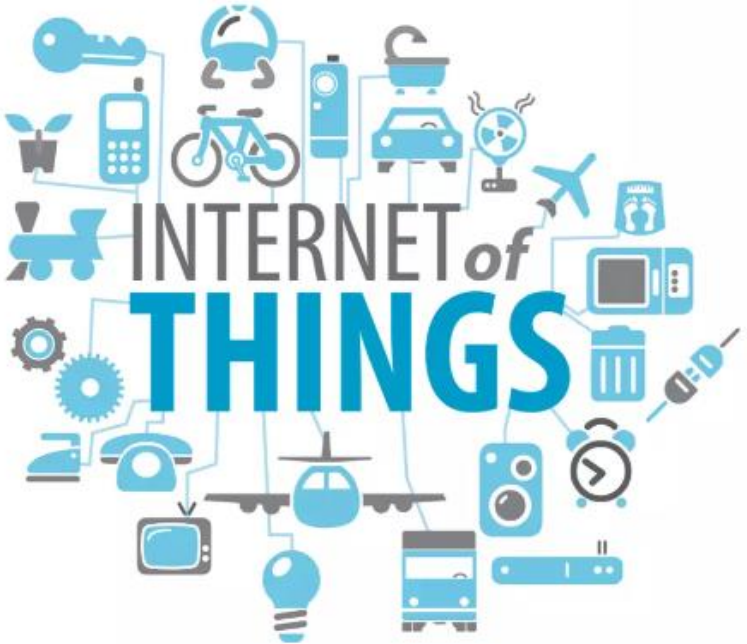


Image from http://smartdatacollective.com/rick-delgado/285576/scary-security-concerns-internet-things

What is the Internet of Things

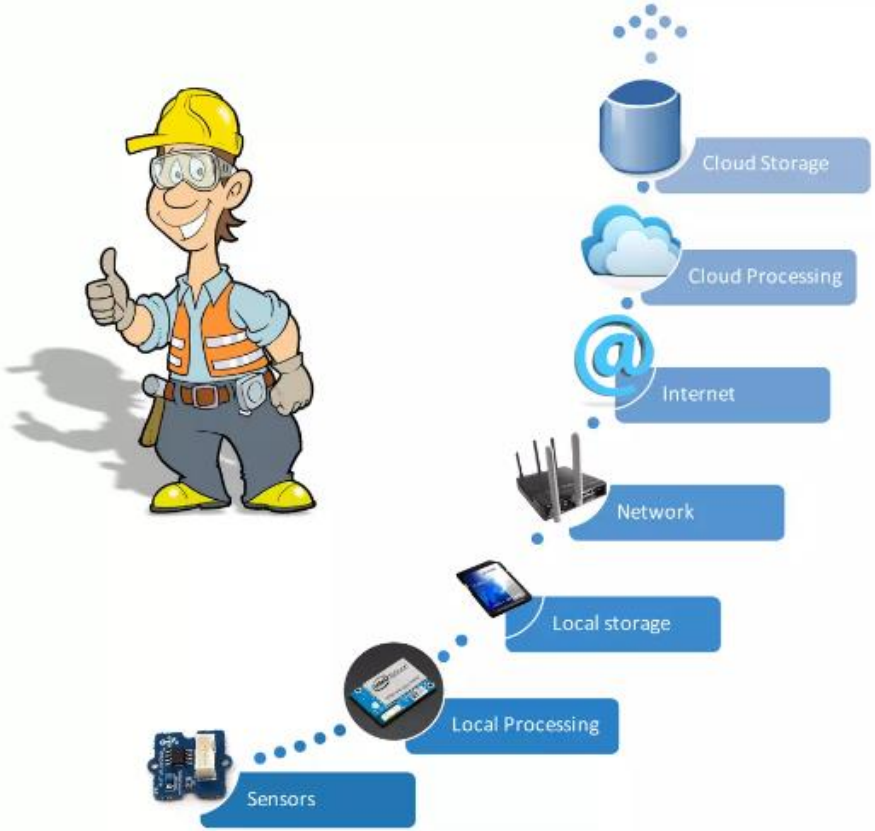


Image from http://www.cchc.cl/informacion-a-la-comunidad/industria-de-la-construccion/personaje/

What is Internet of Things?

Image from https://inventrom.wordpress.com/2014/11/27/the-thing-in-internet-of-things/

Sensors

Measure values

Send raw data

Low power

Local Processing and Local Storage

Get data from sensors

Process

Send some data to

Edge/Fog Computing

Network and Internet

IoT Gateway

Gathers data from sensors

Gateway Protocols

- 6LoPAN
- LoRaWAN
- BLE

Internet Protocols

- CoAP
- MQTT
- HTTP
- XMPP

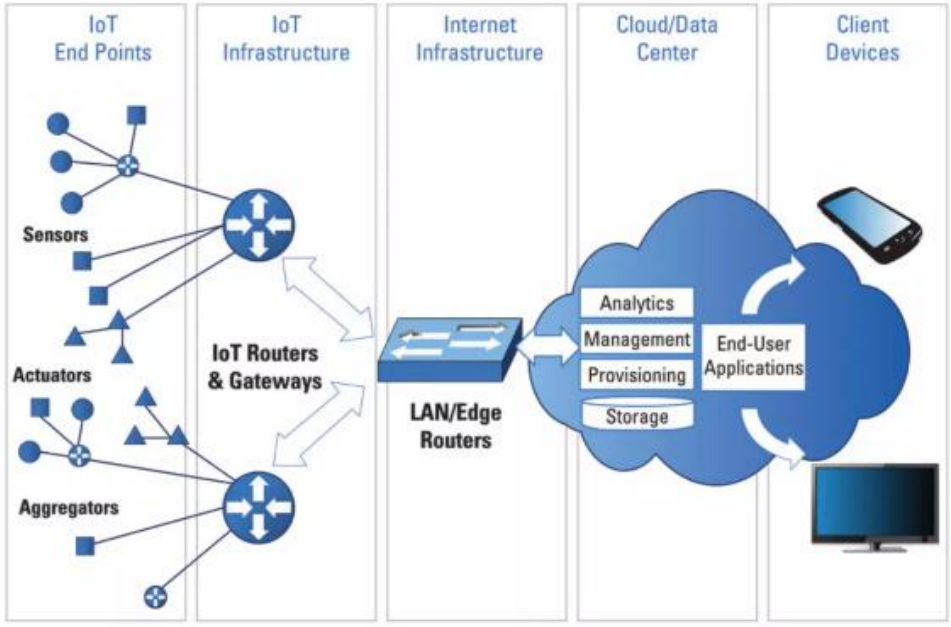
Cloud Processing and Storage

Aggregate Data

Storage

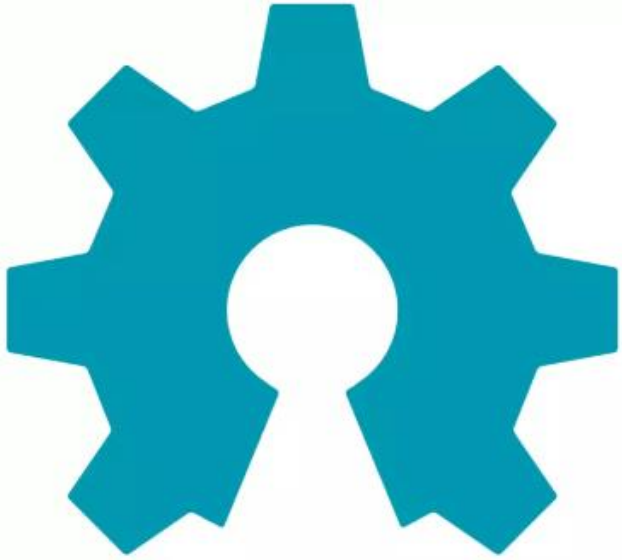
Inferences

IoT Network



http://www.rtcmagazine.com/articles/view/105734

How did it start

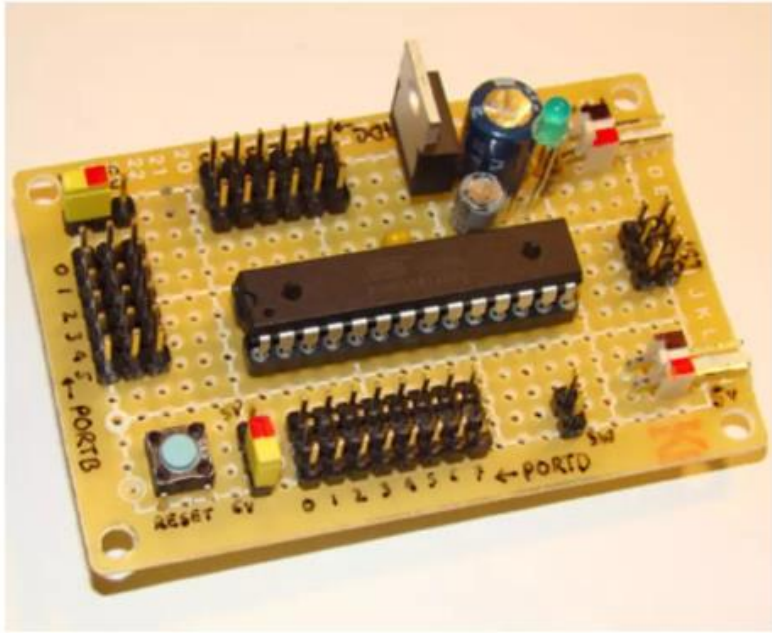


open source hardware

Microcontroller

Small programmable device

Easy connectable



Arduino

Small programmable device

Easy connectable

Is open source

Has a simple to use software

Arduino Ethernet

Small programmable device

Easy connectable

Is open source

Has a simple to use software

Only around 4 simultaneous networking connections

Raspberry Pi

Computer

Runs Linux

More software oriented programming

Full Networking System

Raspberry Pi and Arduino

HARDWARE

SOFTWARE AND NETWORKING SYSTEM

Hardware

Arduino
Raspberry Pi™
Intel® Galileo
Intel® Edison
Beaglebone Black
UDOO
Parallella

Good for sensors

Arduino
$25
ATmega328

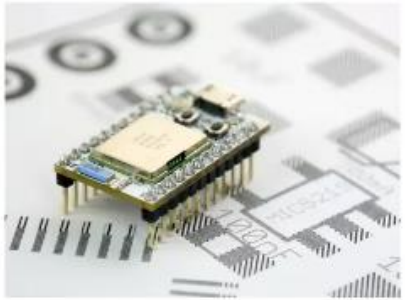
ChipKIT
$30
PIC

LaunchPad
$4
MSP430

Good for some sensors and processing

STM32
$30
ARM Cortex M0,
M3, M4

Particle
$35
ARM
WiFi Internet



Espruino
$30
ARM
Javascript

Good for processing and network

Raspberry Pi
$35
900 MHz ARM, GPU
1 GB RAM

Compute Module

Intel® Galileo
$50
400 MHz Quark x86
256 MB RAM

Intel® Edison
$70

1 GHz Dual Core Atom x86
1 GB RAM
WiFi
BLE
4 GB Flash

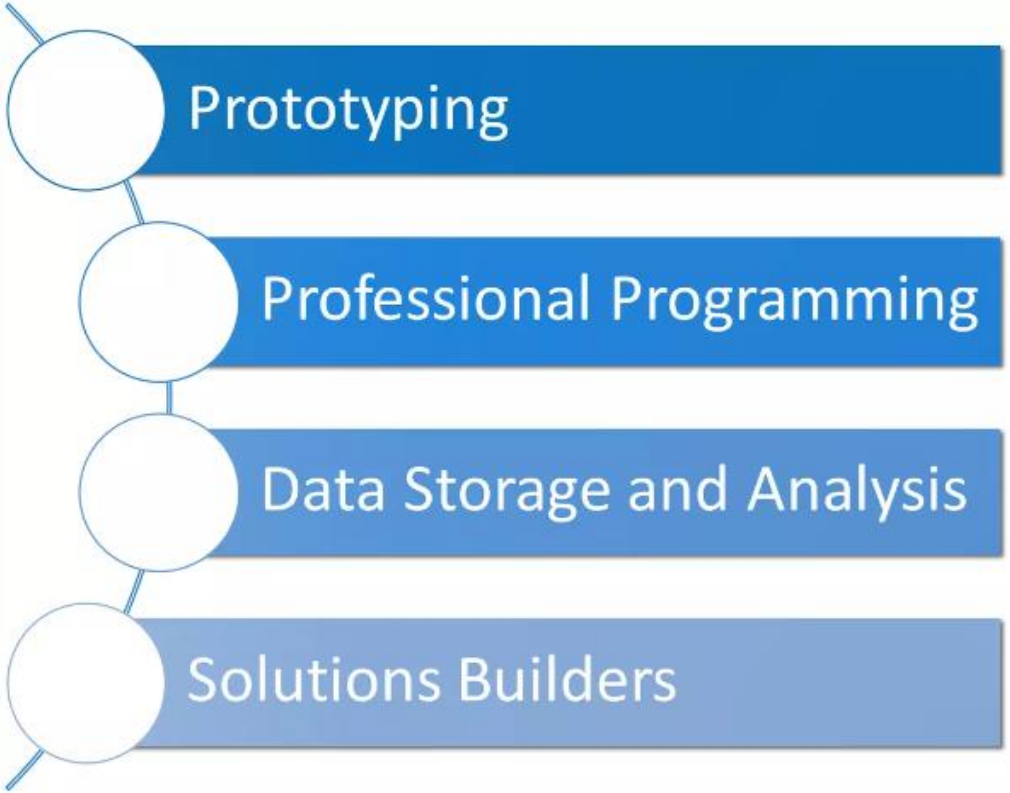
Good for processing and network

Beaglebone Black
$45
1 GHz ARM, GPU
512 MB RAM
4 GB Flash

UDOO Neo
$50
i.MX 6 Solo ARM, GPU
ARM M4
512 MB or 1 GB RAM

Parallella
$99
1 GHz Dual Core Zynq ARM
16 or 64 Epiphany CPUs

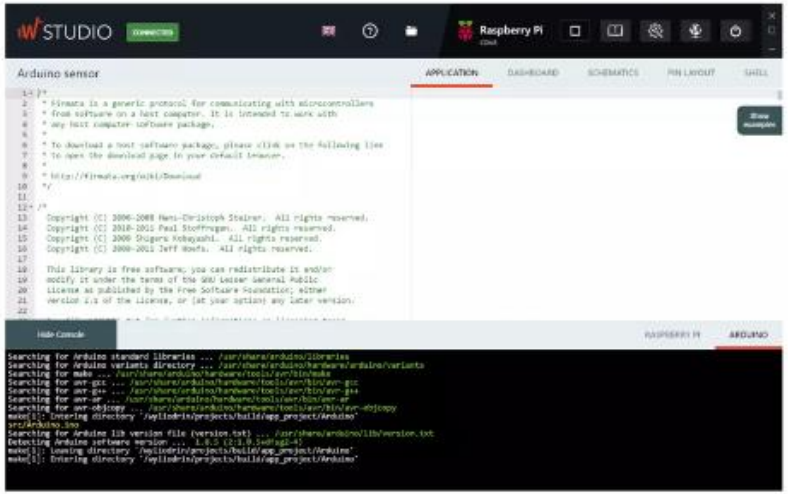
Software


Prototyping
Professional Programming
Data Storage and Analysis
Solutions Builders

Prototyping

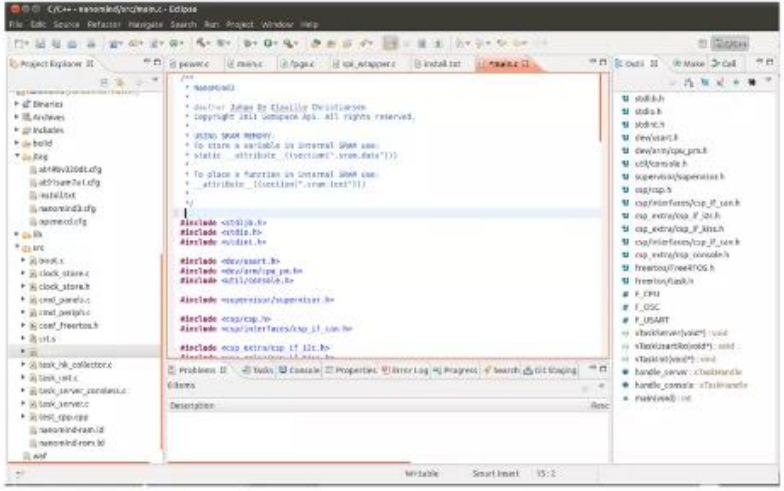
ARDUINO

WYLIODRIN STUDIO

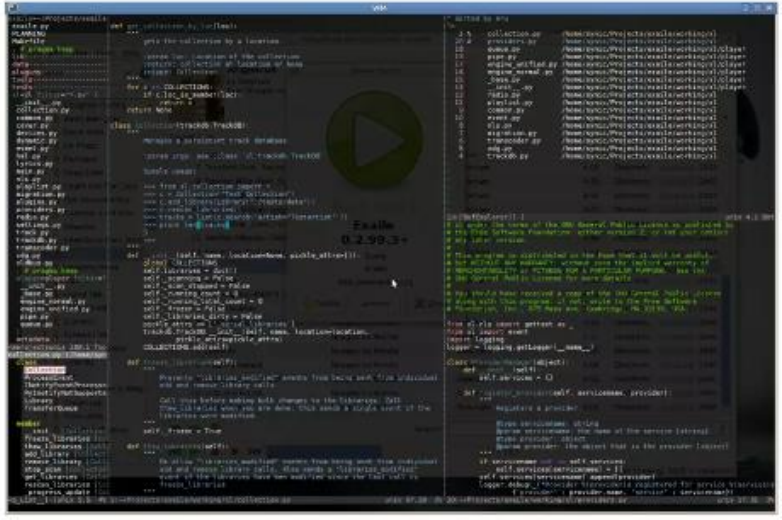


Professional Programming

ECLIPSE

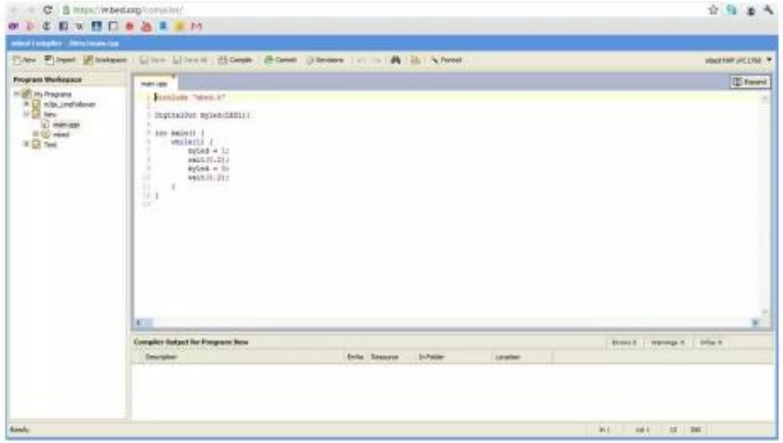


VIM

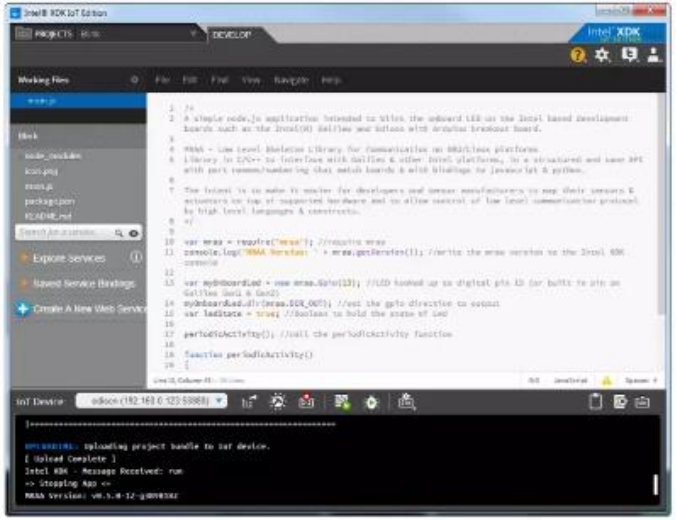


Professional Programming

MBED (ONLINE)

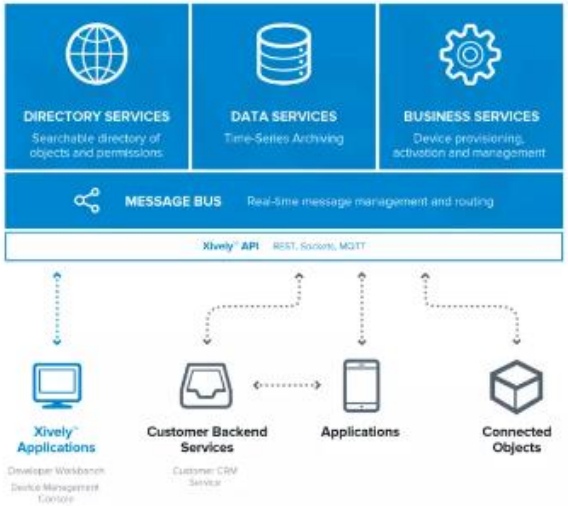
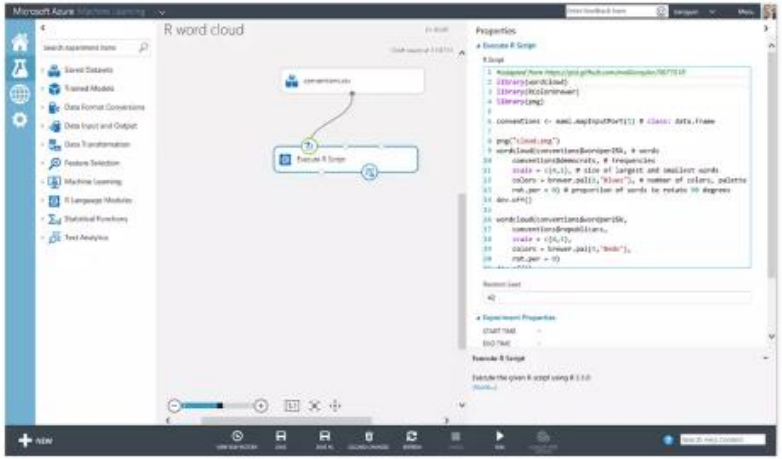


INTEL® XDK



Data Acquisition and Analysis

XIVELY



MICROSOFT AZURE