ZERYNTH

The first Python IoT Development Suite

TECHNOLOGY AROUND US

BIG DATA

PEOPLE ALWAYS CONNECTED

IOT COMPONENTS

SMART DEVICES

WEARABLE TECHNOLOGY

FACTORY ON INTERNET – 4.0

LINE 0374
STATUS OFF
HOURS TO NEXT MAINTENANCE 96 h

STATUS ON
HOURS TO NEXT MAINTENANCE 327 h
LINE 0374

STATUS UNDER MAINTENANCE
HOURS TO NEXT MAINTENANCE NOW
LINE 0376

ENERGY CONSUMPTION 45 kwh
VIBRATION LEVEL MEDIUM
OIL LEVEL OK
WORKING HOURS 10 h

LINE 0377
STATUS ON
HOURS TO NEXT MAINTENANCE 238 h

ENERGY CONSUMPTION 41 kwh
VIBRATION LEVEL LOW
OIL LEVEL OK
WORKING HOURS 6 h

LINE 0378
STATUS ON
HOURS TO NEXT MAINTENANCE 112 h

DASHBOARD

LINE 0377
STATUS ON
HOURS TO NEXT MAINTENANCE 238 h
VIBRATION LEVEL MEDIUM
OIL LEVEL OK
ENERGY CONSUMPTION 45 kwh
WORKING HOURS 10 h

ON
SETTINGS
STATISTICS

THE BIG DATA

THE BIG DATA

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ZERYNTH

THE TYPICAL AUTOMATION ARCHITECTURE

THE TYPICAL AUTOMATION ARCHITECTURE

Classic Automation Pyramid

CLOUD/LOCAL SERVER

ERP

MES

SCADA

PLC

in-/output signals

MACHINE
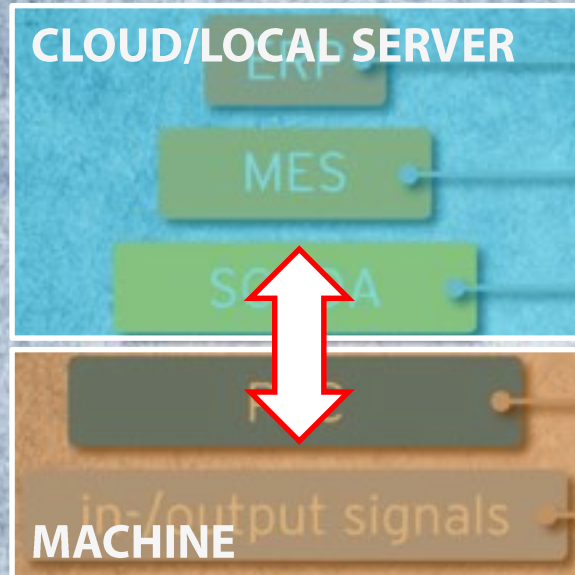
In this classic model every system only exchanges data with the adjacent levels.

Limitations:
- PLC not connected to the network;
- PLC firmware are typically not available/maintained by the company;
- Different world regions different PLC vendors for the same machine;
- Different PLC different interfaces;
- Custom PLC data gathering solutions do not scale;

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ZERYNTH AUTOMATION AGNOSTIC PARADIGM

IN THIS MODERN APPROACH
EACH SYSTEM IS DECOPLUED
FROM THE ADJACENT LEVELS

PLC

in-/output signals

**ZERYNTH 4.0
FIELD SENSOR
GATEWAY**

ERP

MES

SCADA
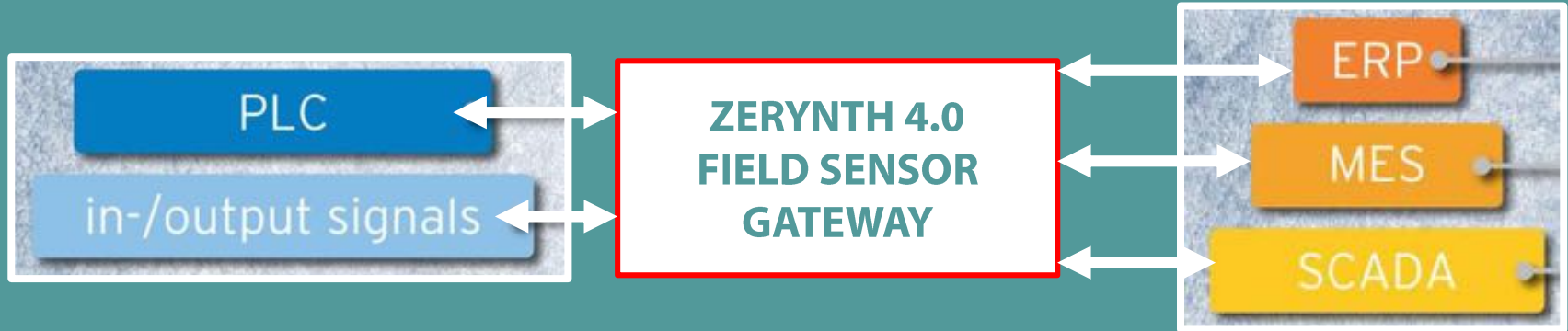
ZERYNTH

ZERYNTH 4.0 FIELD SENSOR GATEWAY

An agnostic reference hardware for Industry 4.0 applications
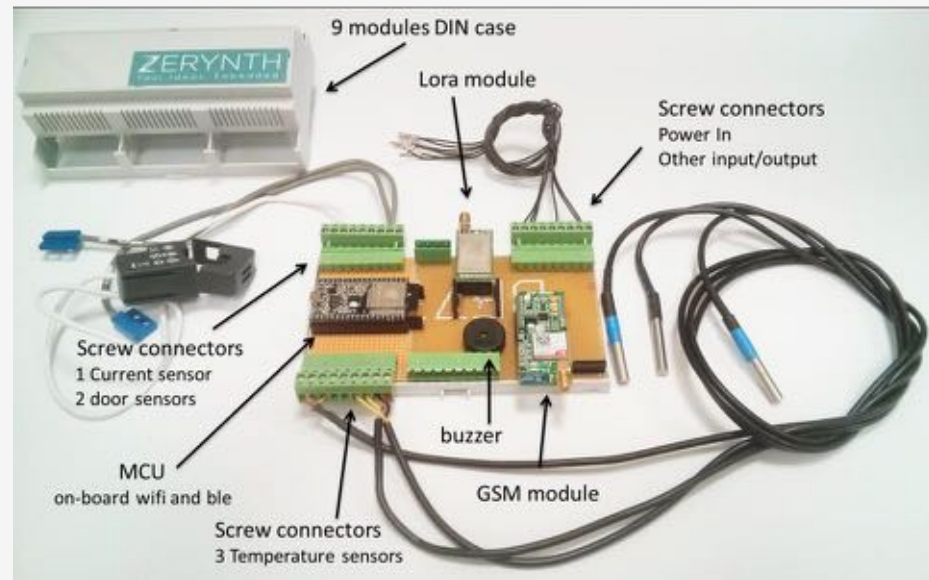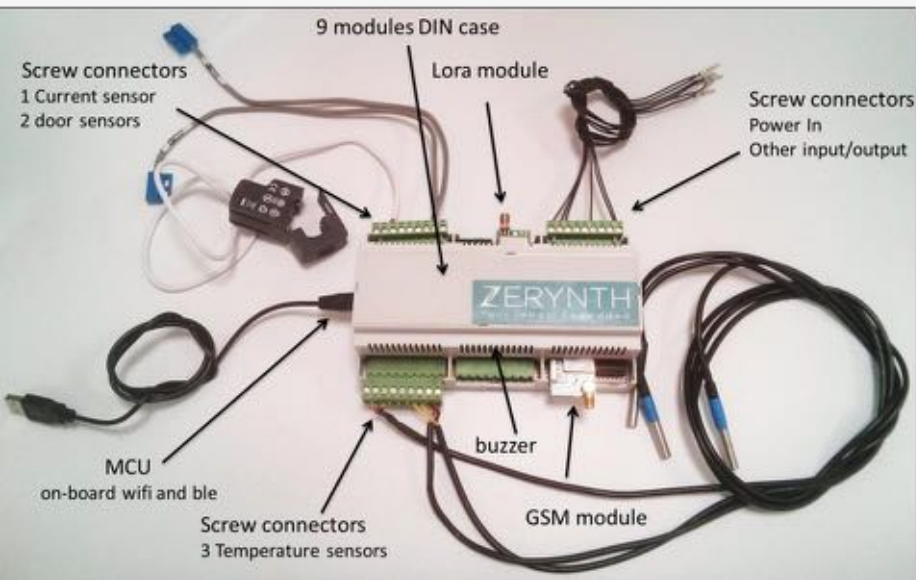
Secure HTTPS Connections and blockcahin integration supported

Case Studies

ZERYNTH

ROI: REFRIGERATION ON INTERNET

ROI is a control unit for commercial refrigerators endowed with an easy to use and configurable energy consumption control, an analytics engine and a user friendly reporting interface.
An integrated monitor interface allows predictive maintenance and easy configurable alarms.

• WI-FI SMART DEVICE with sensors and display, ready to install on new and existing commercial refrigerators

• CLOUD INFRASTRUCTURE for remote fridges fleet management and predictive maintenance

• WEB-BASED DASHBOARD for fridge performance monitoring, failure alarming and data reporting

ZERYNTH POWERED LORA NODES


```
#############################################
# Zerynth Powered LORA nodes
#
# Created: 2016-09-30 09:10:10.047879
#
#############################################

import streams
from microchip.rn2483 import rn2483
from stm.hts221 import hts221

streams.serial()

try:
    rst = D16
    appeui = "YOURAPPEUI"
    appkey = "YOURAPPKEY"
    print("joining app...")
    if not rn2483.init(SERIAL1, appeui, appkey, rst):
        print("denied :(")
        raise Exception

    lat, lng = 43.715, 10.395  # IF

    temp_hum = hts221.HTS221( I2C1,D31 )
    for I in range(4):
        pinMode(LED1 + i, OUTPUT)
        digitalWrite(LED1 + i, LOW)


    while True:
        temp, hum = temp_hum.get_temp_humidity()
        print('temp: ', temp, 'hum: ', hum)
        print('lat: ', lat, 'lng: ', lng)
        data = bytearray(9)
        data[0:2] = bytearray([ int(temp) + 127, int((temp - int(temp)) * 100) ])
        data[2:4] = bytearray([ int(hum) + 127, int((hum - int(hum)) * 100) ])
        data[4:6] = bytearray([ int(lat) + 127, int((lat - int(lat)) * 100) ])
        data[6:8] = bytearray([ int(lng) + 127, int((lng - int(lng)) * 100) ])
        r = rn2483.tx_uncnf(data)
        if type(r) == PTUPLE:
            if r[1][0] == 120:
                for i in range(4):
                    pinToggle(LED1 + i)
        sleep(5000)
except Exception as e:
    print(e)
```

LORA GATEWAY

LORA DEVICE HARDWARE

ENG Faculty UNIPI

TAG Coworking PISA

THE THINGS NETWORK PISA

Only **35 lines of Python** to:
- establish, login and manage the Lora connection
- acquire temp and hum data
- send acquired data to the TTN network every 5 sec

WASTE MANAGEMENT SYSTEMS

CH₄	43%
O₂	3%
PRESSURE	-1mbar

CH₄	39%
O₂	2%
PRESSURE	-3mbar

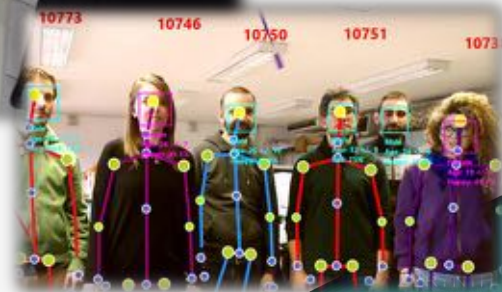| CH₄	44.3%
O₂	2.5%
PRESSURE	-8mbar

SMART RETAIL DISPLAY

- **11 synchronized rotating platforms for jewels display**
- **Remotely controllable with a dedicated mobile app Working 24/7**
- **Able to gather data from customer interaction, presence, etc.**

SMART RETAIL DISPLAY

LINCOLN: LEAN INNOVATIVE CONNECTED VESSELS

IoT Blackbox for added-value specialized vessels able to run requested services for Marine Aquaculture, Ocean Energy, Coastal Monitoring, Control and Surveillance, and Rescue sectors in the most effective, efficient, economic valuable and eco-friendly way

www.lincolnproject.eu

LINCOLN

MULTI-PLATFORM BOAT

A multi-platform catamaran to serve as Service crew vessel and Multipurpose survey vessel.

PATROL BOAT

A module based high-speed patrol boat platform that is reconfigurable to adapt to the different operational requirements of patrol and security operators.

EER VESSELS

A multi-platform catamaran to serve as Service crew vessel and Multipurpose survey vessel.

ZERYNTH

ZERYNTH
Your Ideas. Embedded

Thank you!

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🐦 **@zerynth**

f **zerynth**

CONTACT US!

3. Business Model

ZERYNTH

Zerynth Studio

Products and Features		Zerynth Studio	Zerynth Studio Pro
		Free	**Preorder at 199$/year**
Programming and Prototyping	Free to program 5 units of each supported board	YES	YES
	Hybrid C/Python programmability	YES	YES
	Secure and Robust on-the-fly compiled Virtual Machines	YES	YES
	Integrated compiler and firmware loader	YES	YES
	Automatic Device discovery and configuration	YES	YES
	Powerful integrated command line Toolchain (ZTC)	YES	YES
	Ready to use multi-architecture pre-configured development environment	YES	YES
	Tutorial and code examples	YES	YES
	On-Line documentation and board pinmaps	YES	YES
	USB, USB-to-Serial and JTAG programming (soon)	YES	YES
	Power Saving	NO	YES
	Selectable RTOS	NO	YES
	Over the Air update support	NO	YES
	Hardware-driven Secured Firmware	NO	YES
Device Management	Zerynth App included	YES	YES
	Devices controllable via Zerynth ADM	5	50 to Unlimited (3rd party clouds)
	Devices OTA bytecode updates	NO	YES
Productivity	Projects on the Private Git Repository	50	1000
	Projects publishable on Github and Gitlab from Zerynth Studio	NO	YES
Support	Community forum support	YES	YES
	Email Support	NO	YES
	Premium Email Support (2 days reply)	NO	35$/Month
	Premium Professional Live Voice Support	NO	100$/hour
Production	Purchasable VMs Packs	NO	YES

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Zerynth VM Production packs

End-users VM production packs, usable on all the supported boards once upgraded to Zerynth Studio PRO

For big prototyping and production purposes, the Zerynth VMs are purchasable in "Packs", **usable for all the supported boards**. As the VMs are linked to the single chip ID, they are "generated on demand", just when needed.

- The low volume VMs packs are suitable for large prototyping and small production series

- The purchased VMs Pack amount is displayed into your Zerynth Studio account assets, where checking how many VMs are left

- You can use every single VM via Zerynth studio when you need to program a new prototyping board or to flash a small series of devices

- Zerynth VMs packs **support mass programming**: we provide scripts to control the device programmer and, for big volumes, a collection of pre-compiled VMs ready to be flashed

Package name	Pre-paid VMs	Pricing	Unit Price
Welcome Pack	50	Included with Zerynth Studio Pro	Free
Development Pack	200	$900	$4.95
Startup Pack	500	$1,990	$3.98
Pre-production pack	1000	$3,490	$3.49
Production pack	5000	$9,900	$1.98
Mass Production pack	> 5000	Contact us for info at sales@zerynth.com	

SERVICES

- We can make our complete set of high-quality embedded development tools compatible with a vast set of 32bit MCU hardware and with any proprietary cloud infrastructures.

- We can support you during the prototyping phase, and accompany you to the mass production, by providing either scripts to control the device programmer or, for big volumes, a collection of pre-compiled virtual machines ready to be flashed.

- We can provide professional support to Product Designers, IoT Systems Integrators and Managed Service Providers, for the development of connected interactive solutions, IoT systems and Industry 4.0 applications.

PORTING
We can port the Zerynth VM on new embedded architectures, MCUs and boards

CODING
We develop drivers and libraries for Sensors, Actuators and Peripherals

SUPPORT
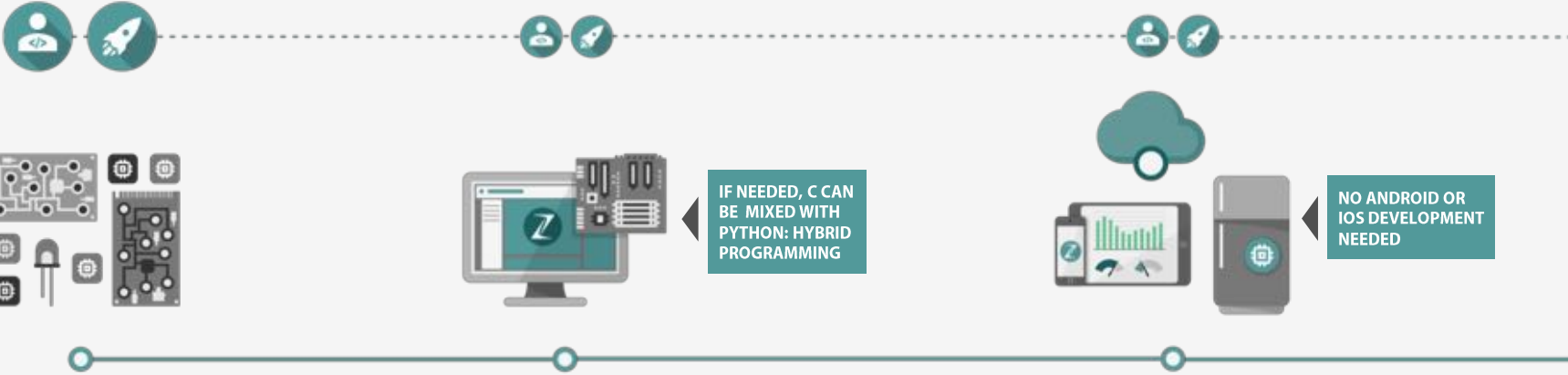We support the customers using Zerynth tools on commercial basis

DESIGN
We enable the integration for any hardware and cloud infrastructure

ZERYNTH

HOW ZERYNTH WORKS

DESIGN AND PROTOTYPING PHASE

IF NEEDED, C CAN BE MIXED WITH PYTHON: HYBRID PROGRAMMING

NO ANDROID OR IOS DEVELOPMENT NEEDED

**1** Select and Plug one of the 32 bit boards supported by the Zerynth VM and peripherals

2 Code in Python with Zerynth Studio, compile and upload on the selected board

3 Use the Zerynth App to control your devices through a simple HTML5 interface. Connect to the preferred third party cloud by using the provided libraries

HOW ZERYNTH WORKS

INDUSTRIALIZATION PHASE

NO BOOTLOADER REQUIRED
SMALL FLASH MEMORY
FOOTPRINT

OTAupdate
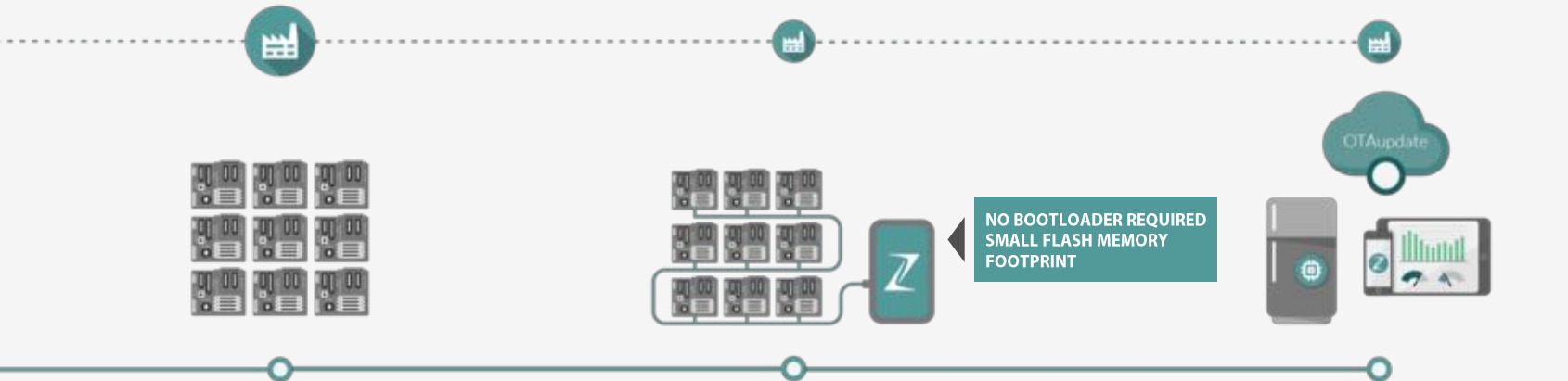
4 We can port the Zerynth Virtual Machine on custom MCUs and industrial PCB

5 Burn the Industrial PCB with a secure and hacker-proof monolithic firmware (VM+Bytecode) using the exact code developed for the prototype (step 2)
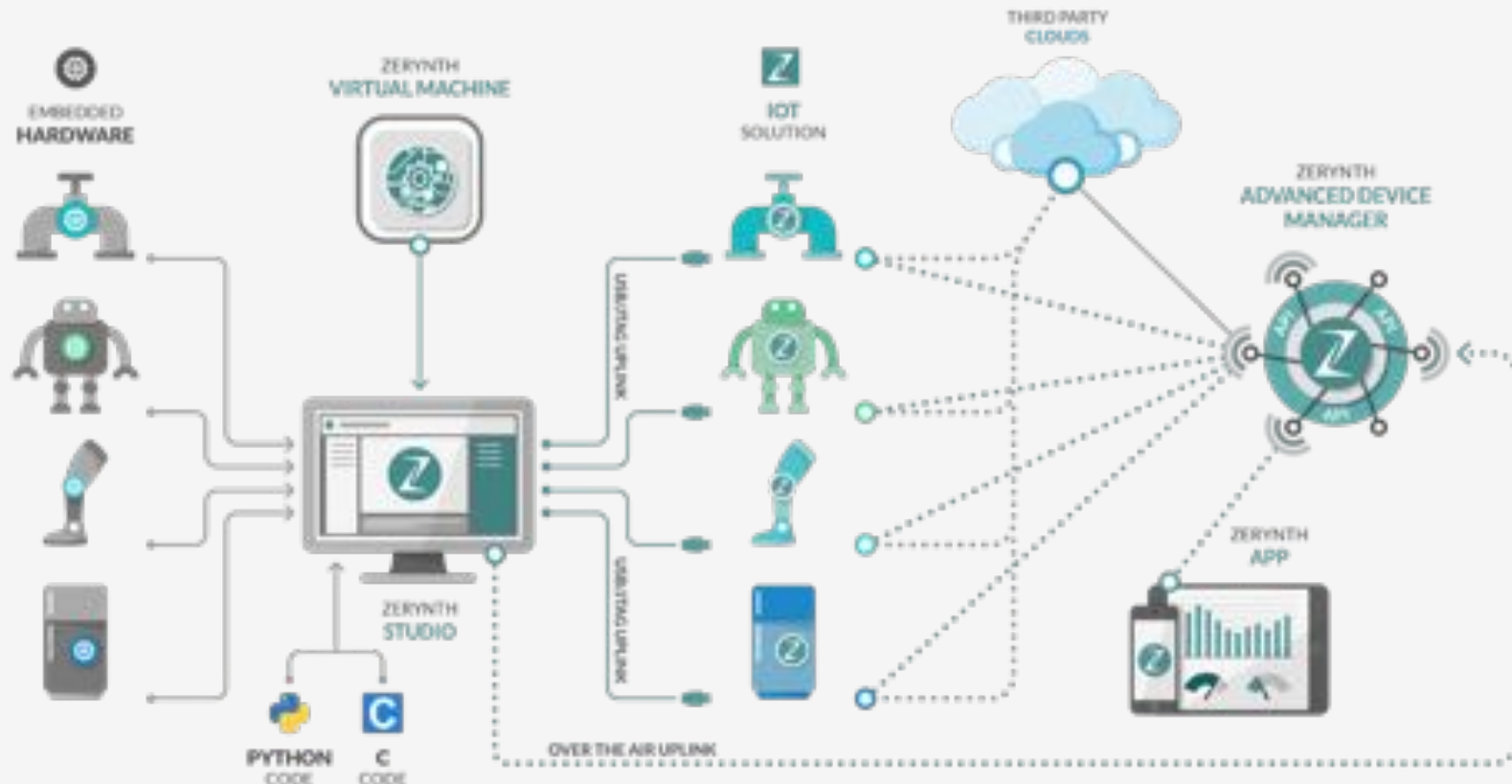
6 Over-The-Air update your devices via Zerynth ADM and develop your own mobile APP using the Zerynth Android or iOS SDKs

ZERYNTH STACK

Zerynth features a full stack solution going from embedded hardware cross-platform programming to cloud data visualization, analytics and mobile integration

ZERYNTH UNIQUENESS

TIME TO MARKET REDUCTION

Zerynth reduces the development and industrialization time thanks to faster coding and ready-to-use features

FLEXIBILITY

Zerynth allows the generation of multiple IoT solutions with different hardware and cloud architectures

SCALABILITY

The Zerynth-powered IoT solutions grow with your needs, thanks to code transferring and over-the-air updates