
SIEMENS
Ingenuity for life
SIMATIC IOT2040
The intelligent Gateway for Industrial IoT solutions
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siemens.com/iot2000

Case for action
SIMATIC IOT2040 motivation for development

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Increasing data volumes

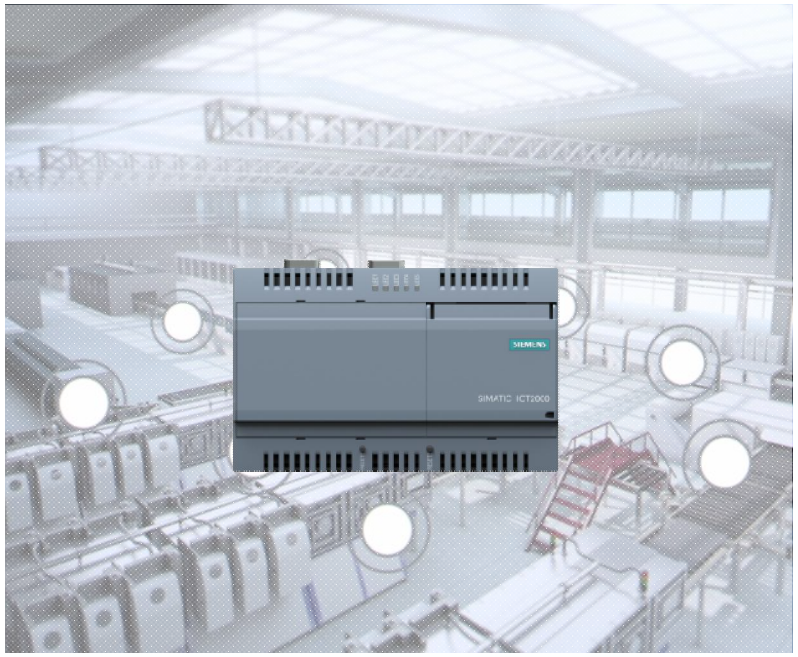
Capturing and monitoring data from the automation level

Growing performance

Intelligence in the field required for pre processing and data-handling

Usage of open standards

High-level languages and standard interfaces required



Connecting Automation & IT

Usage of various physics & protocols

Cloud-based solutions

- Cloud-based analysis requires data flow from and to the field
- Connecting brown-field applications to the cloud via retrofitting

Growing IT influence

Remote monitoring and analysis functionality required

Increasing interconnection and data communication between automation and IT require programmable gateway platforms

Portfolio overview

SIMATIC IOT2040 is an intelligent data gateway with limited computing functionality

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Maker Boards

Free programmable boards / single board PCs without housing and certifications with focus on maker market.

Teach. Learn. Make.

SIMATIC IOT2040

Additional features compared to standard maker boards:

+ Industrial robustness
+ 24/7 operation
+ Real time clock
+ Standard interfaces
+ Housing and DIN rail mount

SIMATIC IOT2000:
Intelligent gateway for industrial IoT

Enhancement capabilities:
Expandable by ARDUINO & mPCIe

SIMATIC IPC

Additional features compared to SIMATIC IOT2000:

+ Windows support
+ Performance and mass storage
+ Industrial server functionality
+ HMI applications
+ SIMATIC Software controller
+ TIA / IPC diagnosis
+ Expandability

SIMATIC IOT2040

Industrial ruggedness. Openness. Connectivity.

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SIMATIC quality
Designed for 24/7 operation in industrial environment

AutomatIon.ConnecTed
Easy connection to automation level with PROFINET*) and openness to cloud based solutions

Openness
Free programmable in high-level languages (e.g. Java, C++) via various IDEs (e.g. Eclipse) and compilers for Yocto Linux

Expandability & connectivity
With mPCIe, Arduino Shields and various standard interfaces & available protocol drivers

Performance & Deterministic
Intel Quark® CPU and 1 GB RAM as well as x86-deterministic and battery buffered real-time-clock

*) planned

Application example SIMATIC IOT2040

The intelligent gateway to connect the field level to the IT level / cloud

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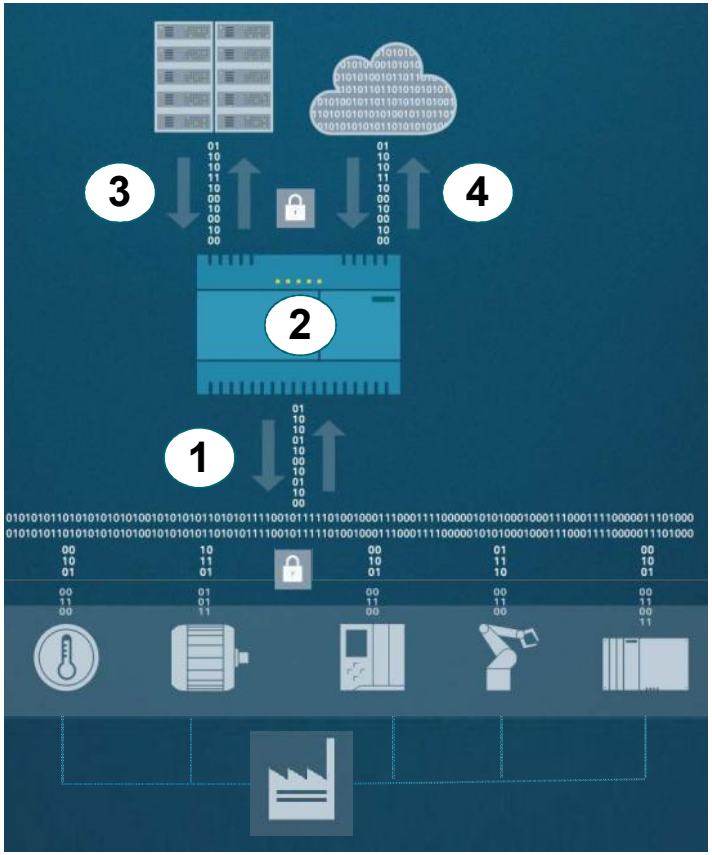

1 **Collecting and concentrating** relevant production **data** of several sources

Flexible Connection to sensors/actors via serial communication, Ethernet or Arduino shields. Communicating with PLCs, drives and motors with e.g. PROFINET[1)] or OPC OA[2)]

2 **Protocol conversion / customer programmed control**

Data aggregation, conversion of different communication protocols and pre-processing programmed in high-level language e.g. Java, C++

3 **Secure transfer to** connected company **IT-systems or cloud applications**

Converted data can be transmitted to IT systems / cloud solutions using e.g. OPC UA, MQTT or AMQP [2)]

4 **Production monitoring, analysis and optimization**

Cloud based analytics to detect optimization potential

[1)] planned [2)] application examples will be provided at IOT2000 forum

Target applications – focus on brown-field applications

IOT2040 for production data pre-processing, conversion and transfer

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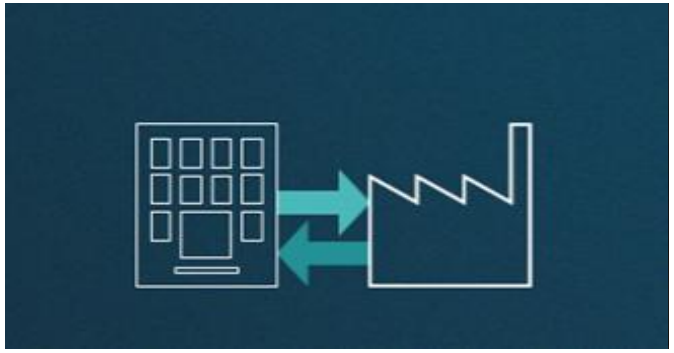

Connecting IT/cloud and automation

- Secure communication between ERP/IT systems or cloud applications and production
- Production optimization with vertical data integration from shop floor to cloud

Predictive maintenance

- Capturing and analyzing production data like e.g. speed or operation hours in order to identify the best maintenance interval
- Optimize machine downtimes

Optimized shop floor management

- Data transfer in case of undercut of minimum stock levels of consumables
- Automated alarming in shop floor management system in order to avoid production downtimes

IOT2000 as open platform to connect legacy systems, additional sensors and IT-level

SIMATIC IOT2000 forum

Managed forum with getting started, application support and FAQs

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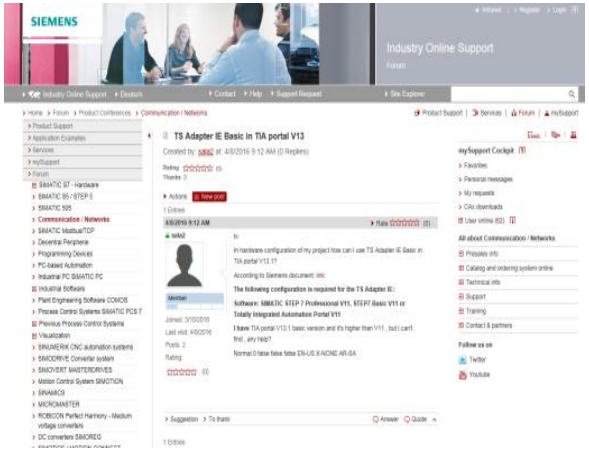
SIMATIC IOT2000 Online Forum



www.siemens.de/iot2000-forum

Initial content provided by Siemens

Getting started

- Getting started and setting up to start with IOT2000 application development.
  - Hardware setup
  - System console and driver for debugging
  - Development environment (Arduino IDE or Yocto Linux Eclipse IDE)

Base image as download

- µSD Card base image for download
- Usage of all onboard interfaces possible

Application examples

- cloud connect use case
- sensor connection
- ...

Q & A

- FAQs (e.g. sampling rate analog inputs using Arduino shield, max. current feed GPIOs using arduino shield)

Further content provided by IOT2000 community and Siemens

Openness to realize modern solutions
Efficient programming

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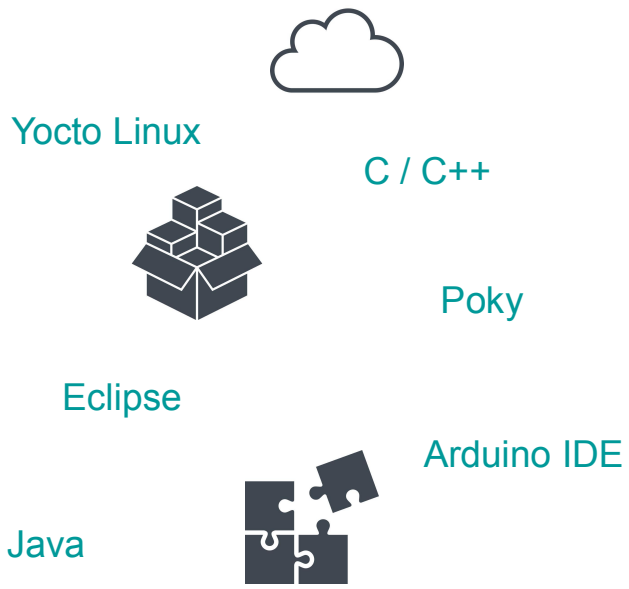
Openness



Feature / function	Benefits
• Programmable in various high-level languages like C/C++ or Java • Arduino IDE or Eclipse for • Open-source application examples and libraries	• Efficient programming with high-level languages • Using community know how and open-source code for fast success

Expandability to realize cost-efficient solutions
Flexibility to connect various data sources

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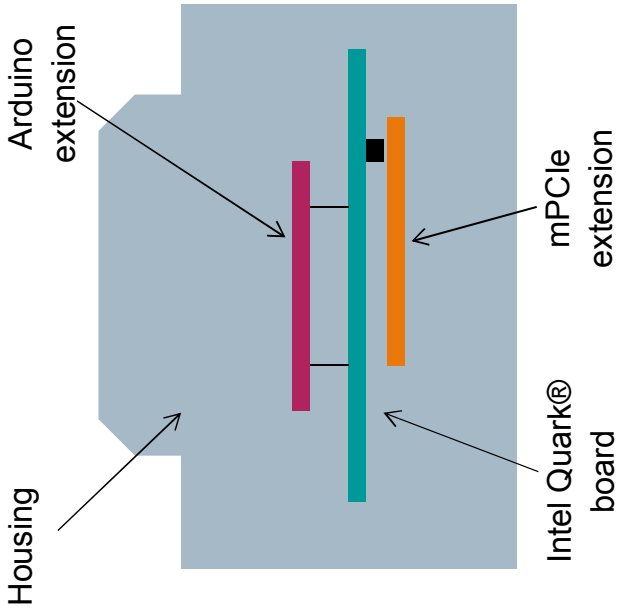
Connectivity



Feature / function	Benefits
• Expandable with Arduino shields for IO/sensor connection	• Benefitting from the variety of expansion possibilities of Arduino
• mPCIe slot suited for radio communication like WLAN or LTE	• Realizing mobile communication concepts
• 2 independent Ethernet ports	• Various possibilities to connect to legacy systems, sensors and different communication networks
• 2 serial interfaces (RS232/422/485)	

Deterministic & Performance for industrial IoT gateway applications
Designed for industrial use

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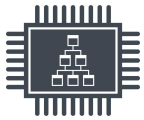
Performance & Deterministic



Low power consumption and deterministic

Battery buffered real time clock

Industrial grade

Feature / function	Benefits
• Intel Quark® X1020 CPU and 1GB RAM • Security features, e.g. secure boot • Battery buffered real time clock • Industrial design and rugged components	• Performance optimized for data aggregation, conversion and communication tasks • Protecting the data and application • Time stamp vital for data analytics • Designed for 24/7 operation in industrial environment

SIMATIC IOT2040
Product data overview

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	SIMATIC IOT2040
CPU technology	Intel Quark® x1020 (x86 400 MHz) with security features
System memory	1 GB DDR3 RAM 8 MB FLASH, 256 kB SRAM
Communication interfaces	2x 10/100 Ethernet RJ45
Serial interfaces	2x RS232/485 switchable
Media interfaces	1x USB Controller + 1x Device
Graphic processor	-
Extension	mPCIe + Arduino
On board I/O	Arduino connector
Mass storage	yes, with microSD[1] card
Embedded features	5 LEDs (one user programmable), battery buffered Real-time-clock, watchdog
Power supply	9..36 V
Operating temperature	0 - 50°C
Certificates	Industry standards (CE, UL)
Dimensions (w x h x d) [mm]	144 x 90 x 53
Order number	**6ES7647-0AA00-1YA2**

Software – *3rd party*

Specific image creation

Poky
by Yocto Linux Project

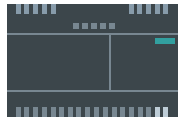
Development environment and programming languages

Arduino IDE
– C/C++
Intel System Studio IoT Edition (Eclipse)
– Java
– C/C++
– Python and more[2]

Adapted Image

Application

Base Image
Download @ SIOS forum



Operating system
Arduino / Yocto Linux

[1] Not in scope of delivery

[2] Image adaption necessary

SIMATIC IOT2040

Analyzing data of additional sensor in existing machine/machine design

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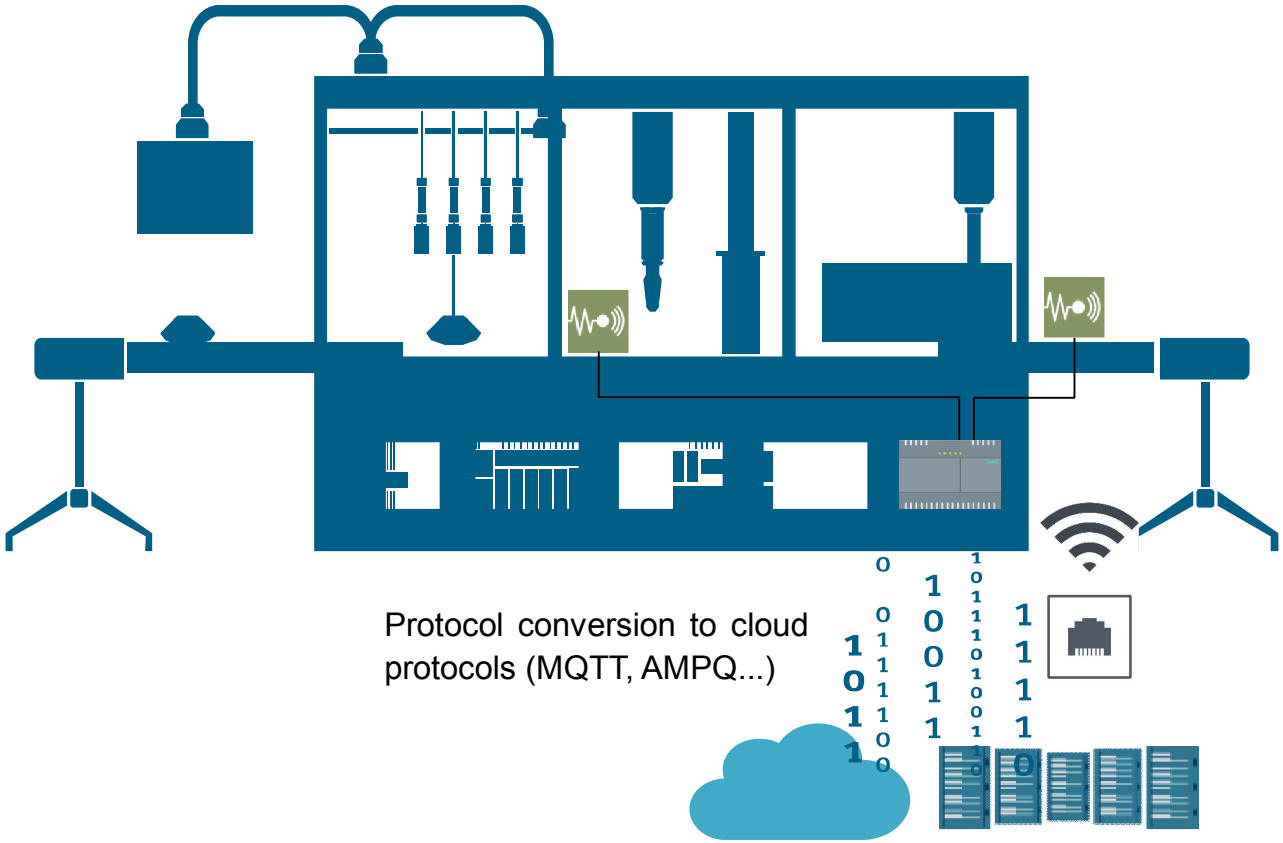

Adding additional sensors in existing machine or existing machine concepts

- Generating new data to make optimization potential transparent
- Pre-processing/data acquisition with IOT2040 and/or data transfer to company network / cloud
- No need to change/adapt existing automation solution

SIMATIC IOT2040 is ideal for retrofits/ additional option for existing machine designs as cost-efficient platform

Your open platform to realize industrial IoT applications

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SIMATIC IOT2040

The intelligent gateway for industrial IoT

- Easy retrofit of existing production sites -

Creating value out of production data with transparency of additional optimization potential.

www.siemens.com/IOT2000

Thank you for your attention

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