Introduction to Industrial Iot

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industrial Revolution 4.0

1st	2nd	3rd	4th
			
1760's	1860's	Late 1900's	nOW
Steam, Water Mechanized Production	Electrification, Oil, Mass Production	Invention of the Microchip	Networked Machines, Big Data, AI

Industrial customers are asking …

How can I **capture knowledge** for my transitioning workforce?

How Can I Better **Innovate?**

How Do I Improve **workforce productivity**?

I need to achieve Real Time Visibility

How Can I Introduce new IOT solutions faster?

How can I **Reduce Downtime?**

How can I have better visibility to manage my

Global Supply Chain?

I need to improve

Product Quality.

Visibility Leveraged for decision making

"While manufacturers have long had access to data collected on the plant. floor, it's typically been locked away in proprietary manufacturing software silos… That changes with IoT, which makes it far easier to collect and manage large amounts of manufacturing data not just in a single factory, but across multiple production sites through the cloud. When paired with analytics, companies will gain better insights, allowing them to optimize plant operations, reduce quality defects and perform preventative maintenance"

-Matt Wells, GE Digital

Matt Wells, product general manager for automation software at GE Digital, based in San Ramon, Calif.

Industrial IoT

WH AT?

Industrial processes are taking on a **dual nature**, one **physical** and the other **digital**. Together Industry 4.0 runs on **Cyber-Physical** machines.

Sensors are connecting our tools to their physical environment and each other.

Large scale computing is connecting our tools to us through optimization of process and analytics.

Industrial IoT

WHY?

- New Modes of Manufacture – Modular Factories
- New Revenue Streams from Data
- Faster Scaling of Processes
- More Efficient, Safer Production
- Real Time Feedback

Industrial IoT

How ?

- Open Industrial Standards and Consortiums
- Virtualization
- Consolidated Workloads
- Security
- Data Analytics

New Revenue Stream – GE Jet Engine

Sensors:

- 280-500 Parameters
- ~1TB Data Per Flight

Predix – Industrial Analytics Platform

Service Provided:

- Fuel Efficiency
- Fleet Management

Safety and Efficiency - Daqri + Intel

- Smart Helmet
- Eye Protection
- Microphone / Speaker
- 3 Cameras – Thermal, Wide Angle, RGB
- AR Display
- Intel Edge Processing

Real Time Analytics – Intel Connected Logistics

Industrial Compute is Transforming

From This…

Proprietary, Specialized, Monolithic

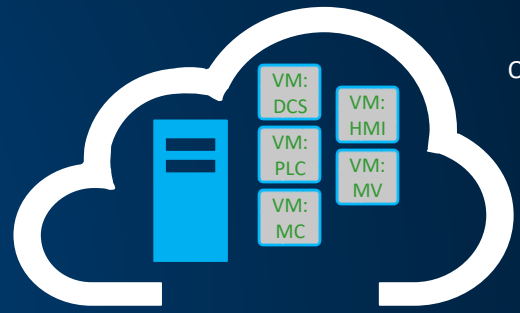
Control

DCS | PLC | HMI | Robotics | MV

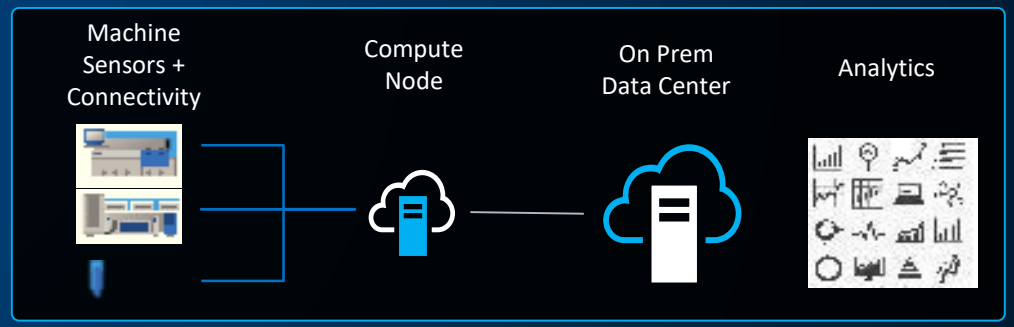
Analytics

To This…

Virtualized, Open, Interoperable



On Prem Compute (Edge to Fog)



enabled by Technical Pillars of Transformation

Virtualization | Security | Safety | Analytics (AI) | Machine vision | Real time

Industrial 4.0 Pilot Opportunities

Digital Business Models	Engineering	Vertical Integrations	Horizontal Integrations	Smart Maintenance	Digital Workforce	Digital Sales & Marketing
Hardware Optimization Service Model	Agile Prototyping	Machine Automation	Integrated E2E Planning and Execution	Predictive Maintenance	Integrate ERP Systems	Digital Customer Relations Management
Pay as you Go Models	Simulation & Digital Twin Modeling	E2E Product Lifecycle Management	Visibility into Supply Chain	Simulation of Digital Twin	Digital Finance and Accounting	Customer Service Portals
Complete Platform Management Model	Scalable Device Management	Smart Building Management	Smart Warehousing and Logistics	Augmented Reality	Connected Agile IT	Dynamic Pricing
Big Data Analytics	Virtualization	Energy Optimization	Digital Parts and Equipment Sourcing	Wearables	Augmented Reality	Personalized Marketing
Performance Management	Xeon to FPGA Embedded Technology	Connected Logistics	Intrinsic E2E Security	FUSA	UX Interface Support	E-Payment Systems

Government Action

Canada—Innovation, Science and Economic Development Canada plans to launch a public consultation on releasing large amounts of spectrum to support development and deployment of 5G networks.

UK—The govt. awarded a $135.98M funding to 38 **automotive** R&D projects to help in the development of next-generation driverless and low-carbon vehicles.

Russia—The Moscow mayor's office and a consortium of Russian mobile operators are in discussion for the creation of a 5G consortium in the hopes of having 5G networks by 2020.

China—China to focus on smart manufacturing by integrating the strategies of Made in China 2025 and Internet Plus Initiative (which would integrate mobile internet, cloud computing, big data, and IoT innovation into other industries to create new industries and business opportunities).

US—New York allowed testing of AVs on public roads; started to accept applications from companies interested in testing AVs.

France—The govt. set up a blockchain working group to research implementations

South Africa—As part of South Africa's strategy to gain competitive advantage in 3D printing and create jobs in industries such as additive manufacturing and gas & energy, the Industrial Development Corporation invested ~US$1.2M in Metal Heart to make metal 3D printers for production.

Australia & Germany—The Australian Prime Minister's Industry 4.0 Taskforce and Platform Industry 4.0 from Germany collaborated to advance both countries' manufacturing sectors by focusing on areas such as Industry 4.0 Test labs and security of networked systems.

Intel IoT Developer Products and Program

Accelerating IoT Solution Design and Deployment

Core and Visual Computing Group, Intel®

Intel Technology for **Industrial IoT/Industry 4.0**

Open Platform

built with interfaces and APIs that enable integration with legacy systems and devices and with platforms from multiple vendors.

Interoperability

is designed into IA CPUs to offer backward compatibility to help SW and application reuse thus reducing development time and resources.

Performance at the Edge

that enables near-real-time analytics, local decision making, and tighter process controls.

Advanced Security

for trusted data from edge to cloud and protection from costly attacks.

Scalability

for varying levels of gateway performance, with a broad range of support from Intel® Quark™, Intel® Atom™, Intel® Core™ and Intel® Xeon® processor D and E families.

Manageability

for secure remote upgrades and services.

Faster, More Flexible Deployment

with a platform that supports your choice of operating systems and ecosystem applications.

Delivering a Unified, Seamless IoT Developer Experience

DEEP INVESTMENT

in understanding, addressing IoT developer challenges

ACCELERATING

the development process

AMAZING

out-of-box experiences

simplified

for ease of use, consistency, and compatibility

Comprehensive portfolio of developer resources

ToolS

ARDUINO CREATE

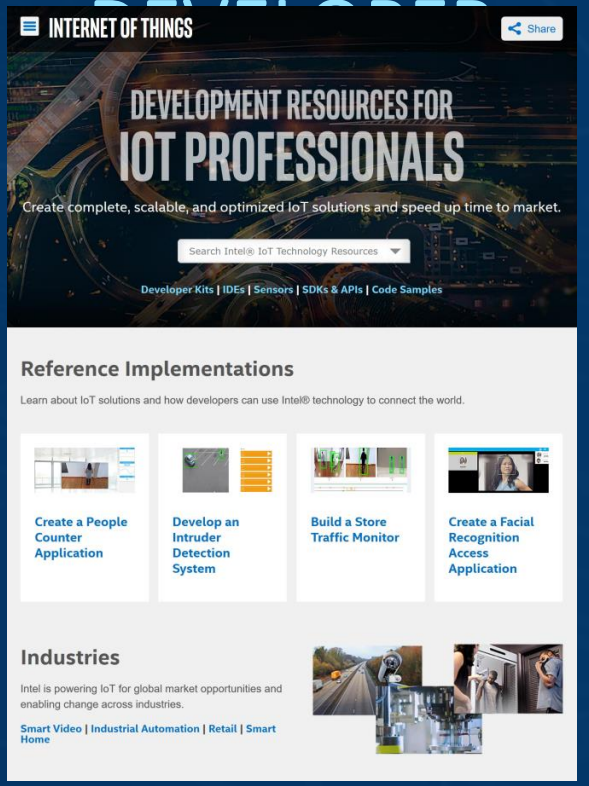
intel SYSTEM STUDIO

KITS

SDKS

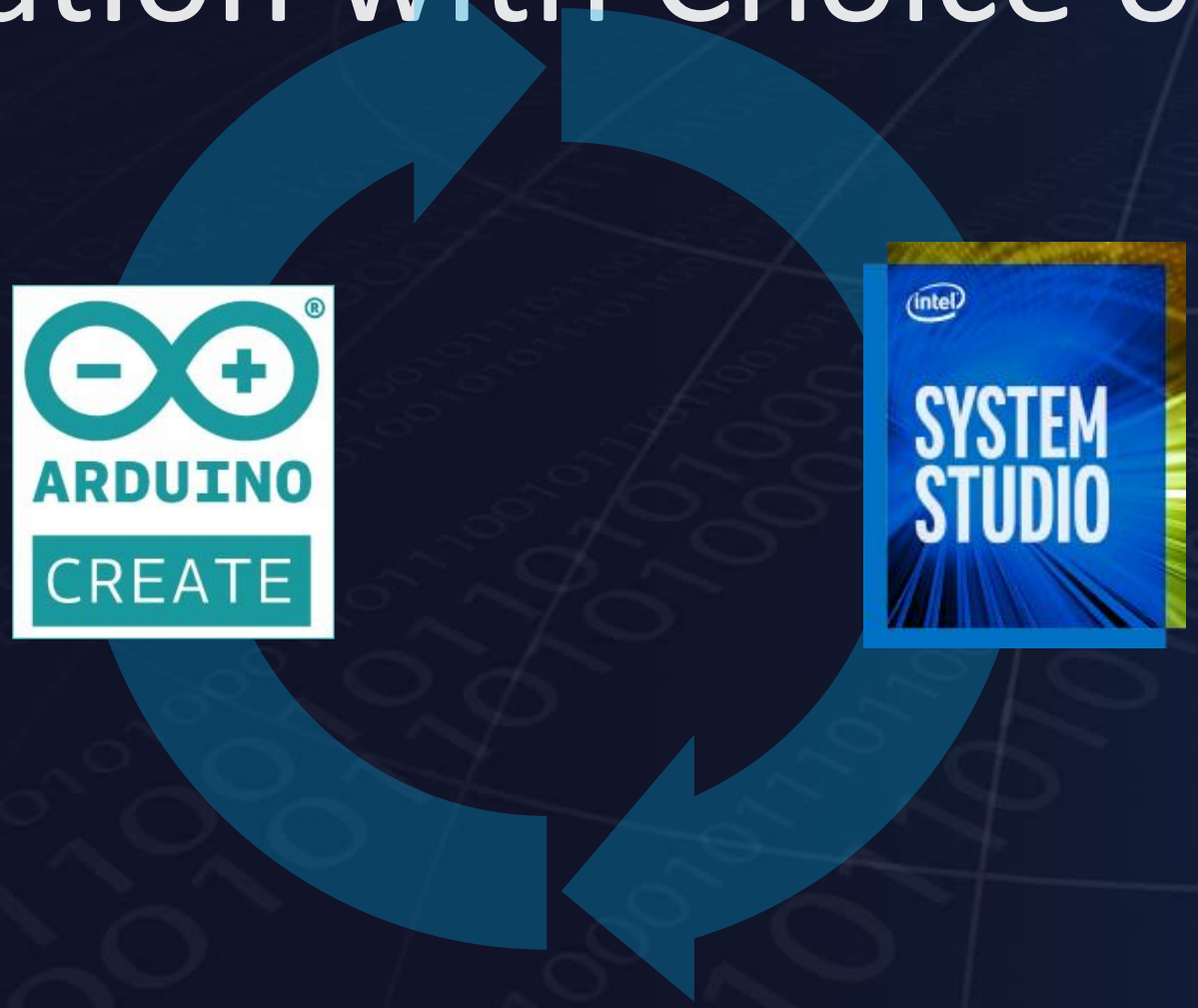
- OpenVINO™ Toolkit
- Intel® Media SDK and Intel® Media Server Studio
- Intel® SDK for OpenCL™ Applications
- Intel® Active Management Technology (AMT)
- mRAA/UPM

INTEL DEVELOPER



Fast Prototyping and Rich Optimization with Choice of Tools

- Rapid Prototyping
- Cloud-Based developer environment
- Easy Out of Box Experience
- Supports Intel based platforms running Linux



- For Production and Performance Optimization
- Easy Migration From Arduino Create*
- Integrates Analyzers and Debug Tools
- Leverages Sample Codes in the Kit

Developer Kits Accelerate Design of Innovative Solutions

UP2 grove IoT development Kit

- Versatile, broad prototype application
- Traditional computer vision – Non-inference based training/learning
- Basic essential components

UP² AI Vision development Kit

- Light computer vision/deep learning applications (1-2 cameras)
- Conceptualization and early CV prototype development
- Optional accelerator options

iEi TANK aIot Development Kit

- Demanding computer vision/deep learning applications (multi-camera environments)
- Commercial production ready development
- Built-in scaled support for complex/parallel video streams

Reduced time to prototype, expedite path to productization, and designed for scalability and extensibility

All kits include the start-up essentials for a bootable development environment

SDKs—Common Tools for Heterogenous Silicon Development

OpenVINO™ Toolkit

Accelerate Computer Vision, Integrate Deep Learning Inference

Intel® MEDIA SDK and Intel® Media Server studio

Deliver Fast, High-Density Video and Image Processing

Intel® SDK for OpenCL™ Applications

Customize Solutions, Optimize Compute with Intel® Graphics

Intel® Active management technology (AMT)

Remotely access a device to discover, activate, monitor, protect, and manage it independent of its power state

mRAA/ UPM

Easy, standardized connection and interface to over 400 to devices and sensors

Intel Developer zone for iot:

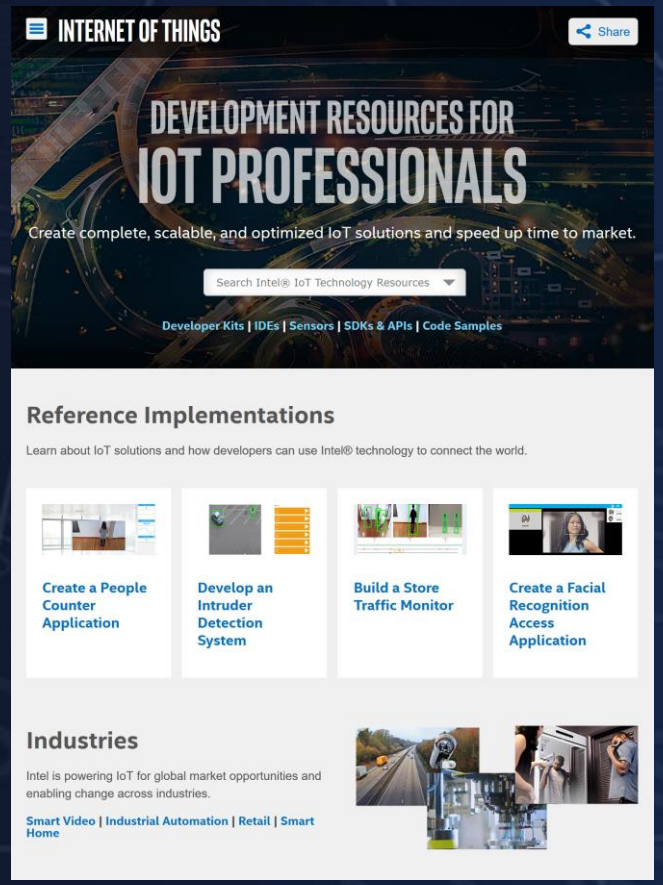
Central resource for E2E solution support

Training, How-Tos, Documentation, Forums, Support

Development Kits, SDKs, Libraries, Sensor Drivers, APIs, Tools

Code Samples and Tutorials, End-to-End Reference Implementations

Guides for Productization and Commercialization



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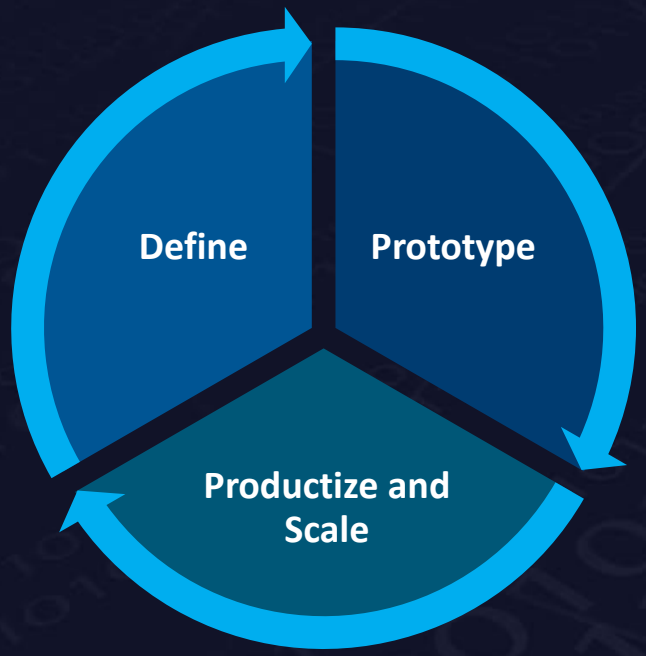
Engaging Through All Phases of Development



Events

Virtual/Tradeshows
(Global IoT DevFest)

Workshop

Hands-On Training
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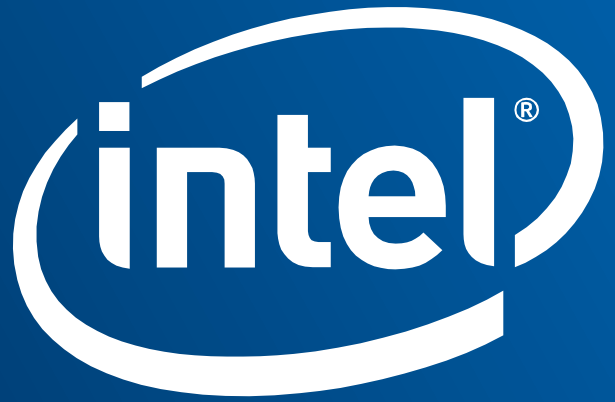
Promotion

Showcase Reference Implementations
IoT Innovators sharing Expertise

Engagements

ISV Engagement
App Enablement
Architecture Conversion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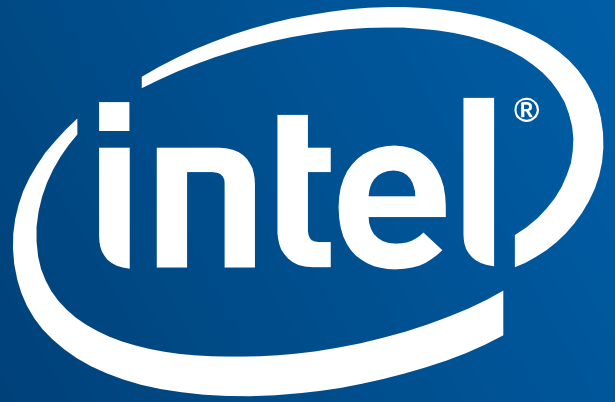
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