IoT in Action

#IoTinActionMS
Evolving IoT with AI, Mixed Reality and Automation

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Microsoft
Intelligent Edge
We are living in an automated world
Evolution of industrial systems

**Mechanized** systems
- Powered by **steam or electricity**
- Manually operated

**Automated** systems
- Powered by **software**
- Fixed operation

**Autonomous** systems
- Powered by **AI**
- Intelligent operation (sense/plan/act)
Convergence is driving new opportunities

Cloud: Globally available, unlimited compute resources

IoT: Harnessing signals from sensors and devices, managed centrally by the cloud

Edge: Intelligence offloaded from the cloud to IoT devices

Digital Twins: Create living replicas of any physical environment, track the past and predict the future

AI: Breakthrough intelligence capabilities, in the cloud and on the edge
Microsoft’s comprehensive IoT product portfolio

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<th>Azure IoT Priority Verticals</th>
<th>Manufacturing</th>
<th>Retail</th>
<th>Agriculture</th>
<th>Energy</th>
<th>Smart Cities</th>
<th>Healthcare</th>
<th>Transportation</th>
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<td>Azure IoT Solutions</td>
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<td>Azure IoT Hub Device Provisioning Service</td>
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<td>Azure Time Series Insights</td>
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<td>Azure IoT Reference Architecture &amp; Accelerators (PaaS)</td>
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Azure Services for IoT

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<th>Azure IoT Hub</th>
<th>Azure Stream Analytics</th>
<th>Azure Cloud</th>
<th>Azure DevOps</th>
<th>Power BI</th>
<th>Azure Data Share</th>
<th>Azure Spatial Anchors</th>
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<td>Azure IoT Hub Device Provisioning Service</td>
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<td>Azure AI</td>
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IoT & Edge Device Support

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<tr>
<th>Azure Sphere</th>
<th>Windows IoT</th>
<th>Azure ML</th>
<th>Azure SQL</th>
<th>Azure Functions</th>
<th>Azure Cognitive Services</th>
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<td>Azure Certified for IoT—Device Catalog</td>
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<td>Azure IoT Edge</td>
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Global Access

1 in 9 people are undernourished (UN)

65% Reduce poverty for 65% of the world’s poor who live in rural areas and work in farming

70% more food is needed by 2050

Sustainable Production

70% of global water resources are needed for Agriculture

24% of global greenhouse emission comes from Agriculture

251T liters of water to be saved in 2030 from implementing Smart Agriculture

Need for Economic Growth

30% of global workers are employed by Agriculture

10-30% Agriculture contributes 10% of global GDP and up to 30% in low income countries

$4.8T Global Agriculture revenue

Source: Sustainability development goals, UNITED NATIONS 2017
An end-to-end system that enables seamless data collection and insights for agriculture
Combine visual data from drones with the sensor data from the farm.

Drones are ~1000 dollars and automatic.

Can cover large areas quickly.

Can collect visual data.
Azure AI

AI apps & agents
Knowledge mining
Machine learning
Azure AI

Fueled by Microsoft breakthrough research

- First FPGA deployed in a datacenter
- 39.5 Teraflops with Intel Stratix 10

- Speech recognition
  - Human parity
  - 94.9% on Switchboard test

- Machine translation
  - Human parity
  - 69.9% with MT Research system

- Conversational Q&A
  - Human parity
  - 89.4% on Stanford CoQA test

- Object detection
  - Human parity
  - 96% on RESNET vision test
Azure Cognitive Services

Decision
- Personalizer
- Anomaly Detector

Language
- Language Understanding
- QnA Maker

Vision
- Ink Recognizer
- Computer Vision

Speech
- Conversation transcription capability
- Neural Text-to-Speech
- Speech Service Device SDK

Web search
Azure Cognitive Services

The most comprehensive pre-trained AI

Decision
- Personalizer
- Content Moderator
- Anomaly Detector
- Conversation transcription capability
- Custom Speech
- Speech transcription
- Neural Text-to-Speech

Language
- Translator Text
- Bing Spell Check
- Language Understanding
- QnA Maker

Vision
- Computer Vision
- Face
- Custom Vision
- Form Recognizer
- Video Indexer
- Ink Recognizer

Speech
- Text-to-Speech
- Custom Speech

Web search
- Bing News Search
- Bing Custom Search
- Bing Video Search
- Bing Image Search
- Bing Web Search
- Bing Local Business Search
- Bing Entity Search
- Bing Autosuggest
- Bing Visual Search
Azure Cognitive Services

Deploy anywhere using containers

Azure Cognitive Services

Vision
Speech
Language
Decision

Wherever your data resides
Accelerate bot development

Build with open source tools

- Microsoft Bot Framework
  - 4K Community commits
  - 2M+ SDK downloads

Easily deploy and manage

- Azure Bot Service
  - 35K Active bots
  - 3K Bots created weekly

Bot Framework SDK 4.5—Adaptive dialogs

Virtual assistant solution accelerator—Skills templates
# Machine Learning on Azure

## Domain specific pretrained models
To simplify solution development

- **Vision**
- **Speech**
- **Language**
- **Web search**
- **Decision**

## Familiar data science tools
To simplify model development

- **Visual Studio Code**
- **Azure Notebooks**
- **Jupyter**
- **Command line**

## Popular frameworks
To build advanced deep learning solutions

- **PyTorch**
- **TensorFlow**
- **Scikit-Learn**
- **ONNX**

## Productive services
To empower data science and development teams

- **Azure Machine Learning**
- **Azure Databricks**
- **Machine Learning VMs**

## Powerful infrastructure
To accelerate deep learning

- **CPU**
- **GPU**
- **FPGA**

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*From the Intelligent Cloud to the Intelligent Edge*
Microsoft platform for autonomous systems

Scale human expertise  Trustworthy autonomy  Real world scenarios
Autonomous systems scenarios

Motion control  Smart buildings  Machine calibration  Process control  Industrial robotics
People-centred experiences

Artificial Intelligence

Ubiquitous computing

Intelligent Cloud

Intelligent Edge
Mixed reality

A blending of the physical and digital worlds in which users may interact with digital and real-world objects while maintaining presence in the physical world.
Opportunity and Responsibility

Responsible AI
- Fairness
- Inclusivity
- Transparency

Reliability
Privacy
Accountability

AI for Good
- AI for Earth
- AI for Accessibility
- AI for Humanitarian Action
So what’s stopping you from making things happen?