Evolving Manufacturing Connectivity with Scalable data-to-decision platforms

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Key Smart Factory Deliverables

It solves Management Issue!!

**Performance Monitoring**
- Monitor *asset performance*
- Real-time KPI *such as OEE*
- Monitor critical parameters, *like cycle time, zone temperature*

**Predictive Maintenance**
- *Condition based Maintenance*
- Prevent *unexpected downtime*
- Reduce *maintenance cost*
- Reduce *quality issue*

**Smart Factory Deliverables**

**Data to Decision**
- *Predictive Quality*
- Reduce *Time & Cost of Inspection*
Evolving Manufacturing Connectivity with Scalable Data-to-Decision Platforms

**Data 2 Decision Cloud Platform**
Convert Info to Decision & Action to enhance overall Efficiency

**Data River**
Steam the RIGHT INFO to RIGHT Place @ RIGHT Time

**Data 2 Decision Edge Platforms**
Connect the Unconnected and Convert Data to Info at the Edge
Perform Decision & Action at the Edge
Accelerating the journey of Smart Manufacturing
AIOT @ the EDGE for Manufacturing

- **Connect the Unconnected at the Edge** in Green & Brown fields \((D2I)\)
- **Real-time Data Connectivity** to stream information to anywhere when needed \((I2S)\)
- **AI Inference Service** to convert the information into decision & action, also accumulate knowhow \((I2D)\)
Data Centric Development Platform for Smart Factory

Vortex DDS Data River

- Thing SDK
  - Real Time Decision with AI
- Thing SDK
  - Convert Raw Data into Information
- Thing SDK
  - Stream Info to the Right place at Right Time

- Camera
  - Image
- DAQ
  - Time Series Data
- DEX
  - Message
connecting the unconnected
Do you have machine which like an isolated island
Case 1: PCB Drilling Machine

- Target: Extract Operational message in PC based controller

- Challenges:
  - Legacy operation system: OS2
  - No Ethernet port
Case 2: LCD Glue Dispensing Machine

• Target:
Collect the parameters during operation to improve yield rate

• Challenges:
  • The quotation from machine vendor is too high to accept.
  • User has tried to put data extraction program in machine, but it resulted in instability of the machine.
Solution: The VGA port on PC Controller

Human Machine Interface cross all PC generations
Solution: DEX-100
display port with Optical Character Recognition (OCR)
Key Features

• Non-intrusive: Guarantee machine stability
• Common Interface: VGA/DVI output port is available for all legacy machines
• Real-time: Build in KVM function, which can drive KB/mouse to get the real-time screen shot
• Easy to learn: Engineer can hands on within one day
Easy Connect, Quick Configure, Extract Data
Customer Benefits

- Reduce Waste Material
- Solve Labor Shortage
- Better Machine Maintenance Schedule
- Improve Product Quality
- Reduce Rework Process
- Higher Productivity

生产/机器状态/材料跟踪
The Data Source
Performance Monitoring Solutions

IT SI
MES

OT SI
SCADA

DEX-100
Cloud Gateway
DEX-200 for PLC

OPC-UA
Modbus

DEX-300 for Modbus

ThingSDK™

Azure Cloud

On Premise
Dashboard

Data River

Microsoft

SCM
ERP
APS
MES

Leading EDGE COMPUTING
How to Predict the needs of Maintenance?
Traditional industrial equipment maintenance uses the following methods:

- Equipment engineer regularly inspects
- Determine whether the device function is abnormal by experience
- Manually record device status

MCM-100 change the game:

- 24-hour continuous monitoring and recording of data
- Simplify maintenance services with remote monitoring and alarm notification
- Full support for production management systems such as MES, ERP...etc.
ADLINK MCM-100

Intelligent IoT Edge for Machine Condition Monitoring

ADLINK’s MCM-100 machine condition monitoring edge platform enables rotating machinery, tooling, and plant and automation equipment operators to easily overcome challenges inherent in conventional equipment maintenance

- Simple connection, configuration, and operation speed setup with no downtime
- Complete single-operation data acquisition, analysis and upload
- Real-time monitoring, intelligent management
**Simple Fast, Simple Whole-System Setup with No Downtime**
- Integrated function in compact construction
- Built-in IEPE 2mA excitation current source, requires no additional signal conditioning

**Complete One-Operation Data Acquisition, Analysis, and Upload**
- Delivers edge-based data acquisition, domain algorithm, data analytics capability, converting machine status, usage trends, alarms, and more for distribution

**Real-time Monitoring & Intelligent Management**
- Easy to implement third party web dashboard enables remote acquisition of machine status
- Automatic recording of machine information to enable long-term machine health monitoring
- Enable value-added service for Machine builders
Making the Long Journey Short
Solution Diagram

- **Rule based MCM software**
- **MCM-100**
- **Vibration Sensors**
- **Vibration Signal**
- **Data Acquisition**
- **Data Computing and Analysis**
- **Data Upload**
- **WLAN**
- **Azure based MCM Web Portal**
- **DataConnect Pro**

*ADLINK Offering*
Azure based MCM Web Service Portal – DataConnect Pro

Web Service Portal
- Quick add MCM-100
- Easy configure widget and layout
- Easy configure factory and equipment info

Web Dashboard
- Factory/equipment status monitoring
- Alarm log and alarm notification
- Historical data/statistics
- Mobile device support
智慧工廠預測性維護解決方案

- 工廠/設備管理
- 歷史數據
- 報警通知
- 支援行動/手持裝置

吊裝設備、真空泵、空氣壓縮機和其他旋轉設備在許多製造和加工過程中都是不可或缺的。因此意外的機器故障會導致生產停止，進而產生巨大的損失。凌華科技智慧設備監測解決方案取代了傳統的人工監測方法，可以提供24小時全天候的線上監測和故障預測，實現設備狀態的精確控制並提供即時的回應維護。

邊緣運算平台，資料摘取、分析和上傳一體化
將摘取資料、域演算法，經過資料分析，直接轉換機器狀態、使用趨勢分析、示警並上傳。

無線OT/IT端到端連結
可連結Vortex Edge架構，無需編程，即可快速連結第三方雲平台，透過Data River靈活的資料串流架構，可讓用戶更輕鬆佈建多個場域。

遠端設備總覽資訊看板
可即時監控設備、機台資訊機台狀態、警報狀態等資訊。歷史數據紀錄下載、設備維修保養排程管理。
Who Need the MCM E2E IoT Solution?

- Steel Plant
- Energy
- Compressor
- CNC

**Facility Management**
(Small and medium)

- Increased equipment availability / uptime
- Reduced maintenance-related costs
- No IT system/resource

**System Integrators**

- Compact and easy to integrate
- High performance at affordable price point

**Machine Builders**

- Enhanced performance increases sales
- Value-adding data analysis & management capabilities

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Azure Based MCM Web Service

- Factory Dashboard
- Alarm Notification
- Data Security
- OT/IT Convert
Case 1: Air Compressor Maker

Intelligent Predictive Maintenance

The Challenges
~ Competitor’s competition on price
~ What’s add-on value provided to customer compare to competitor

The Target
~ Upgrade to Smart Machine by adding intelligent predictive maintenance function and IoT service

The Benefit
~ Save maintenance cost and zero production down time for end-customer
~ Enhance competition, enhance differentiation compare to competitor
~ Increase sales revenue

Prospect Result
~ Perfectly realize online monitoring and machine status check and life prediction by vibration measurement and Edge computing capability from MCM-100.
Case 2: Screw Manufacturer

Predictive Quality & Maintenance

**The Challenges**

~There are a large number of screw orders in the production. Once there are defective products, it will not be easily detected in a large number of good products. It will generate huge cost of inspection and risk of outflow of defective products.

**The Target**

~Production line QC on screw machine to ensure that the defective products can be detected immediately.

**The Benefit**

~Zero Defect, save a lot of inspection cost and ensure the quality

**Prospect Result**

~Realize Zero Defect by vibration measurement and Edge computing capability from MCM-100 and domain expert algorithm from ADLINK solution partner.
Case 3: Dry Pump

Intelligent Predictive Maintenance

Business Value
- **Reduce downtime**: avoid unexpected failure on-line
- **Optimize operational efficiency**: estimated spare parts with predictive analysis
- **Deploy agilely**: simple connection, configuration
Case 4: Water Turbine

Intelligent Predictive Maintenance

**Business Value**
- **Unusual situation detection**: avoid unexpected failure on-line
- **Deploy agilely**: simple connection, configuration

**Solution Overview**
- Continuous 24/7 monitoring
- Instant automatic data logging
- Dramatically streamlined maintenance service with remote monitoring and alarm notification
- 4 Channel for signal input, parameter matrix comparison
Features:
- Easy Deployment
- Quick Connection
- Precise Alarm

Benefits: Reduce the significant losses caused by unplanned downtime
Connecting the Unconnected
The Foundation for the Connected Enterprise

IOT Monitoring Use Cases for Machine Data

Vibration  Acoustic  Force  Distortion  Temperature  Power  Pressure  Flow  Insulation Degradation  Structure Dislocation

ADLINK Market-Ready Solutions

Partial Discharge Sensor  Pressure Sensor  Acoustic Emission  Flow Meter  IST Smart Gateway  DEX-100

Acoustic Emission  MCM 100 Series  Current Transducer  RTD/TC  Historian  Protocols

Accelerometer  Microphone  Load-cell  Strain Gauge
Machine Vision
Algorithms / Deep Learning Based Solutions

Manufacturing AOI

Textile / Wood

Metal Surface

Classification

Food

Solar

Location/Guide

Inspection/Classification

Measurement

Identification

ADLINK Confidential
Adlink Machine Vision

The Expert in Automation

• Over **400K cameras** connected to Adlink Vision products till now
• One of few companies who familiar with **Industrial Camera interfaces, Computer Technology, Motion control and Industrial DI/O**
• 15 years experience in Machine Vision
  • Domain knowledge for H/W Design and Applications
  • Long and good relationship with key players
• Member of AIA and EMVA, know the trend and latest machine vision tech. information
## Vision Product Overview

Full Spectrum Vision Productions

<table>
<thead>
<tr>
<th>Vision System</th>
<th>Products</th>
<th>Applications</th>
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</thead>
<tbody>
<tr>
<td>EOS series</td>
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<td>Factory Automation</td>
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<tr>
<td>Ready to Deploy</td>
<td></td>
<td>Machine &amp; Factory Automation</td>
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<tr>
<td>Compact Size</td>
<td></td>
<td>Factory Automation</td>
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<tr>
<td>GiGE</td>
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<td>Robot Guidance</td>
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<thead>
<tr>
<th>Frame Grabber</th>
<th>Products</th>
<th>Applications</th>
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<tbody>
<tr>
<td>Full Product line Support</td>
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<td>Factory Automation</td>
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<tr>
<td>Long term availability</td>
<td></td>
<td>Machine &amp; Factory Automation</td>
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<tr>
<td>Compatible for Most camera and SW</td>
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<table>
<thead>
<tr>
<th>Smart Camera</th>
<th>Products</th>
<th>Applications</th>
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</thead>
<tbody>
<tr>
<td>NEON Series</td>
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<td>Factory Automation</td>
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<tr>
<td>Intel® Atom™ Quad core processor</td>
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<td></td>
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<tr>
<td>PWM Light control, DI/O</td>
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<tr>
<td>Support 1 GiGE Slave Camera</td>
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<td>IP67</td>
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NEON-J

nVidia Jetson TX2-based AI Industrial Camera

- nVidia Jetson TX2 and 2Mpx 60fps color image sensor
- 256 core Pascal nVidia GPU supports Deep Learning Inference
- ARMv8 (64-bit) multi-processor CPU complex for heterogeneous multi-processing
- Global shutter image sensor
- 1x Ethernet port, 1x USB and 1x RS-232
- 4x digital input, 4x digital output, 1x trigger input

Segmentation  |  Defect/Object Detection  |  Classification
Redefining the Smart Camera

A Camera can Track, Think & Talk
Intelligent Pallet Solution

The Pallet which knows what’s wrong and proactive communicates

- Target on Logistic/Packaging Segment
- Scenario:
  - Pallet stacking is the **bottle neck** of modern logistic lines, since it involves huge manpower and with **highest error rate** due to the fact of highest complexity amount stations.
  - Customer hope the pallet can know if the package is supposed on this pallet **the second** when worker place it on.
  - Once it mismatch the light start blinking, and inform other pallet. And the moment worker put the package on the right pallet, the light stops blinking and remove error record since it was **acknowledged** by the right pallet.
  - The **high performance NEON and DataRiver** make it possible for the real-time information capturing and sharing so the wooden pallet can look so intelligent.
Data River case sharing

Edge computing with DataRiver

棧板ID: P1
位置: L1
包裹ID: 111, 222, 333, ...

包裹ID888剛放在P2, 刪除包裹ID888

包裹ID888剛放到棧板P3上, ID888是屬於棧板P3的

包裹ID666屬於棧板P5的, 請操作員將ID666放到P5上

包裹ID666被放到棧板P4上了, 但ID666不屬於P4. ID666是那個棧板的呢?
Summary

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Data 2 Decision Cloud Platform
Convert Info to Decision & Action to enhance overall Efficiency

Data River
Steam the RIGHT INFO to RIGHT Place @ RIGHT Time

Data 2 Decision Edge Platforms
Connect the Unconnected and Convert Data to Info at the Edge
Perform Decision & Action at the Edge
Thank you