Take your LoRaWAN® project to the next level with LoRa devices from Bosch

Reiner Schmohl
Bosch Connected Devices and Solutions GmbH
Agenda

1. Bosch Connected Devices and Solutions GmbH
2. Cross Domain Development Kit (XDK)
3. XDK LoRa-Extension
4. TRACI
5. Parking Lot Sensor (PLS)
1. Bosch Connected Devices and Solutions GmbH

About the company:
• IoT startup
• 4 domains (connected mobility, logistics, industry 4.0 and cross domain)

Why we use LoRaWAN® technology:
• Wireless and secure
• Robust and over long distances communication solution
• Bandwidth adjustment and adaptive data rate
• Private and public networks can be joined
2. Cross Domain Development Kit (XDK)
Embark on the Journey to IoT Applications with Bosch as your Partner

**XDK 110**
Single box XDK, a universal IoT programming platform

**XDK Node**
Professional Bundle, box of 10 XDKs to implement small batch, cost-efficient applications

**Solution Sets**
Jump right into IoT use cases with Bosch and partner-made solution sets

Rapid Prototyping
Small Series Application
Ready-to-use scalable applications
2. Cross Domain Development Kit (XDK)
Strategy – IoT Customer Barrier

- **Number of connected devices**
  - 0
  - 100
  - 500
  - 1,000
  - 5,000
  - ∞

- **Percentage of IoT projects**
  - 70%: ≤ 500 pcs. 1)
  - 90%: ≤ 1,000 pcs. 2)
  - ≥ 5,000 pcs.

1) Source: Strategy Analytics
2. Cross Domain Development Kit (XDK)
The universal, freely programmable smart sensor

- All in one sensor platform: hardware, software, community
- Connectivity via BLE and WiFi
- 32-bit microcontroller ARM Cortex M3
- Rapid prototyping, with Mita you don't need C-development skills
- No limitations thanks to extension board adapter
2. Cross Domain Development Kit (XDK)  
The Swiss Army Knife of IoT sensoric

**MEASURING RANGES**
- Accelerometer: ±2 ... ±16 g (programmable)
- Gyroscope: ±125 °/s ... ±2000 °/s (programmable)
- Temperature: -20 °C ... 60 °C
- Pressure: 300...1100 hPa
- Humidity: 10...90 %rH
- Magnetic field strength: ±1300 μT (X,Y-Axis); ±2500 μT (Z-Axis)
- Light sensor: 0.045 lux ... 188,000 lux; 22-bit

**SAMPLING RATES**
- Accelerometer: BMA280 2000 Hz
- Gyroscope: BMG160 2000 Hz
- Magnetometer: BMM150 300 Hz
- Hum./press./temp.: BME280 182 Hz
- Inertial measuring unit: 1600 Hz (Accelerometer); BMI160 3200 Hz (Gyroscope)

- All-in-one sensor kit: No component selection, hardware assembly, or provision of a real-time operating system required
- Functional expandability through the included expansion board
- USA, CAN, AUS, MYS, MEX, SGP, BRA, PHL, CHN, THA, JPN, IDN, KO
2. Cross Domain Development Kit (XDK)

Potential use cases

Monitoring Motor Temperature:
- PT1000 + XDK Ext. board + XDK + PMP installed, to monitor temperature of motors
- Exchange motors during planned downtime predictively, if temperature is rising
- Improved OEE, Reduced labor cost, Avoidance of special freight, Reduced (TEB) cost per unit

Measure current with the LEM-Extension:
- Innovative, accurate, reliable, easy-to-install, non-intrusive current sensing
- for predictive maintenance applications in any use case
- Visualize the data via the Virtual XDK App
3. XDK LoRaWAN® Extension
Sense – Think – Connect - Act

Connect your XDK to a LoRaWAN® Network. Public and Private LPWANs can be joined or created.

Exchange your data up to a range of several km, even through walls and buildings.

Saves energy and ensures a long battery lifetime.

Easy integration of all collected sensor data from the XDK into your preferred backend, e.g. Cayenne, TTN.
3. XDK LoRaWAN® Extension

Potential use cases

- Home and building automation
  - Meeting room
  - 21°C

- Industrial monitoring and control
  - Bearing experiencing excess wear

- Supply chain management
  - Spare part arrived

- Smart city
  - Fine dust alert

Creating Valuable IoT Connections | lora-alliance.org
3. XDK LoRaWAN® Extension
How to get started?

**XDK workbench**
- Flash XDK with LoRaThingsNet workDemo
- Programmable with Mita

**XDK sensors**
- Address all 8 XDK sensors

**Integration into backend**
- Easy integration of all collected sensor-data from the XDK into your preferred backend, e.g. Cayenne, TTN
- Visualization of your data
4. TRACI
Tracking and monitoring in construction

- Long Range Wide Area Network & Bluetooth
- Very robust housing, designed for harsh environments: IP 69K
- 3-10 Years of battery life due to LoRaWAN® and smart algorithms
- Alerts: Accident, maintenance, geofence, temperature
- Equipment search time reduction
- Operating Hour Counter
- Lower costs, increase productivity

Shock
Magnetometer
Temperature
GPS
4. TRACI
Potential use cases

“We need to know where our assets are and if they are in use. This helps planning our daily work!”

“My fleet capacity is limited. I cannot afford having machines standing around unused!”

“Everybody is talking about digitalization but the topic stays really difficult to grasp for me!”
4. TRACI
Main advantages

- **Localize** your assets, equipment and vehicles
- **Improve** logistics and processes in your daily work
- **Gain** transparency of asset usage and idle time
- **Monitor** operating hours, vibration and temperature

"...equipment search time reduction >80%..."

"...avoiding permanent loss of implements & equipment..." (approx. 10% over time)

"...overall productivity increase of building process of up to 16% ..."
4. TRACI
How to get started?

• Mount the device on the asset, vehicle, machine, equipment or building material you want to monitor
• To activate TRACI simply remove the magnetic bar
• Multiple data access:
  - via mobile device apps
  - via web user interface
  - application interfaces to your ERP System
  - application interfaces to your software integrator
5. Parking Lot Sensor (PLS)
Bring your traffic concept to the next level

- LoRaWAN® communication with gateway, range of up to several km
- Enablement of new parking features such as searching, navigation and reservation
- Detection and reporting of parking space occupancy
- Battery life time up to 5 years
- Magnetometer
- Radar
5. Parking Lot Sensor (PLS)
Potential use cases

**eCharging**
Time between parking and unparking events is calculated using sensor notifications, when a specific limit is reached illegal users can be charged

**Autonomous car parking**
System reserves and notifies the self-driven car for a free parking spot based on sensor data

**Reducing congestion in the city**
Mobile application like Google Maps could display the available parking spaces

Search time reduction
5. Parking Lot Sensor (PLS)
How to get started?

1. Prepare
2. Clean
3. Apply
4. Glue

- Request your PLS now
- Installation takes less than 2 min. per sensor
- No calibration needed at all, completely self-calibrating