IoT Business cases

Murata's Idea for smart city

Smart Infrastructure

Smart Agriculture

Smart Bins

Smart Lighting

Logistics Control

Smart Factory

Smart Metering

Energy Management

Traffic Control

Building Management

Smart Parking

Emerging IoT Applications

- **Utilities**
  - Smart metering (electricity, gas, water)
- **Home Security & Home Automation**
  - Smoke, Motion, Water/Gas Leak, Camera/Surveillance, Doorbell, Lock, Plug, Shutter
- **Smart City**
  - Smart street lighting
  - Traffic monitoring/Fleet management
  - Smart parking
  - Smart bin/waste management
  - Bicycle sharing
  - Sewage flood monitoring
- **Wearable/Trackers**
  - Smartwatch, Panic buttons, other wearables (worker monitoring, tourist tracking, medical, etc.)
  - Trackers (person, child, pet, asset)
  - Fleet management, Logistics/Transport
- **Industrial**
  - Factory automation, machines, robots, etc.
- **Smart agriculture**
  - Livestock (animals: cows, sheep, chicken, pigs)
  - Fields (crops, fertilizer, irrigation, etc.)

Business Case 1: Smart Metering

Use Cases:
- electricity metering
- water metering
- gas Metering

Merits
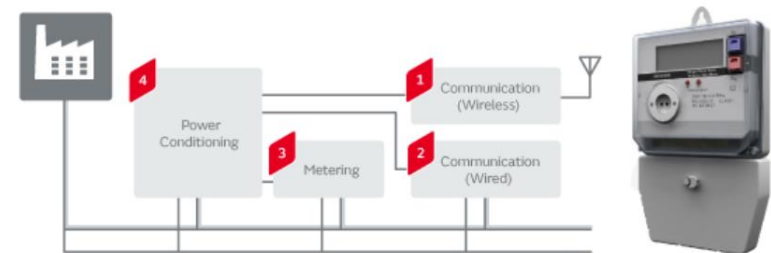- reduced leakage rate
- automatic meter reading, reduce operator cost

Customer
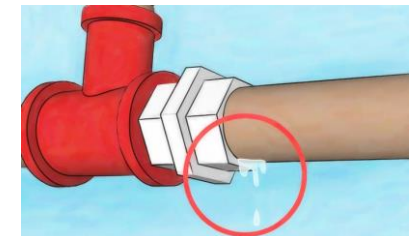- smart meter manufacturer

Murata's key products examples
- **NB-IoT / LTE Cat-M / LoRa module**
- AMR sensor (anti-tempering)
- Coin cell battery, Supercapacitor (battery assist)

Smartmeter

https://www.murata.com/en-sg/apps/smarthome/measurement

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Business Case 2: Building Safety & Security

Use Cases

- security/intrusion systems, motion detection, chime alarm
- door/window open, smart lock, smart doorbell,
- smoke detector, water/gas leak, …

Merits

- remote monitoring and control using smartphone application
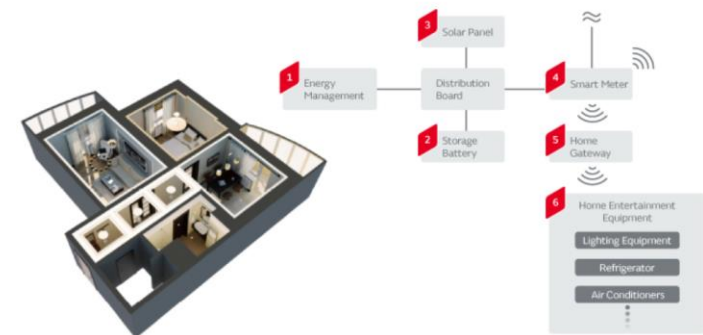- increase building/home safety and security

Customer

- service providers, consumers
- smart appliances manufacturers

Murata's key products

- **NB-IoT / LTE Cat-M module**
- sensors: PIR (detection), AMR (open/close), Smoke/CO_2/gas,
- temperature/humidity, ionizer (air purification)
- coin cell battery

Smarthome

https://www.murata.com/en-sg/apps/safety/securitycameras
https://www.murata.com/en-sg/apps/smarthome/human
https://www.murata.com/en-sg/apps/smarthome/hems
https://www.murata.com/en-sg/apps/lighting/lighting
https://www.murata.com/en-sg/apps/smarthome/thermostat
https://www.murata.com/en-sg/apps/smarthome/dispenser

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Business Case 3: Smart Street Lighting

Use Cases

- replace traditional street lamp by smart LED controller lamp
- manage remotely from monitoring center

Merits

- reduce power consumption
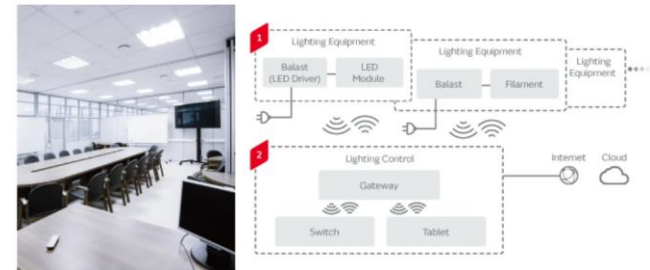- improve management efficiency
- reduce maintenance cost

Customer

- city council
- building manufacturer

Murata's key products

- **NB-IoT / LoRa module**
- PIR sensor (person detection), ultrasonic sensor (vehicle detection)
- coin cell battery, supercapacitor (battery assist)

Lighting Equipment/Lighting Control

https://www.murata.com/en-sg/apps/smarthome/measurement

Business Case 4: Tracking (people, asset)

Use Cases

- person/child/elderly, pet, assets, valuables, lost/stolen equipment
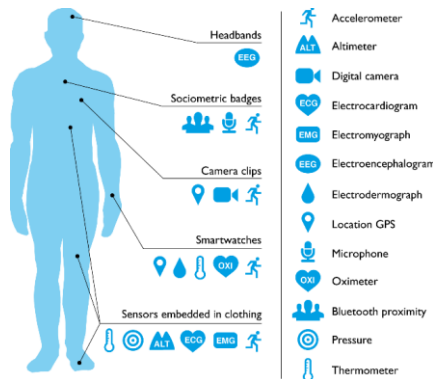- logistics, containers, smart pallets
- geofencing

Merits

- location tracking, panic button
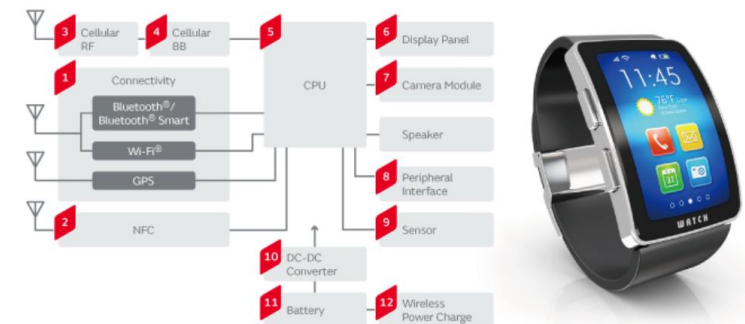- health/Activity tracker, patient monitoring

Customer

- consumers
- logistics companies, transporters

Murata's key products

- **NB-IoT / LTE Cat-M module** (w/ GPS)
- barometric sensor (fall detection)
- coin cell battery

Wearable devices

https://www.murata.com/en-sg/apps/mobile/wearable

Headbands — EEG
Sociometric badges
Camera clips
Smartwatches
Sensors embedded in clothing

Accelerometer
Altimeter
Digital camera
Electrocardiogram (ECG)
Electromyograph (EMG)
Electroencephalogram (EEG)
Electrodermograph
Location GPS
Microphone
Oximeter (OXI)
Bluetooth proximity
Pressure
Thermometer

Business Case 5: Smart Bin/Waste Management

Use Cases

- detect when bin is full using level detection, manage remotely from monitoring center
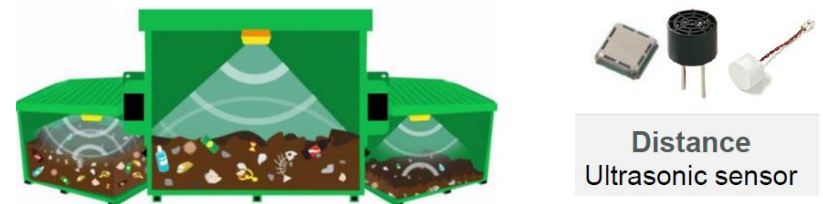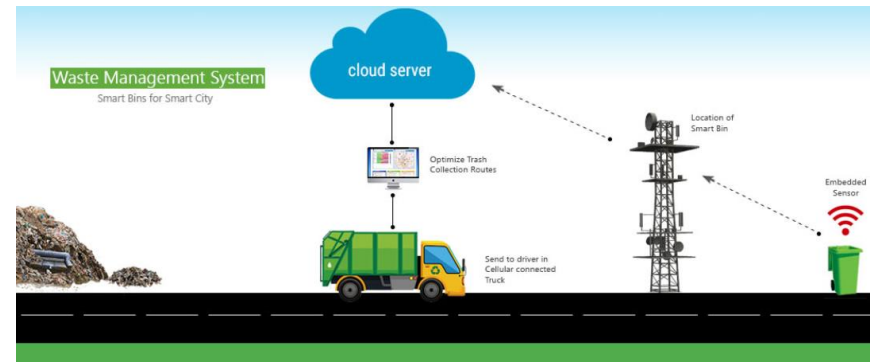
Merits

- remote monitoring, reduce maintenance cost
- improve sanitary conditions and user satisfaction

Customer

- city council
- shopping mall, building/premises operators, etc.

Murata's key products

- **NB-IoT / LoRa module**
- ultrasonic sensor (level detection)
- coin cell battery

Distance
Ultrasonic sensor

https://www.murata.com/en-sg/products/sensor/ultrasonic

Business Case 6: Smart Parking

Use Cases

- auto detect parking slot, auto pay through mobile app

Merits

- remote monitoring, improve parking occupancy rate
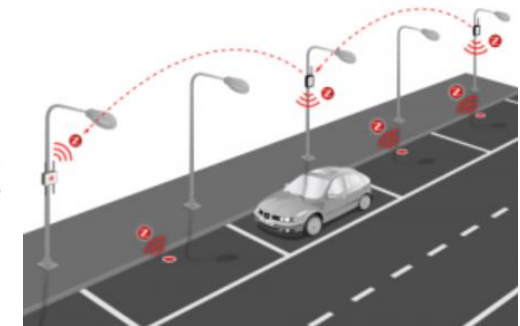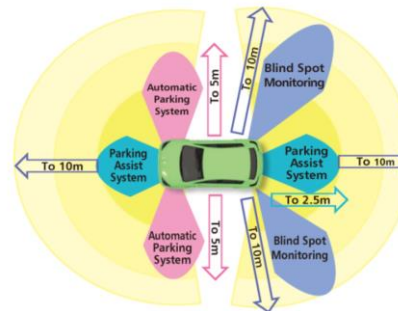- improve user satisfaction by saving time to find free parking slot

Customer

- city council
- parking meter manufacturer, car park operator

Murata's key products

- **NB-IoT / LoRa module**
- ultrasonic sensor (vehicle detection)
- coin cell battery

ADAS Applications for Ultrasonic Sensors

https://www.murata.com/en-sg/campaign/events/asean/es/sensor
https://www.murata.com/en-sg/about/newsroom/techmag/metamorphosis17/productsmarket/ultrasonic

Business Case 7: Vehicle Fleet Management

Use Cases

- monitor and track vehicle parameters and location when in use

Merits

- remote monitoring
- location / itinerary tracking

Customer

- automotive after market device manufacturers (USB dongle, …)
- vehicle leasing companies, transporter vehicle fleet, etc.

Murata's key products

- **NB-IoT / LTE Cat-M module** (w/ GPS)
- MEMS (inertial sensor), ultrasonic (burglar alarm), shock (burglar alarm/accident)
- coin cell battery

Business Case 8: Bike Sharing & Tracking

Use Cases

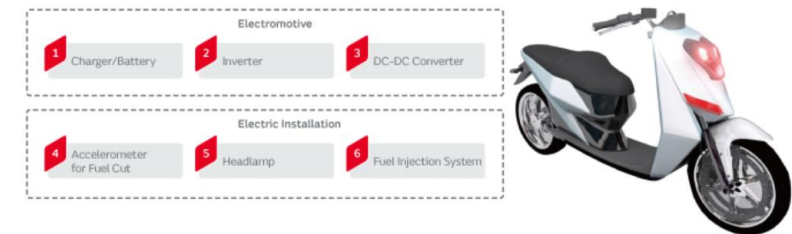- monitor and track bike/bicyle parameters and location when in use

Bike/EV-Bike

Merits

- remote monitoring
- location / itinerary tracking

Customer

- bike sharing operators, bike equipment manufacturers

https://www.murata.com/en-sg/apps/auto/bike

Murata's key products

- **NB-IoT / LTE Cat-M module** (w/ GPS)
- coin cell battery

Business Case 9: Smart Agriculture

Use Cases

- monitor key parameter of agriculture such as water humidity level, soil minerals, temperature, etc. in order to improve crop/farm productivity and resource use efficiency

Merits

- remote monitoring
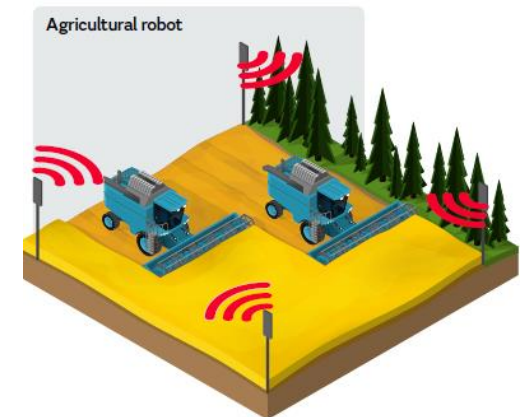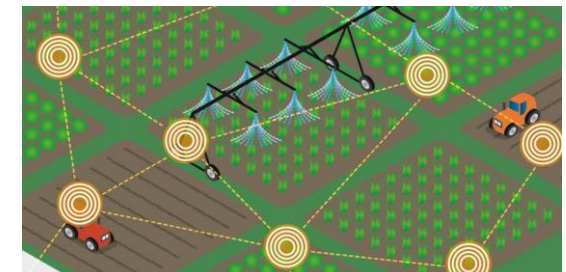- adjust automatically resource use (fertilizer, water supply, etc.)

Customer

- farming company
- farming machinery manufacturer

Murata's key products

- **NB-IoT / LoRa module**
- soil sensor node
- coin cell battery

Agricultural robot

Three sensors in one package
  † Electrical Conductivity (EC)
  † Temp
  † Moisture
  † pH (under development)

Top side view

Back side view

Business Case 10: Smart Aquaculture

Use Cases

- Monitor environment of Fish, Shrimp, Oyster farm, Pond farm like water quality and feedback to farmer and/or automated equipment (auto feeding machine, etc.)

Merits

- Increase productivity
- Reduce operating costs

Customer

- Aquaculture farms

Murata's key products

- **NB-IoT / LoRa module**
- Sensor (TBD)
- Coin cell battery, Supercapacitor (battery assist)

Potential Business Cases are Infinite

- **Industrial / Enterprise**
  - industrial machinery monitor, industrial vehicles tools
  - level monitoring (water, tank, etc.)
  - professional PDA (personal digital assistant), worker wearables (watch, helmet, etc.)
  - POS terminal, vending machine, retail
  - Smart lock, etc.

Water meter · Gas meter · Water boiler · Cylinder control · Tool management

- **Smart city**
  - traffic monitoring / smart lamp post, surveillance system
  - structure monitoring (bridge, building, etc.)
  - environment monitoring (weather, air quality, flood, fire, etc.)
  - smart manhole cover, etc.

Structural health monitoring — Railway track monitoring SCA103T-D04, SCA1000-N1000070 · Geotechnical probes Ground movement measurement devices SCA103T-D04 · Structure monitoring SCA103T-D04

- **Healthcare / Medical**
  - eHealth / remote patient monitoring (glucose, heart pace, etc.)

- Any connected application using battery powered sensor or hard to reach location …

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