STEAM 應用與產品設計新趨勢

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Internet of Things

- Physical objects that are embedded with **sensors**, **processing ability**, **software**, and other technologies that **connect** and **exchange data** with other devices and systems over the **Internet** or other **communication networks**

- Connected Devices
- Smart Devices
- Artificial Intelligence of Things (AIoT)

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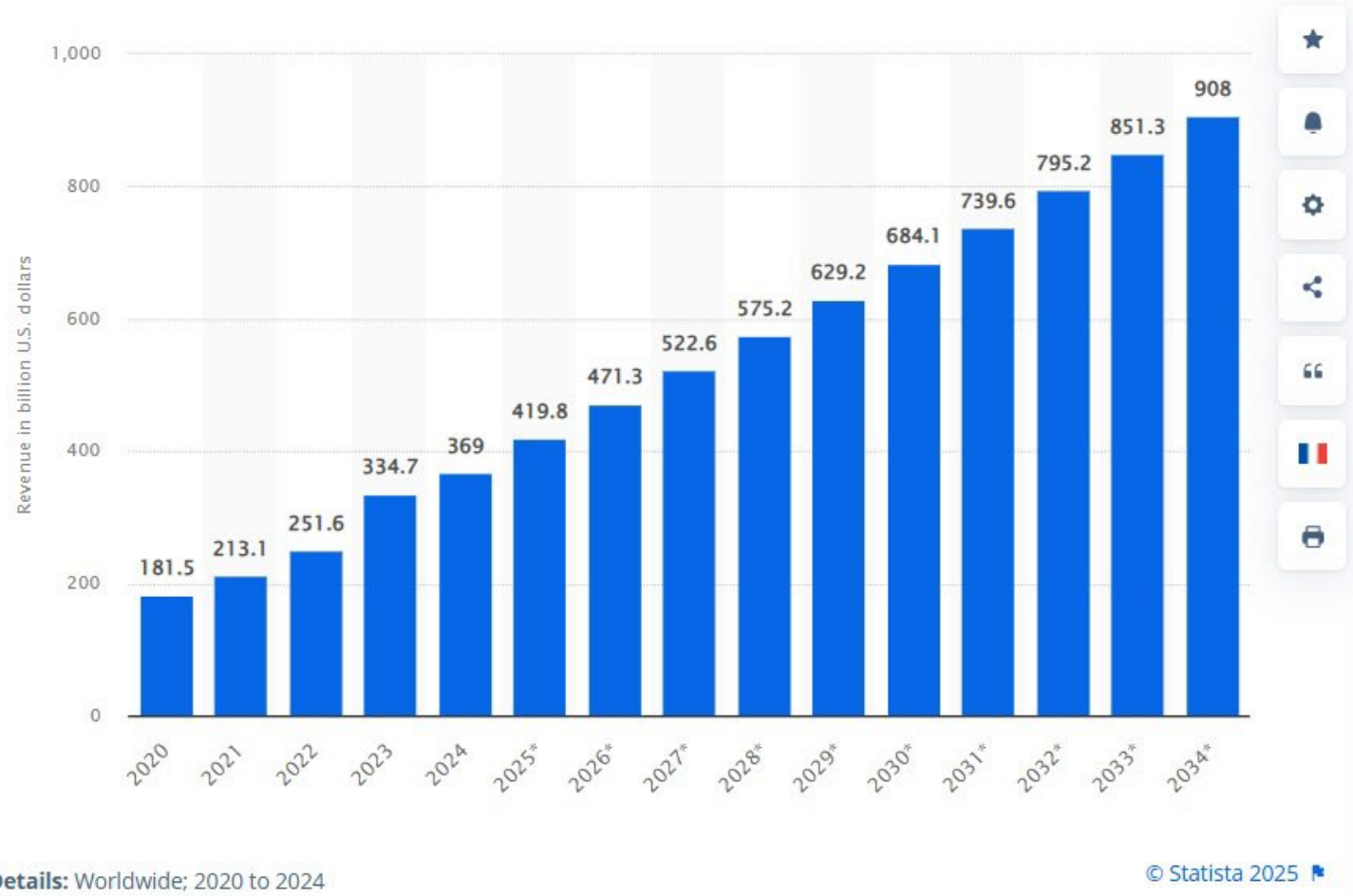
Technology & Telecommunications › Telecommunications

Internet of Things (IoT) total annual revenue worldwide from 2020 to 2034

(in billion U.S. dollars)



Details: Worldwide; 2020 to 2024

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SOURCE DETAILS FAQ

Source
Transforma Insights

Survey by
Transforma Insights

Published by
Transforma Insights

Source link
Transforma Insights Global IoT Forecast Report, 2024-2034, page 34

Release date
June 2025

Citation formats
→ View options

https://www.statista.com/statistics/1194709/iot-revenue-worldwide/

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Types of IoTs

- Consumer IoT
  - Smart home, wearables, personal gadgets
- Commercial IoT
  - Healthcare, retail, logistics
- Industrial IoT
  - Machines, sensors and systems in manufacturing, energy and supply chain
- Infrastructure IoT
  - Large-scale system to support smart cities, transportation, energy grids, environmental monitoring

https://metana.io/blog/four-types-of-iot/

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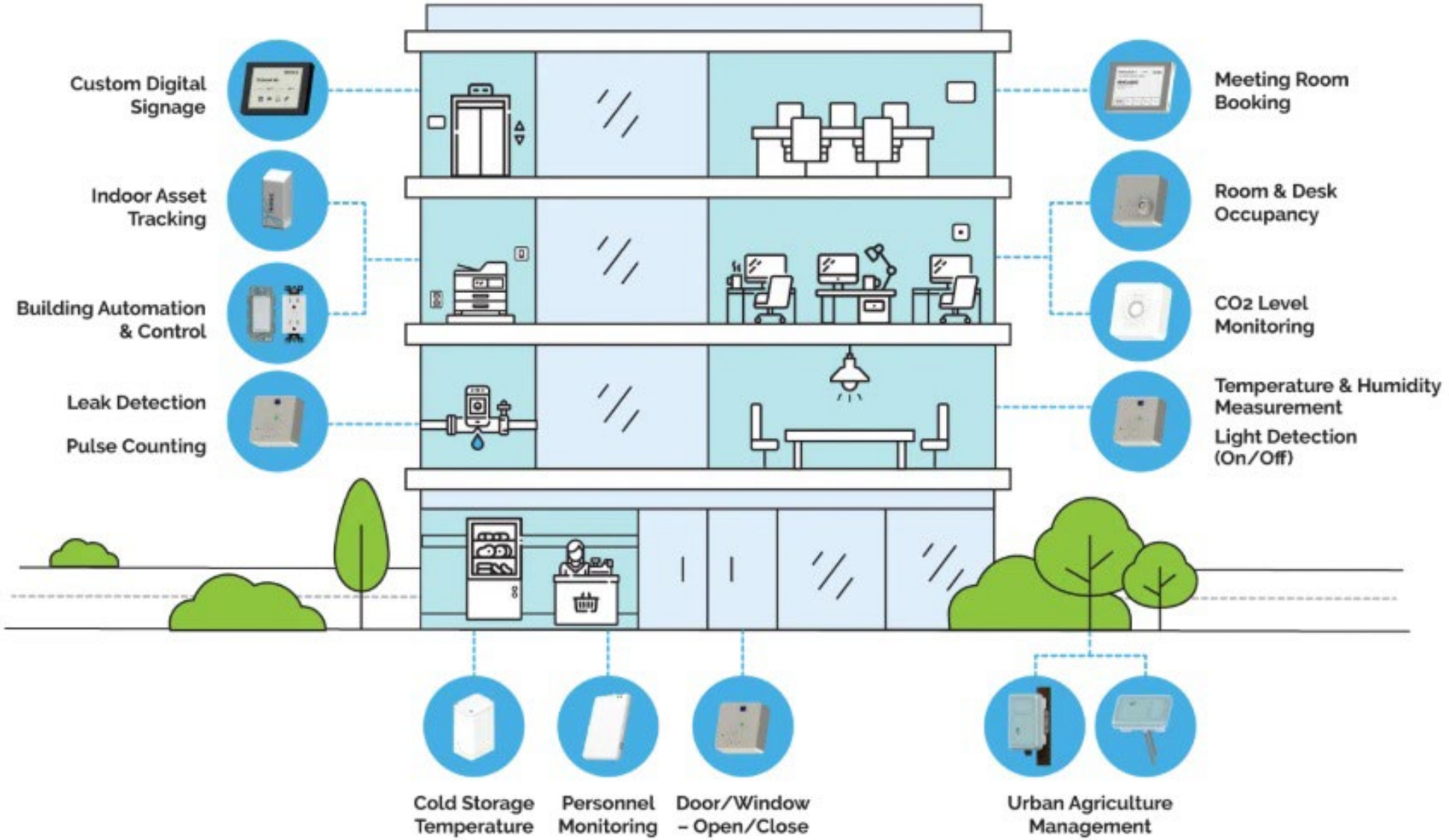

Smart homes and offices

https://tektelic.com/expertise/best-real-world-iot-applications/

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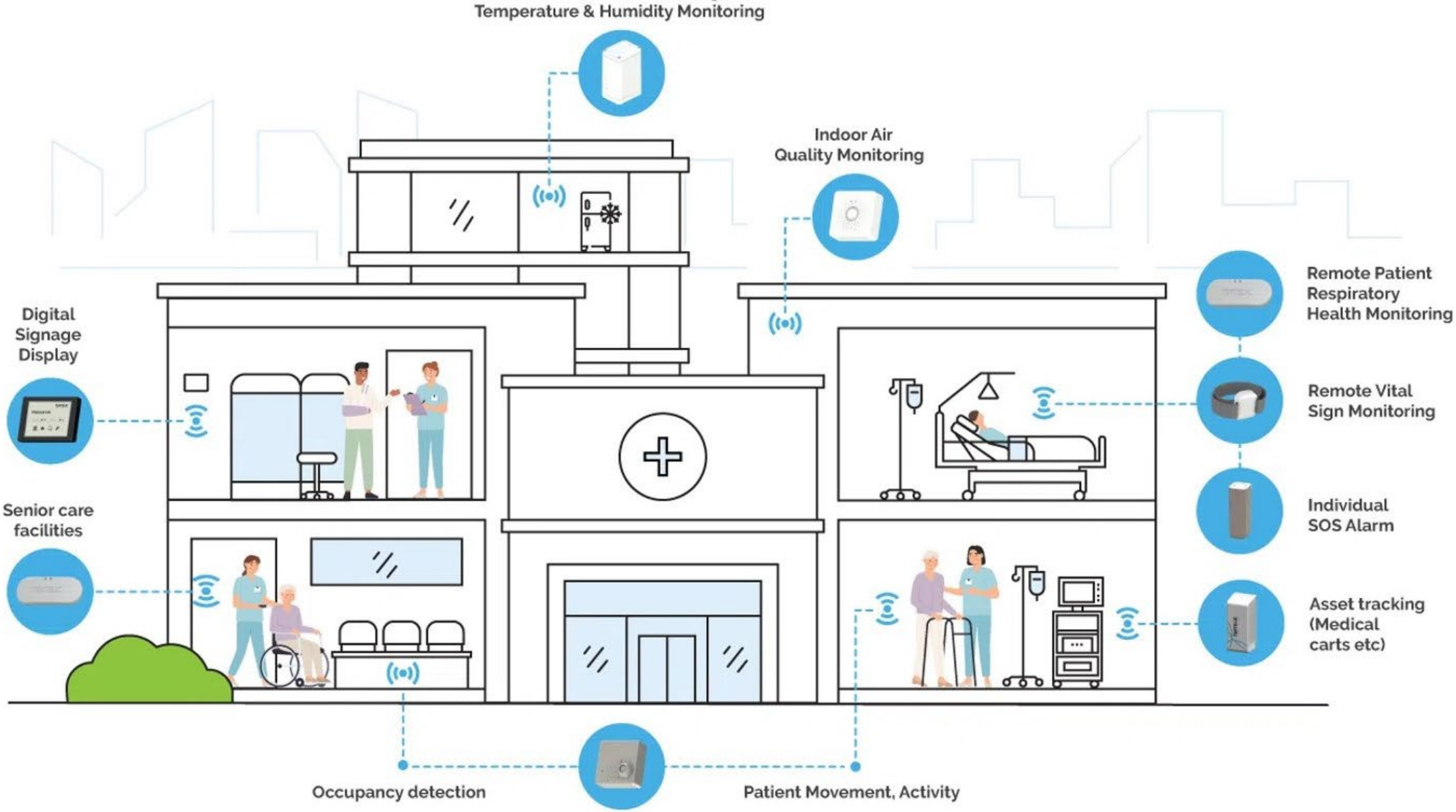

Digital medicine

https://tektelic.com/expertise/best-real-world-iot-applications/

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Smart agriculture

https://tektelic.com/expertise/best-real-world-iot-applications/

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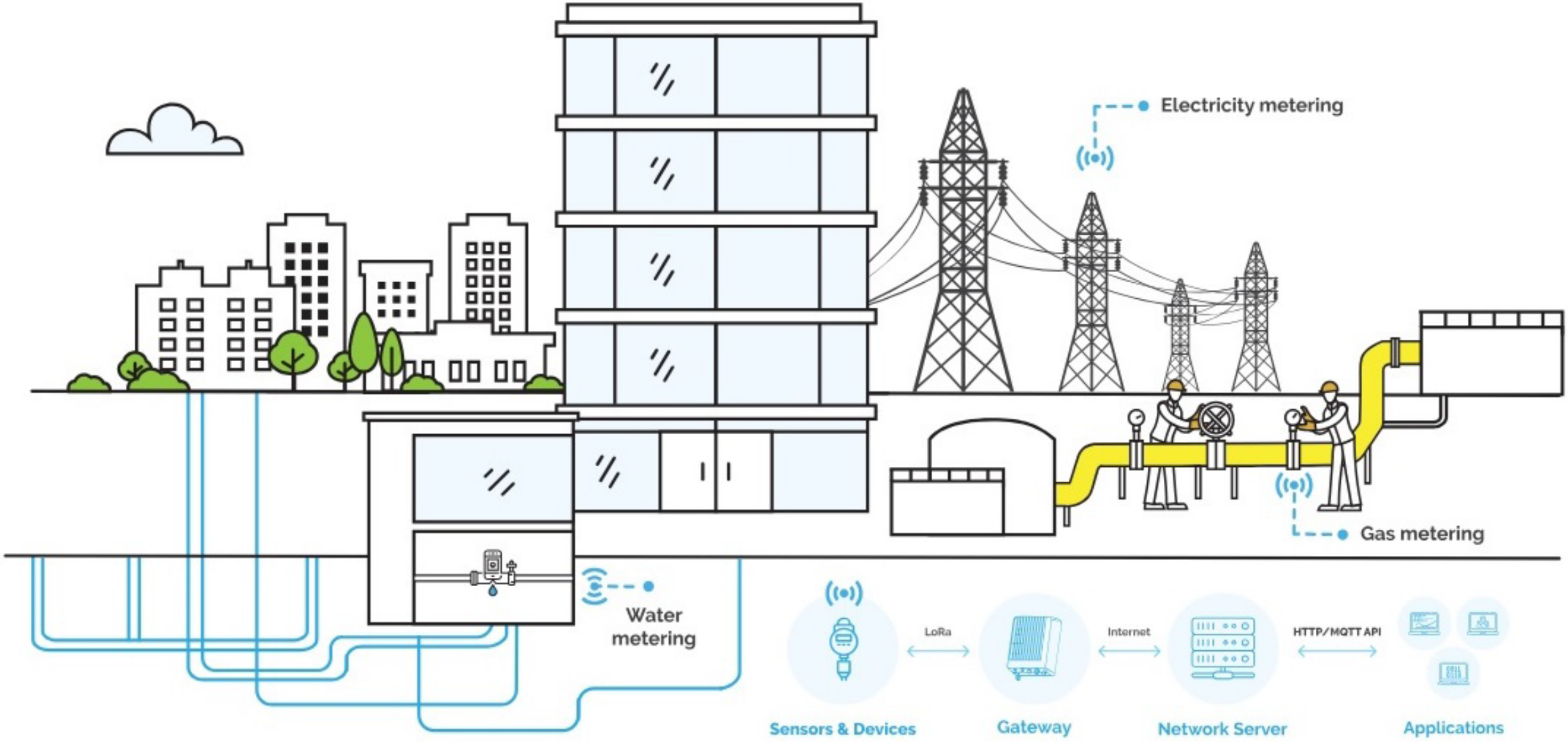

Energy management and smart metering

https://tektelic.com/expertise/best-real-world-iot-applications/

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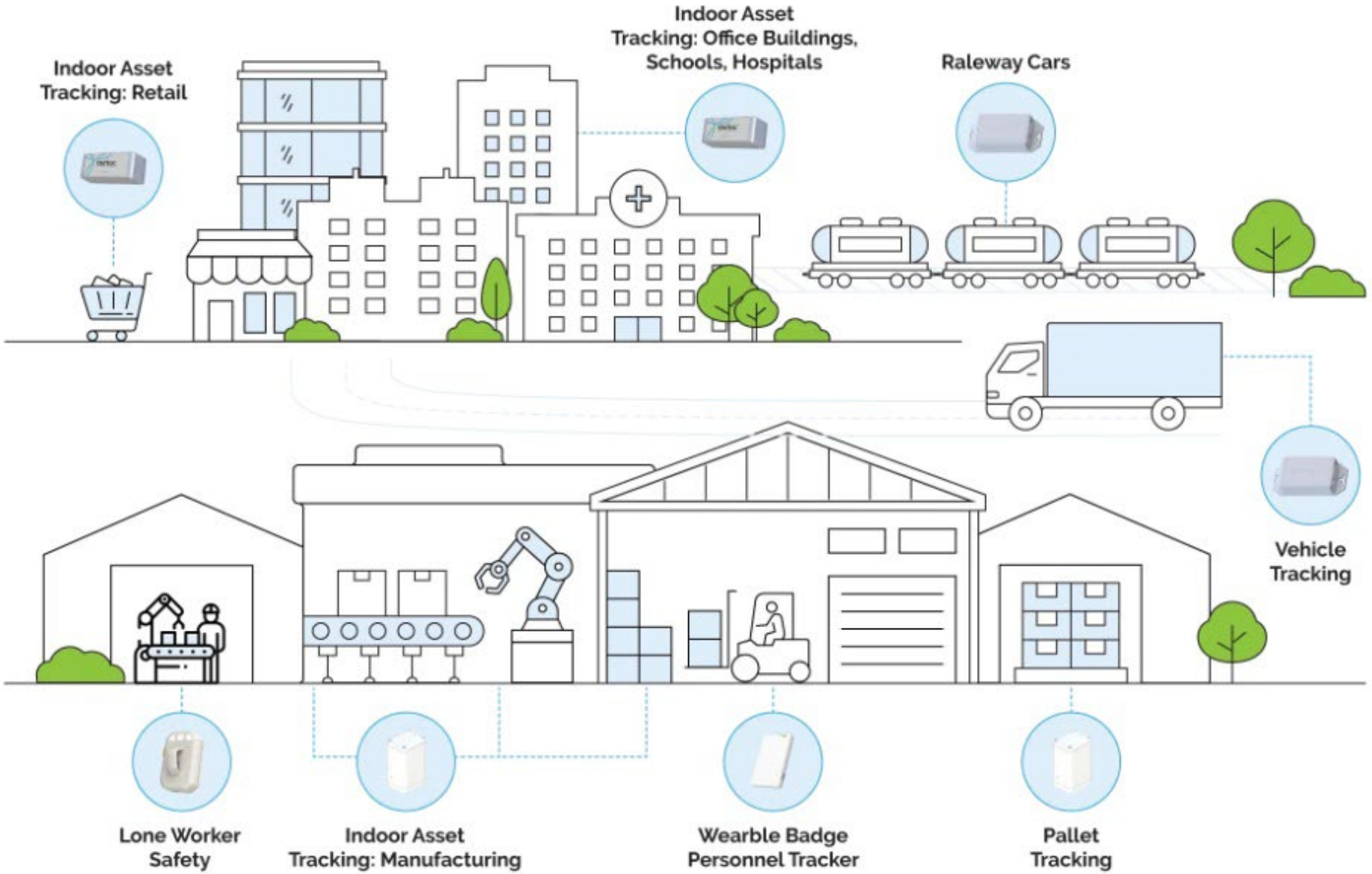

Logistics and fleet management

https://tektelic.com/expertise/best-real-world-iot-applications/

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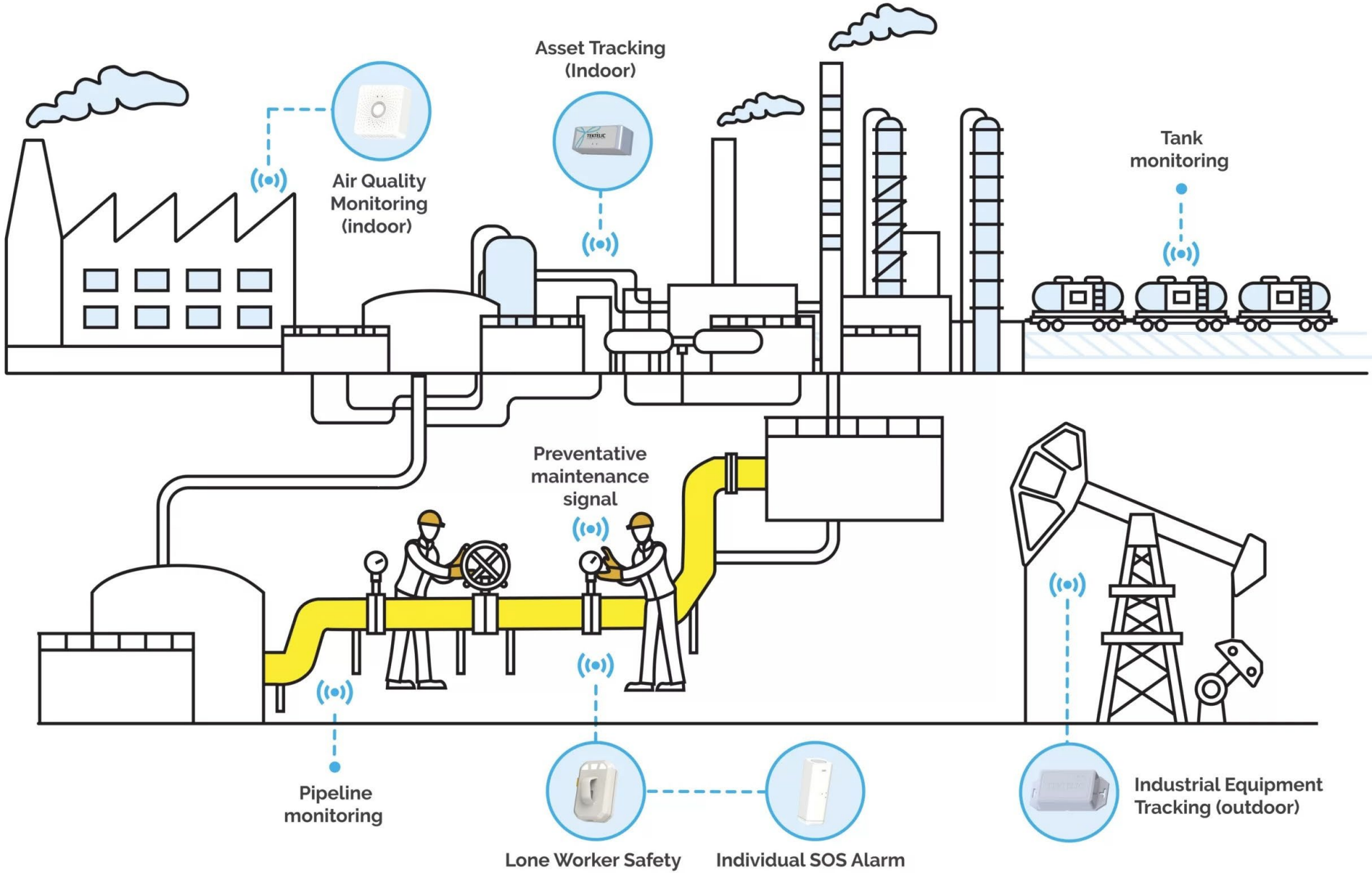

Manufacturing and industries

https://tektelic.com/expertise/best-real-world-iot-applications/

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Enabling Technologies

- Battery
- Microcontroller
- Sensors and Actuators/Effectors
- Connectivity

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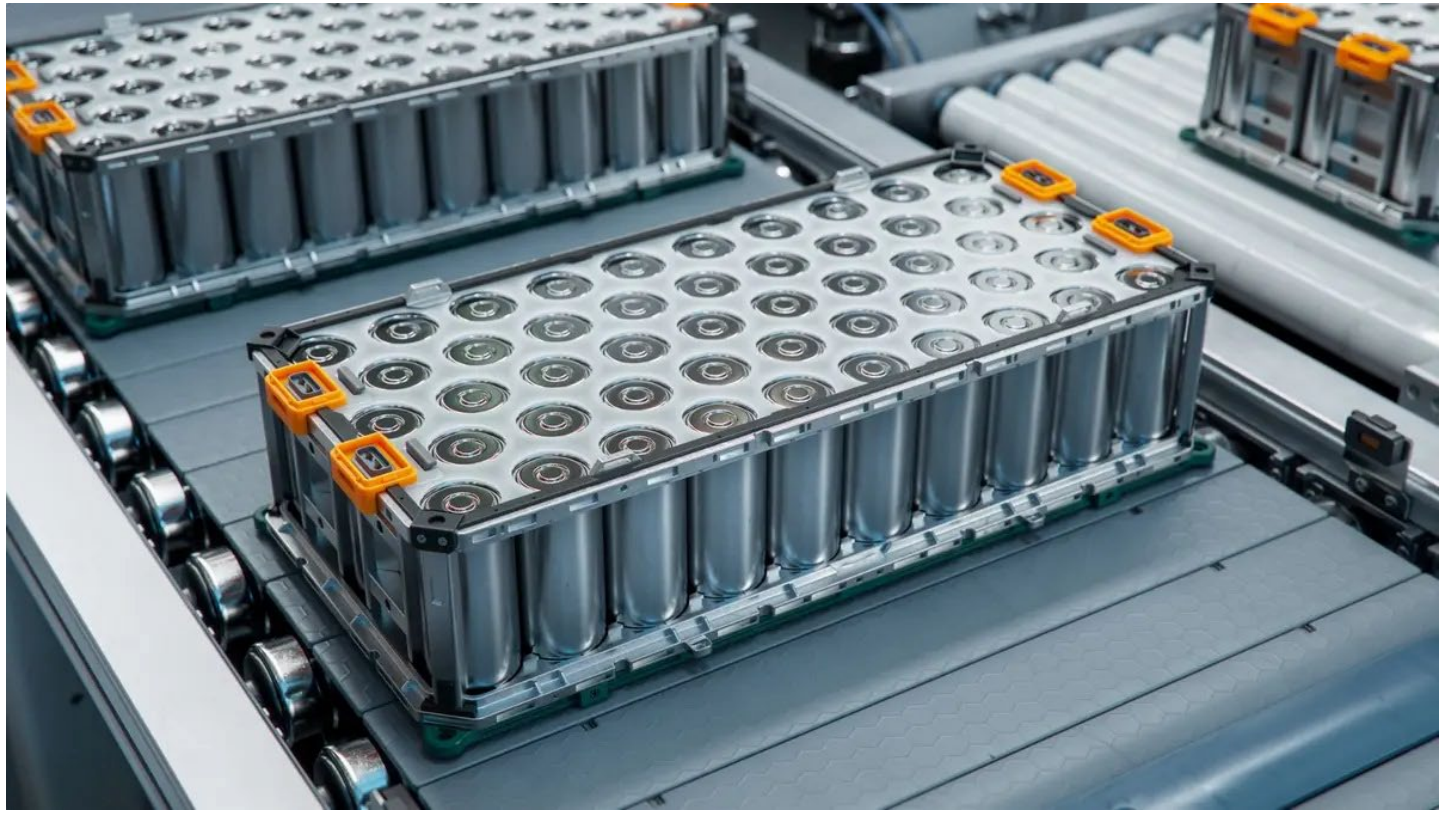

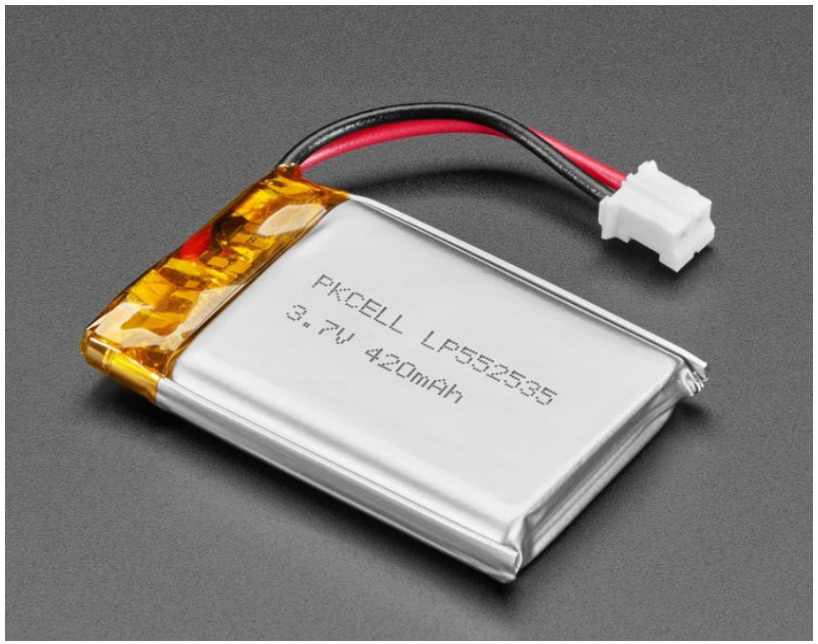

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BBC

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How electric scooters are driving China's salt battery push

2 June 2025

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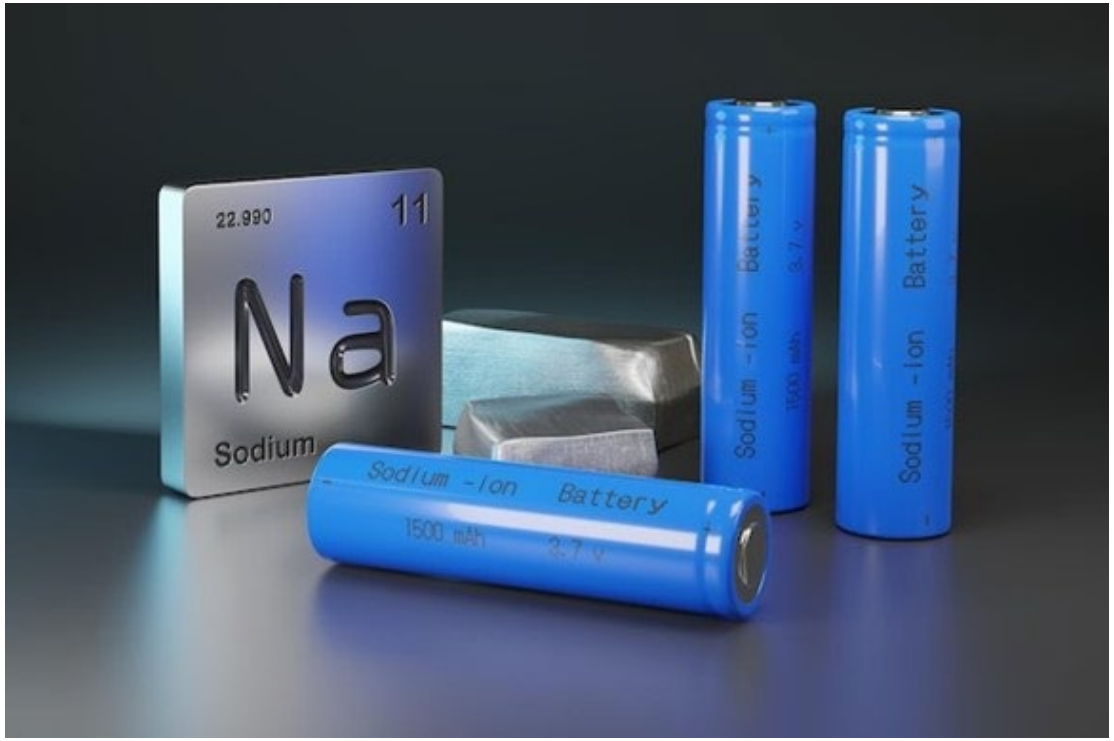
Xiaoying You

The country is racing ahead of the rest of the world in bringing sodium-ion batteries to the mass market. This time, through scooters.



https://www.bbc.com/future/article/20250530-how-electric-scooters-are-driving-chinas-salt-battery-push

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BBC Science Focus

News Future tech Nature Space Health Everyday science Plane

Home > Future Technology > Why Your Next Batteries Might Be Nuclear-Powered

Why your next batteries might be nuclear-powered

They might sound dangerous, but new nuclear batteries could become a useful power source.

Image credit: Alamy

By Luis Villazon

Published: September 3, 2024 at 11:00 am

https://www.sciencefocus.com/future-technology/nuclear-battery

Chinese-developed nuclear battery has a 50-year lifespan — Betavolt BV100 built with Nickel-63 isotope and diamond semiconductor material

News By Mark Tyson published January 13, 2024

The design uses China's first diamond semiconductor material.

Comments (91)

(Image credit: Betavolt)

https://www.tomshardware.com/pc-components/power-supplies/chinese-developed-nuclear-battery-has-a-50-year-lifespan

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https://circuitdigest.com/news/breaking-barriers-espressifs-esp32-c5-brings-5-ghz-wi-fi-to-iot-devices

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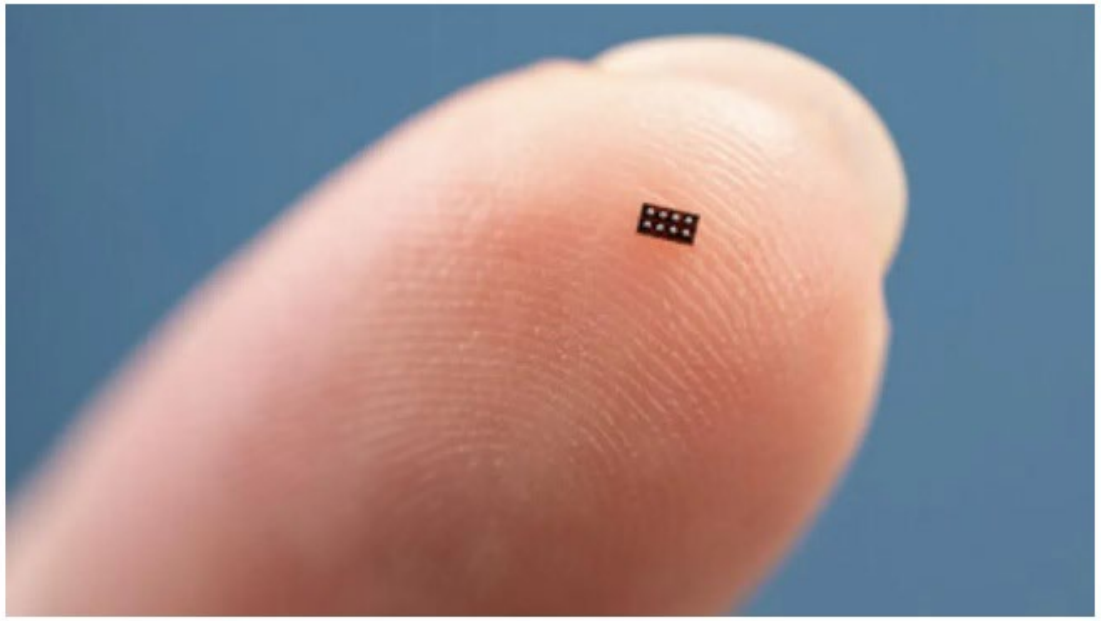
TI's tiny microcontroller is the world's smallest and costs 20 cents

This remarkable device is only a little larger than a pepper flake.

Written by **Adrian Kingsley-Hughes,** Senior Contributing Editor

March 13, 2025 at 9:02 a.m. PT



The MSPM0C1104 measure only 1.38 mm² and yet is a fully-featured microcontroller.

TI

https://www.zdnet.com/article/tis-tiny-microcontroller-is-the-worlds-smallest-and-costs-20-cents/

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Not eno
talking a
Window

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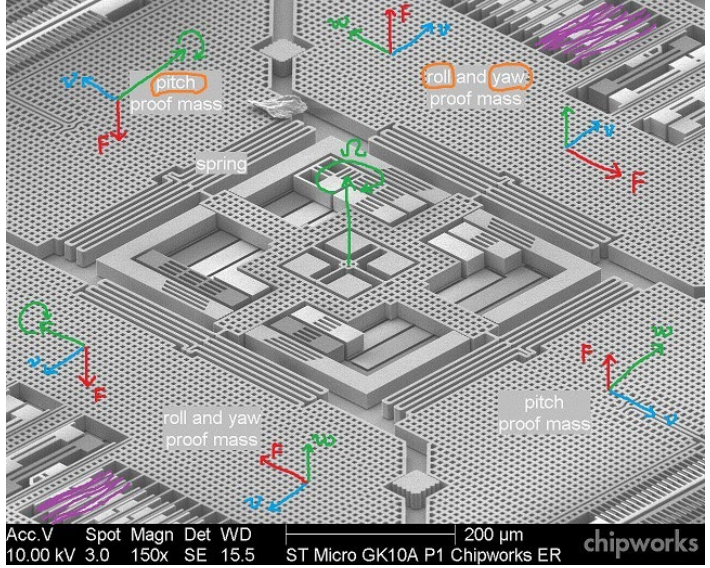
MEMS

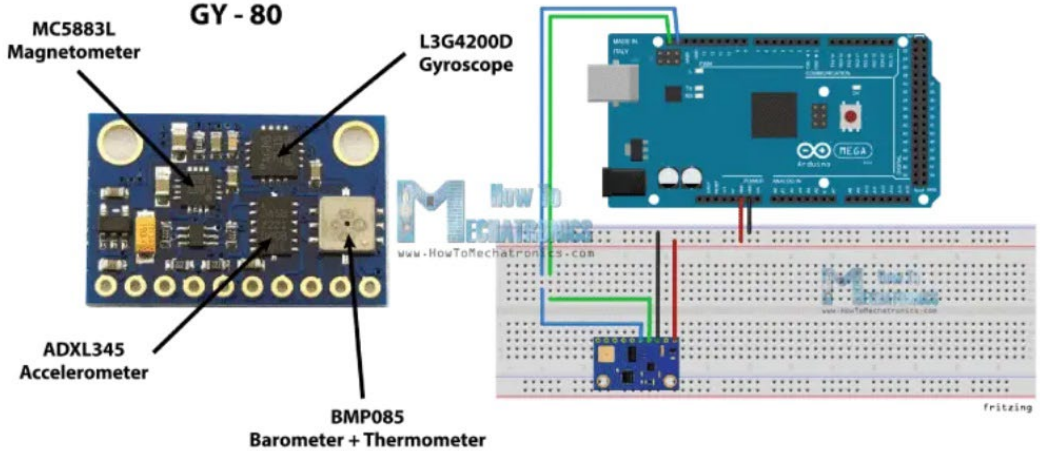
- Micro-Electro-Mechanical-Systems
- Small devices composes of micro components ranging from 0.001mm to 0.1mm in size
- Made of silicon, polymers, metals and/or ceramics, and are usually combined with microcontroller for completing the system

- Examples: Accelerometer, gyroscope, magnetometer

https://howtomechatronics.com/how-it-works/electrical-engineering/mems-accelerometer-gyrocope-magnetometer-arduino/



https://keson96.github.io/2016/06/03/2016-06-03-How-MEMS-Gyroscope-Work/



https://howtomechatronics.com/how-it-works/tometer-arduino/ electrical-engineering/mems-accelerometer-gyrocope-magne

HACKADAY

HOME BLOG HACKADAY.IO TINDIE CONTESTS SUBMIT ABOUT October 24, 2025

1949 GYROSCOPE SPINS UP AGAIN

by: Al Williams

10 Comments

August 29, 2021

[Curious Marc] has an Apollo-era gyroscope but isn't quite ready to put it through this paces without some practice. So he borrowed a 1949 vintage Sperry C5 gyro and did some experiments with it using a 3-phase power supply he plans to use on the other gyro.

SEARCH

Search ... SEARCH

https://hackaday.com/2021/08/29/__trashed-23/

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Lab-on-a-chip

- Technologies which allow operations which normally require a laboratory -synthesis and analysis of chemicals - on a very miniaturized scale, within a portable or handheld device

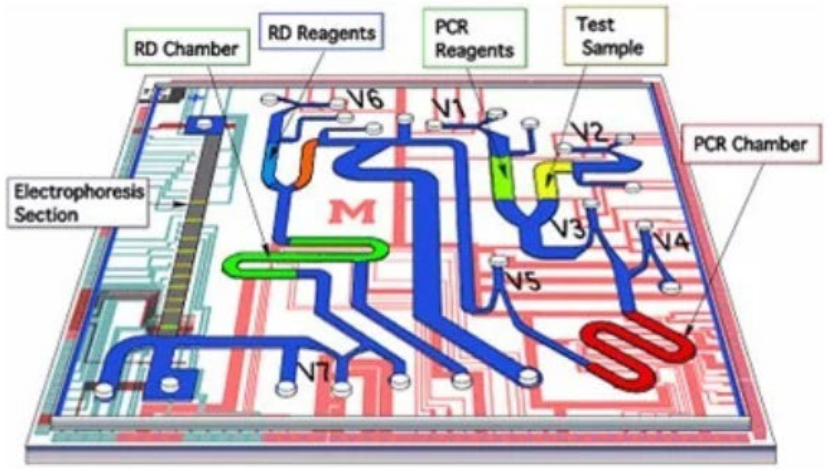

Figure 1. *Schematic of the "Genotyper" device, developed by researchers at the University of Michigan, which could identify different strains of flu. Image Credits: Dr Ronald Larson, via NIAID.*

https://www.azonano.com/article.aspx?ArticleID=3081

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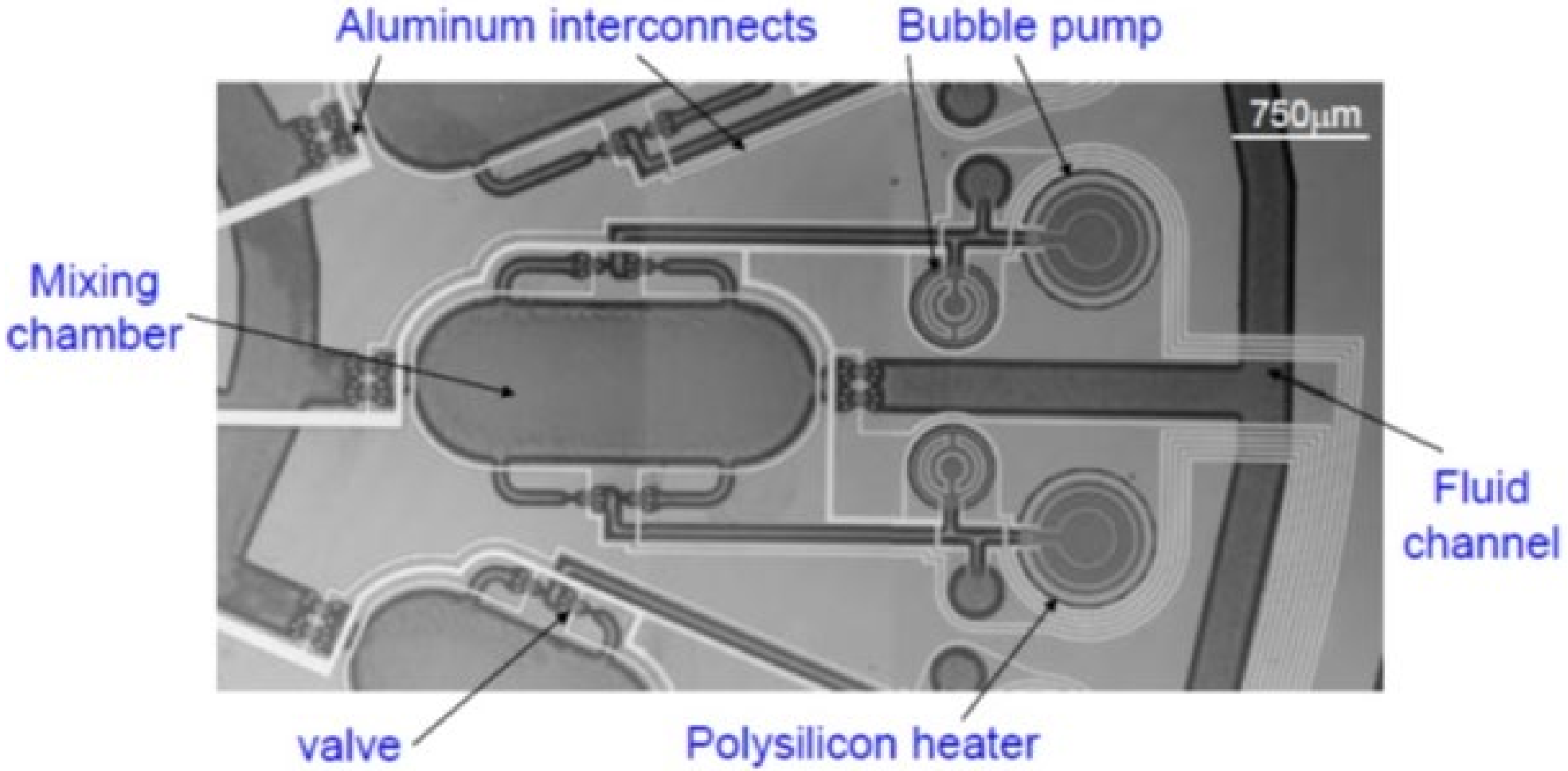

Implemented in a silicon, this lab-on-a-chip can pump liquid through fluid channels, warm the liquid using polysilicon heaters and control the liquid flow into mixing chambers via electrically controlled valves.

http://www.chipdesignmag.com/bursky/?p=140
(not accessible)

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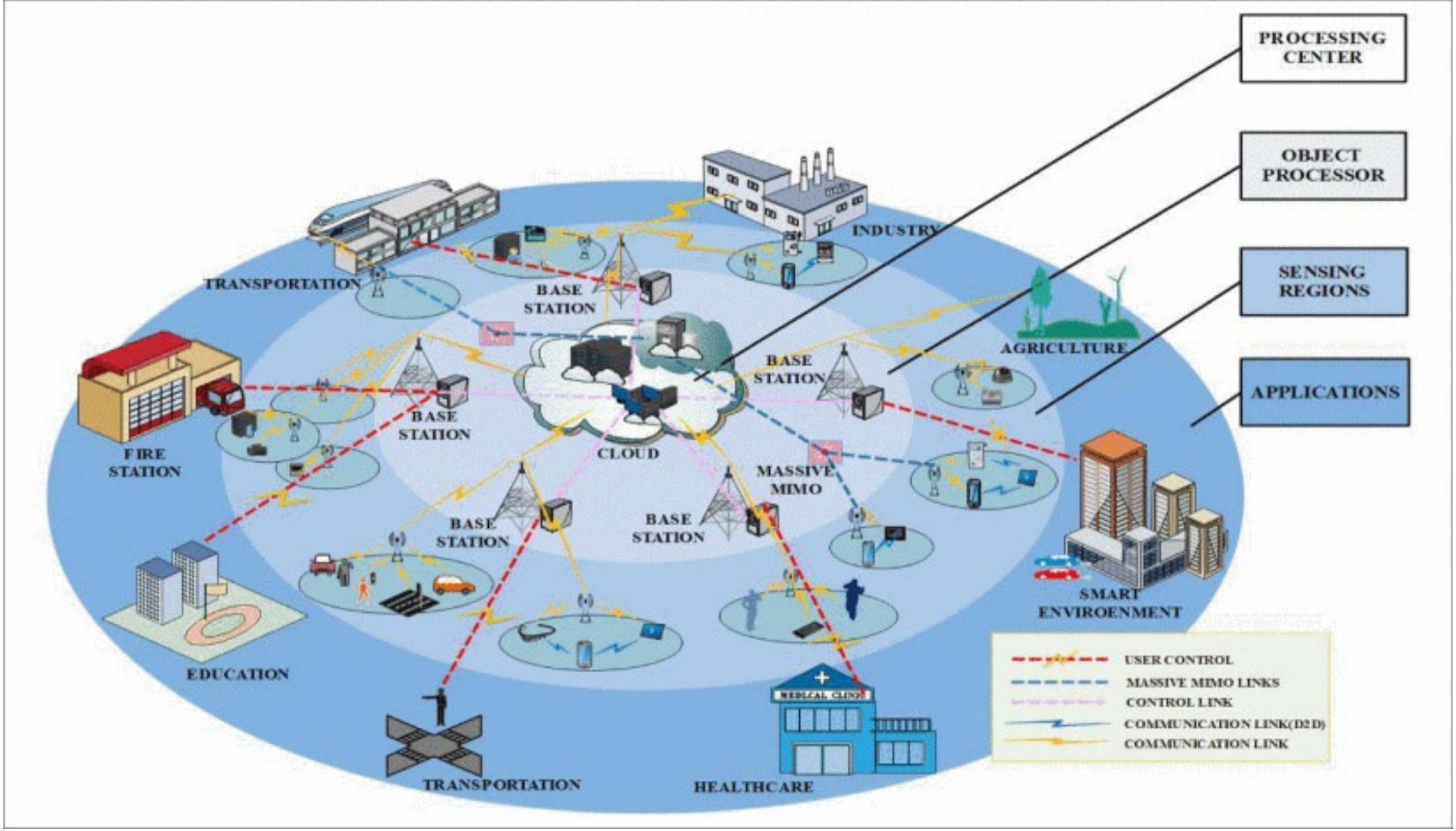

https://innovate.ieee.org/innovation-spotlight/5g-iot-ai/

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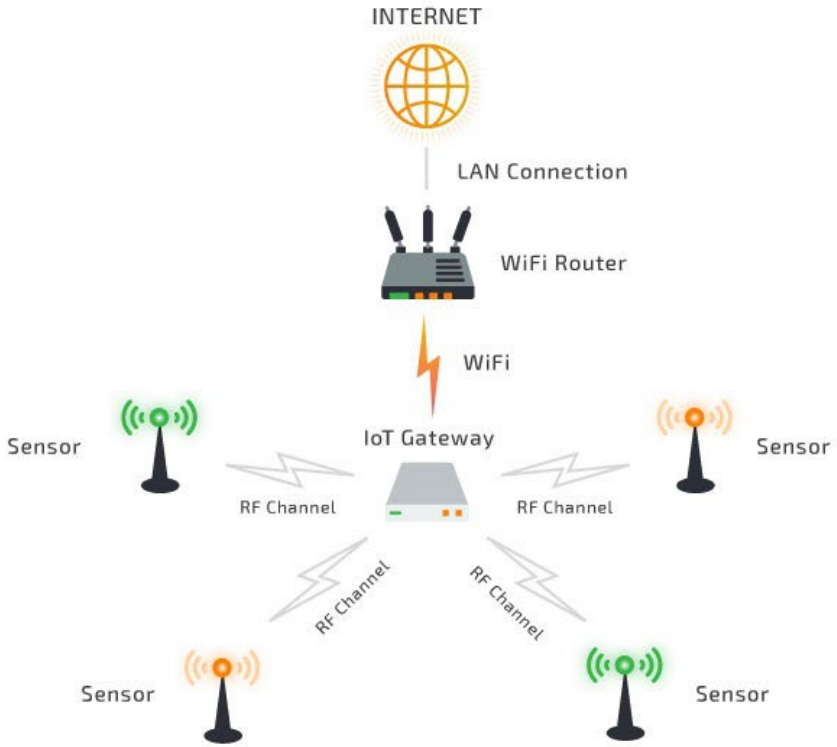

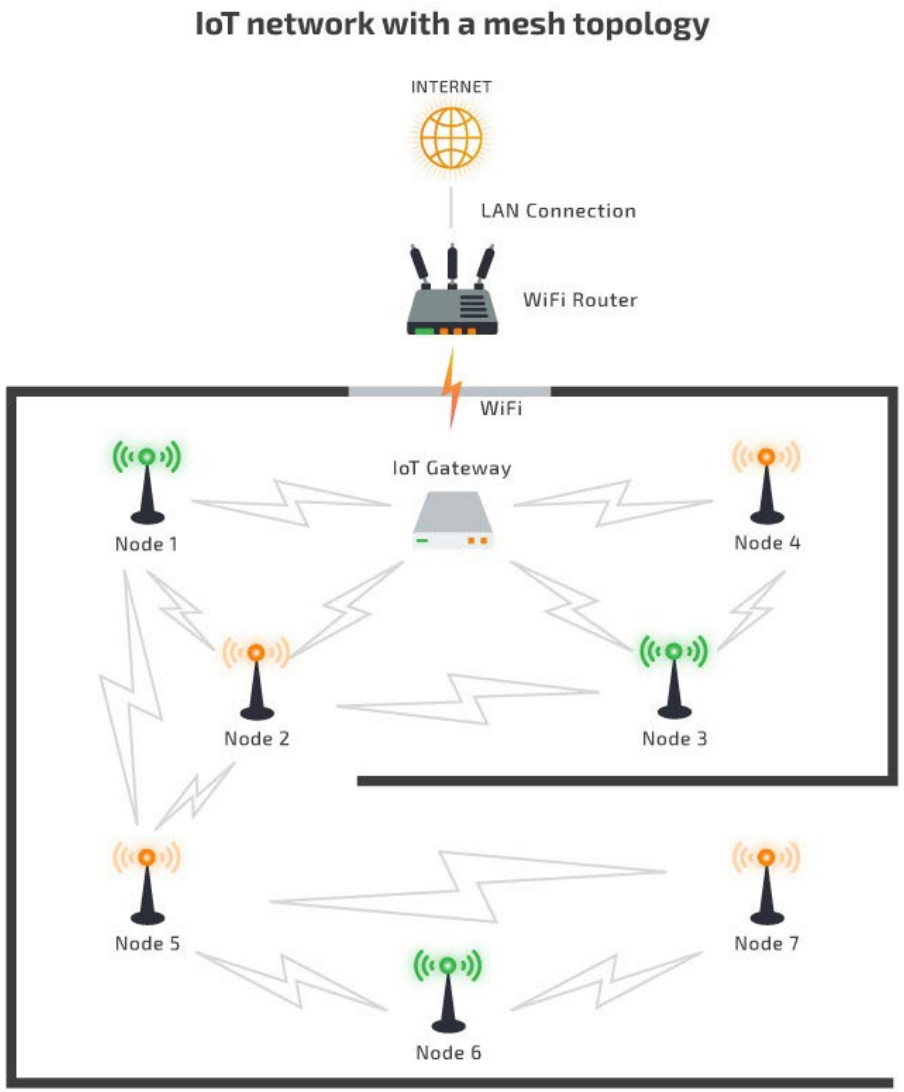

https://www.apriorit.com/dev-blog/673-mobile-mesh-networking-for-iot#pid=1

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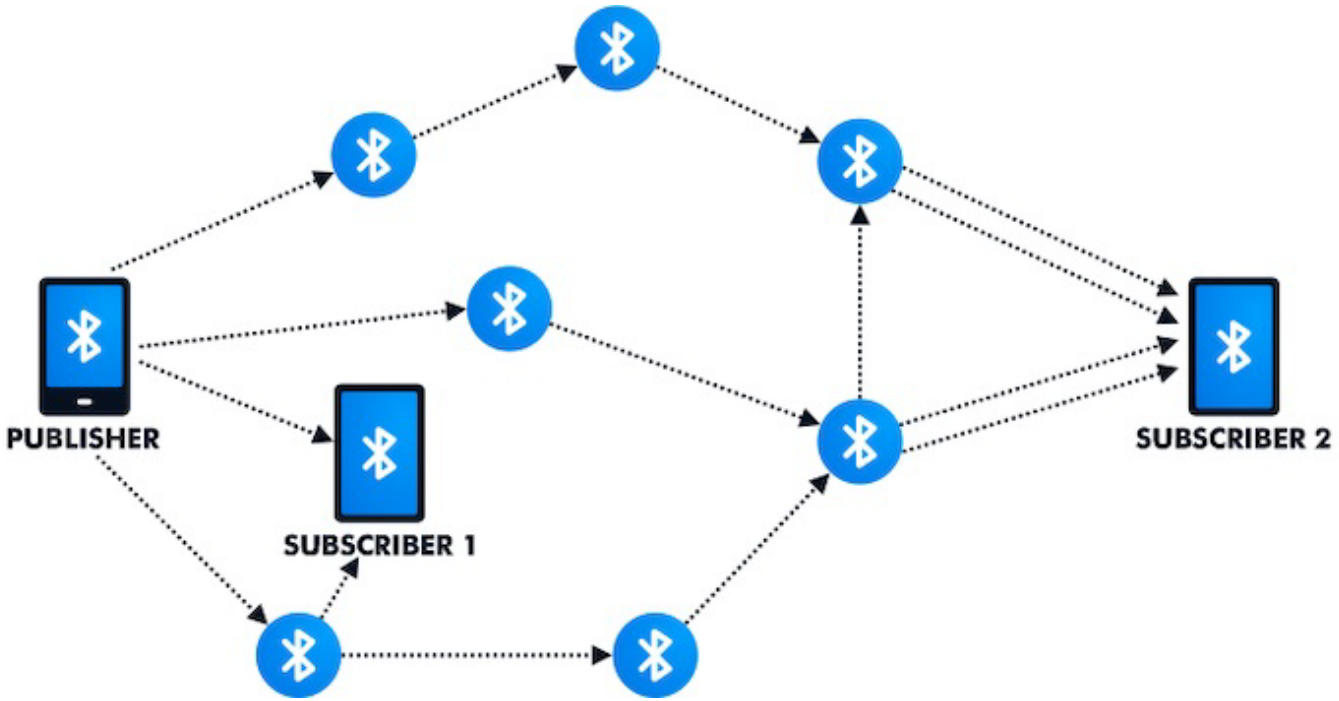
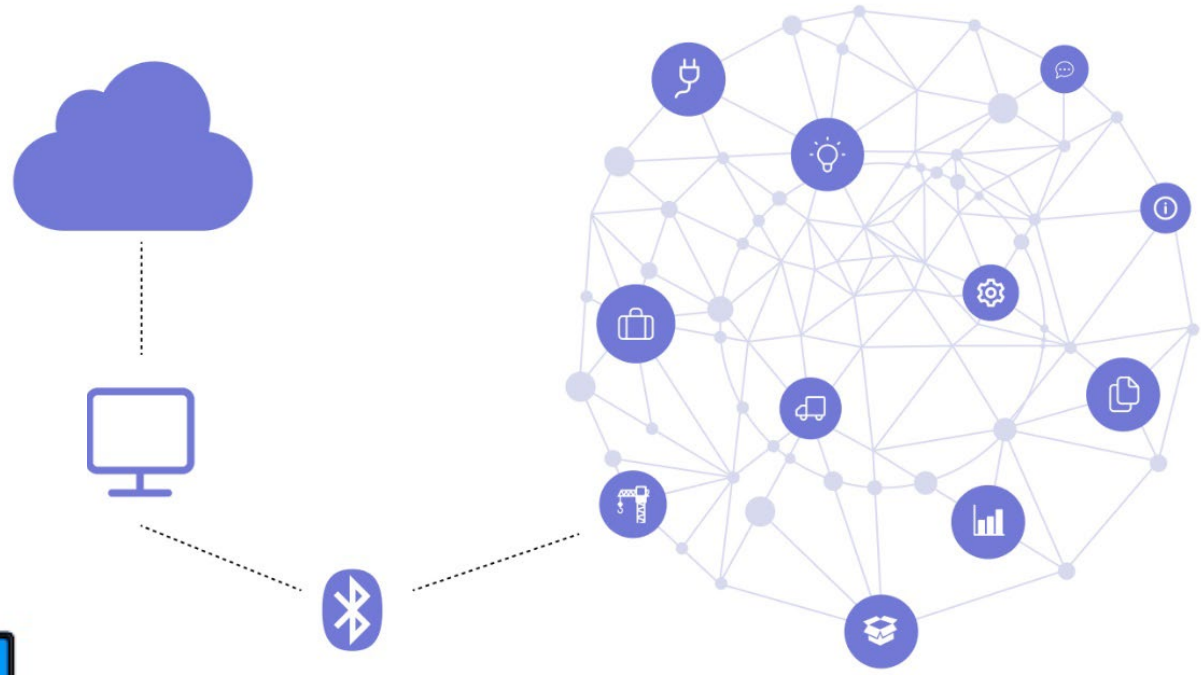
BLE Mesh



https://www.allaboutcircuits.com/technical-articles/introduction-to-bluetooth-ble-mesh-networking/



https://www.psa.inc/company/news/iot-mesh-network-potential-benefits-and-use-cases/

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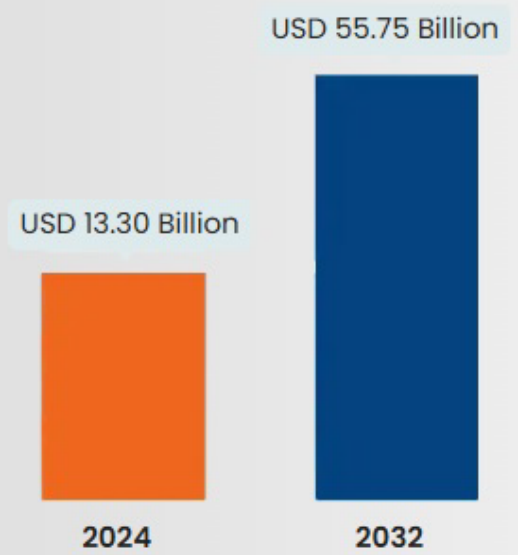
Global Bluetooth Low Energy Market

Market Size in USD Billion

CAGR : 19.62%



Forecast Period	2025 –2032
Market Size (Base Year)	USD 13.30 Billion
Market Size (Forecast Year)	USD 55.75 Billion
CAGR	19.62 %
Major Markets Players	• Infineon Technologies AG • Telefonaktiebolaget LM Ericsson • Intel Corporation • Motorola SolutionsInc • InsightSIP

Global Bluetooth Low Energy Market Segmentation, By Network Topology Type (Central Device, Peripheral, and Device), End-Use Type (Manufacturing, Automotive, Telecommunication, Home Appliances, and Others), Product Type (Module and Chipset), Mode (Single Mode and Dual Mode) – Industry Trends and Forecast to 2032

https://www.databridgemarketresearch.com/reports/global-bluetooth-low-energy-market

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Trends and Recommendations

- IoTs will be increasingly connected to our daily life, and collecting more data around us

- Technologies for IoTs are continually progressing, and getting more accessible and cheaper
- Easy for individuals to explore new applications

- Keep track of latest development in IoT related technologies and their implications
- Focus on what sensors/actuators can be integrated in our everyday life, and develop new IoT devices/systems for improving our life

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Thanks

Email: mccliff@polyu.edu.hk

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