



Internet of Things (IoT)

DAY 5

IoT in the real world, from the home to the city

August 2 to 6, 2026

KGSP Summer Enrichment Program 2026
KAUST Academy, KAUST

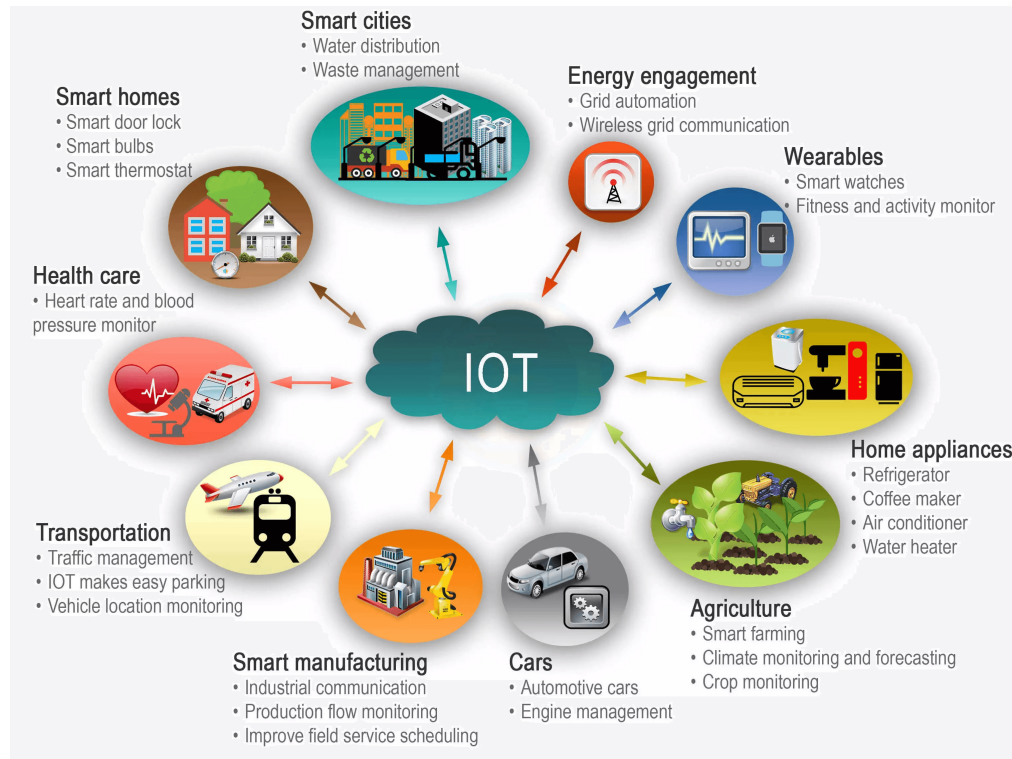
Salah Abdeljabar
salah.abdeljabar@kaust.edu.sa



On Today's Agenda

1. **Consumer IoT**: devices around the home
2. **Commercial IoT**: the workplace, retail & transport
3. **Industrial IoT (IIoT)**: factories & digital agriculture
4. **Infrastructure IoT**: smart cities & utilities
5. **Benefits & concerns**: the promise and the price

IoT Is Everywhere



Consumer IoT

IoT devices you buy and use around the home

Consumer IoT

Devices consumers buy for everyday life: some incredibly useful, some questionable.



Around the home

- Smart speakers & assistants
- Smart heating & thermostats
- Robotic vacuum cleaners
- Smart appliances & plugs



On the person

- Fitness & health trackers
- Wearables & smart watches
- Video doorbells & security cameras

Important

Consumer IoT empowers the **1 billion people with a disability**: voice-controlled ovens, robot vacuums, and self-monitored health conditions.

Commercial IoT



IoT in the **workplace**, retail, and transport

Commercial IoT

Using IoT across offices, factories, retail, and logistics.



Buildings & retail

- Occupancy sensors for lighting/heating
- Factory safety: hard hats, noise levels
- Cold-storage temperature monitoring
- Smart shelves that signal restocking



Transport & logistics

- Vehicle location tracking
- Road-user mileage charging
- Driver hours & break compliance
- Depot arrival notifications

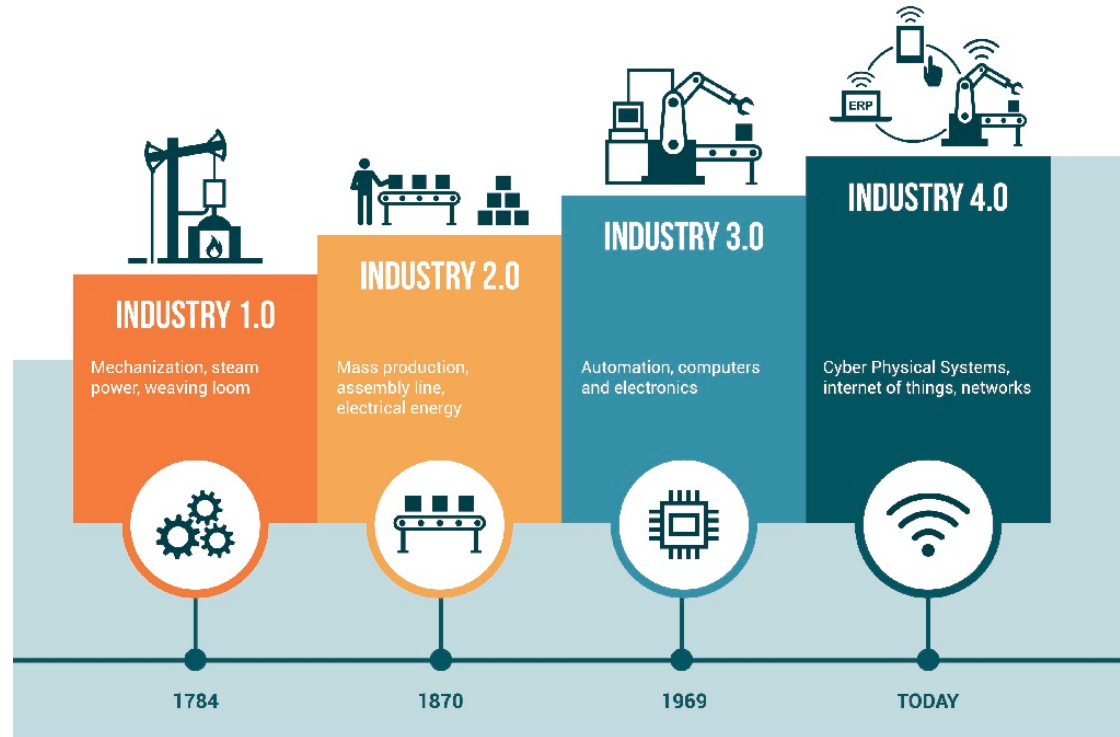
Note

The goal: **cut cost and carbon**, improve **safety**, and keep operations running smoothly.

Industrial IoT (IIoT)

Controlling machinery and agriculture **at scale**

Industry 4.0 and Industrial IoT (IIoT)



From Factories to Farms



Factories

Monitor machinery with many sensors:

- Temperature, vibration, rotation speed
- Auto-stop when outside tolerances
- **Predictive maintenance**: AI predicts failures *before* they happen



Digital agriculture

Feeding a growing planet:

- Soil-moisture → automated watering
- **Growing degree days** to predict harvest
- Drones, satellites & AI for crop health

Why IIoT Matters

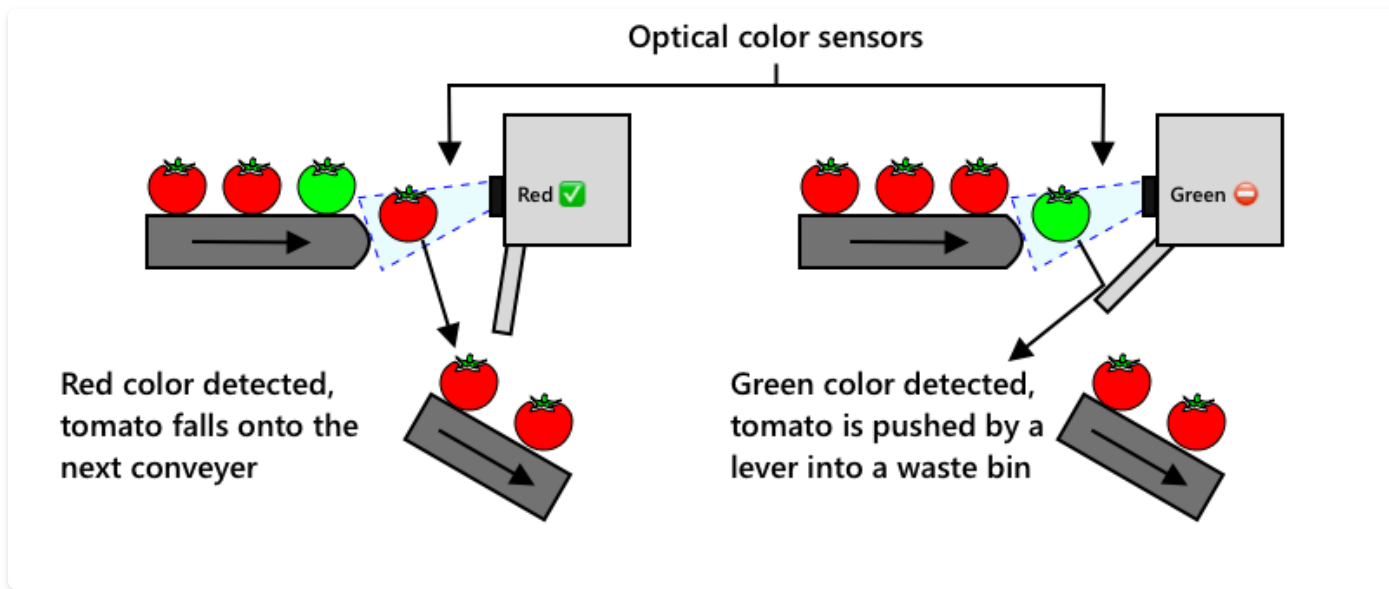
Important

Digital agriculture can help the **2 billion people** in 500 million households living on subsistence farming, starting with sensors that cost just a few dollars.

Think

What other IoT devices could help farmers grow more with less?

One Machine, End to End 🍅



Sense 👁 An optical color sensor reads each tomato as it passes.

Decide 🧠 Red passes. green does not. The rule runs **on the machine**, in milliseconds.

Act 🛠 A lever pushes the rejects into a waste bin.

A whole IoT loop with no cloud in sight: at conveyor speed, the round trip would cost more than it's worth.

Infrastructure IoT



Smarter **cities**, power, and environment

Infrastructure IoT

Monitoring and managing the infrastructure people use every day.



Smart cities

- Pollution monitoring
- Traffic & smart parking
- Public transport management



Utilities

- Smart power grids
- Home-level usage analytics
- Water & environmental monitoring

Real example: Copenhagen

Air pollution is measured across the city and used to suggest the **cleanest cycling and jogging routes**.

Benefits & Concerns



The **promise** and the **price** of connecting everything

Weighing IoT

Benefits

- Convenience & automation
- Efficiency: save cost & energy
- Safety & accessibility
- Data-driven insights

Concerns

- **Privacy**: who sees your data?
- **Security** vulnerabilities
- Dependence on **connectivity**
- Interoperability between brands

Security Deserves Attention

⚠ Caution

There's an old joke: *"the **S** in IoT stands for Security."* There is no S. A device is only as secure as the cloud service behind it.

- Real attacks: the **Stuxnet** worm, hacked **baby monitors**
- Weak passwords and open connections are common entry points
- Good design treats privacy and security as **first-class** requirements