Automated & Emerging Technologies

IGCSE Computer Science ▪ Topic 6

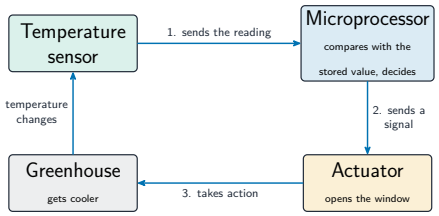
IGCSE Computer Science

What we will cover

1. Automated systems
2. Sensor → micro → actuator
3. Pros & cons
4. Robotics
5. Artificial intelligence
6. Recap

1 Automated systems

The control loop



- a central heating **中央供暖** system;
- a chemical process **化学过程** in a factory;
- a **greenhouse** 温室 (for growing plants);
- a **car park barrier** 停车场道闸.

Automated systems – pros and cons

Advantages

- work day and night without rest
- faster and more **consistent** 一致的
- safe in places people cannot go
- fewer human mistakes

> The deciding weakness is the last one: an automated system only handles what it was built for.

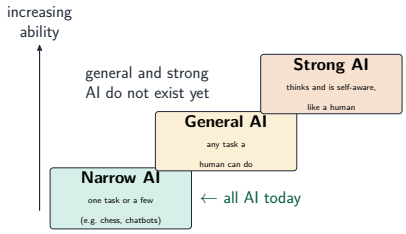
2 Robotics and AI

Robotics

A robot has a **physical structure** 物理结构 (arms), **electrical components** 电子元件 (motors, sensors) and **programmable instructions** 可编程指令. Used for factory work (welding, moving heavy parts) and home appliances (a robot vacuum).

Robot vacuum

Artificial intelligence



- a **physical structure** 物理结构 (a mechanical **机械的** body, such as arms);
- **electrical components** 电子元件 (motors, sensors and wiring);
- **programmable instructions** 可编程指令 – it follows a program that can be changed.

3 Recap

Topic 6 – key takeaways

1 Loop

sensor → microprocessor → actuator, repeated

2 Decide

the micro compares data with stored values

3 Robot

no independent decision-making

4 AI

data + rules; learns and adapts

Check yourself

1. Which part makes the decision?
2. Which part causes movement?
3. What is a robot's key limitation?
4. What can AI do that a fixed system cannot?

Answers **1.** the microprocessor **2.** the actuator **3.** no independent decisions **4.** learn and adapt