

Automated & Emerging Technologies

IGCSE Computer Science • Topic 6

IGCSE Computer Science



Automated & Emerging Technologies

What we will cover

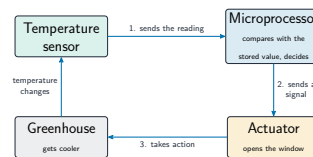
- 1 Automated systems
- 2 Sensor → micro → actuator
- 3 Pros & cons
- 4 Robotics
- 5 Artificial intelligence
- 6 Recap

1 Automated systems

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└ 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.

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└ Automated systems

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

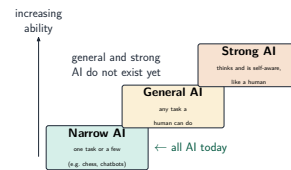
Robotics

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