

6.10 Recognition systems

Syllabus 2026 - 2028

WHAT YOU NEED TO KNOW

- Characteristics, uses, advantages and disadvantages of OMR (including barcode and QR code), OCR (including ANPR), RFID, NFC and biometric recognition

Optical Mark Recognition (OMR)

OMR reads marks made in set positions on a paper form. It detects where light is not reflected, so it knows which boxes were marked.

- Uses:** school registers, multiple-choice exam papers, surveys and lottery tickets
- A **barcode** is a pattern of lines read by a laser scanner. A **QR code** is a square pattern that holds more data and can be read by a phone camera

Advantages	Disadvantages
+ Very fast and accurate for many forms	- Forms must be filled in correctly and neatly
+ Reduces typing errors and staff time	- Badly marked forms cannot be read and may need checking by a person

Optical Character Recognition (OCR)

OCR scans printed or handwritten text and compares the shapes with stored characters to turn them into text that can be edited. **ANPR** (automatic number plate recognition) uses a camera and OCR to read vehicle number plates.

- Uses:** converting printed documents to text, car parks, toll roads, speed cameras and security

Advantages	Disadvantages
+ Fast, automatic and needs no typing	- Poor images (dirt, bad light, angle) cause mistakes
+ ANPR works without a person at the gate	- Handwriting is hard to read, and ANPR raises privacy concerns

Radio Frequency Identification (RFID)

An RFID tag contains a chip and an antenna. A reader uses radio waves to read the tag without touching it or needing a line of sight.

- Uses:** tracking stock, passports, automobiles (toll tags and key fobs) and contactless payment

Advantages	Disadvantages
+ Many tags can be read at once	- Tags cost more than barcodes
+ No line of sight is needed, and data can be updated	- Can be read without the owner knowing and may be cloned or interfered with

Near Field Communication (NFC)

NFC allows two devices to exchange data over a very short distance (a few centimetres). It is used for **payment using a smartphone**: the phone is held next to the payment terminal.

Advantages	Disadvantages
+ Quick and convenient	- Only works over a very short distance
+ Short range makes it harder to intercept	- A lost or stolen phone could be used, and not all terminals accept it

Biometric recognition

Biometric systems identify people by unique body features, which cannot be forgotten or easily shared.

Type	What is read	Points to remember
Finger or thumb	Fingerprint pattern	Cheap and common; dirty or damaged fingers can cause errors.
Hand	Shape or vein pattern of the hand	Contactless versions are possible; larger scanners are needed.
Face	Measurements of the face	Can be read from a distance; light, glasses and ageing can affect accuracy.
Iris	Pattern in the coloured part of the eye	Very accurate and hard to copy; equipment is costly.
Retina	Pattern of blood vessels at the back of the eye	Very accurate; users find it intrusive.
Voice	Pattern and tone of the voice	Easy to use; a cold or background noise can affect it.

Advantages	Disadvantages
+ Unique to each person and cannot be forgotten or lost	- Equipment can be expensive
+ Difficult to forge or share	- Can fail (injury, noise, poor lighting) and raises privacy concerns about stored data

EXAM TIP

Name the exact device and give one specific use for it. For example: RFID tags on stock let a shop count every item on a shelf without scanning each one by hand.

Key terms

Term	Meaning
OMR	Reading marks made in set positions on a form.
OCR	Reading printed text and turning it into editable text.
ANPR	Automatic number plate recognition.
RFID	Using radio waves to read a tag without contact.
Biometric	Identifying a person by a unique body feature such as a fingerprint.