

## Special Purpose I/O

### *Speech Synthesizer*

- A speech synthesizer reads text loudly.
- Often the user can choose between male or a female voice.
- The user can also choose the speed of reading.
- A speech synthesizer can read out word by word or letter by letter.
- Also called text-to-speech (TTS) system.



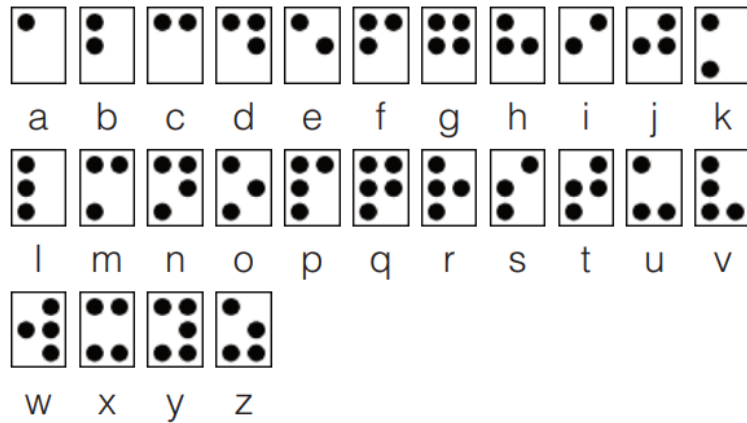
### *Braille Devices*

The following picture shows a Braille Reader



- It enables a blind person to read text displayed on a computer monitor.
- The text is sent by the computer to the device, where it is translated into a braille format.
- The Braille reader allows the visually impaired to use the internet and read books and newspapers more independently.

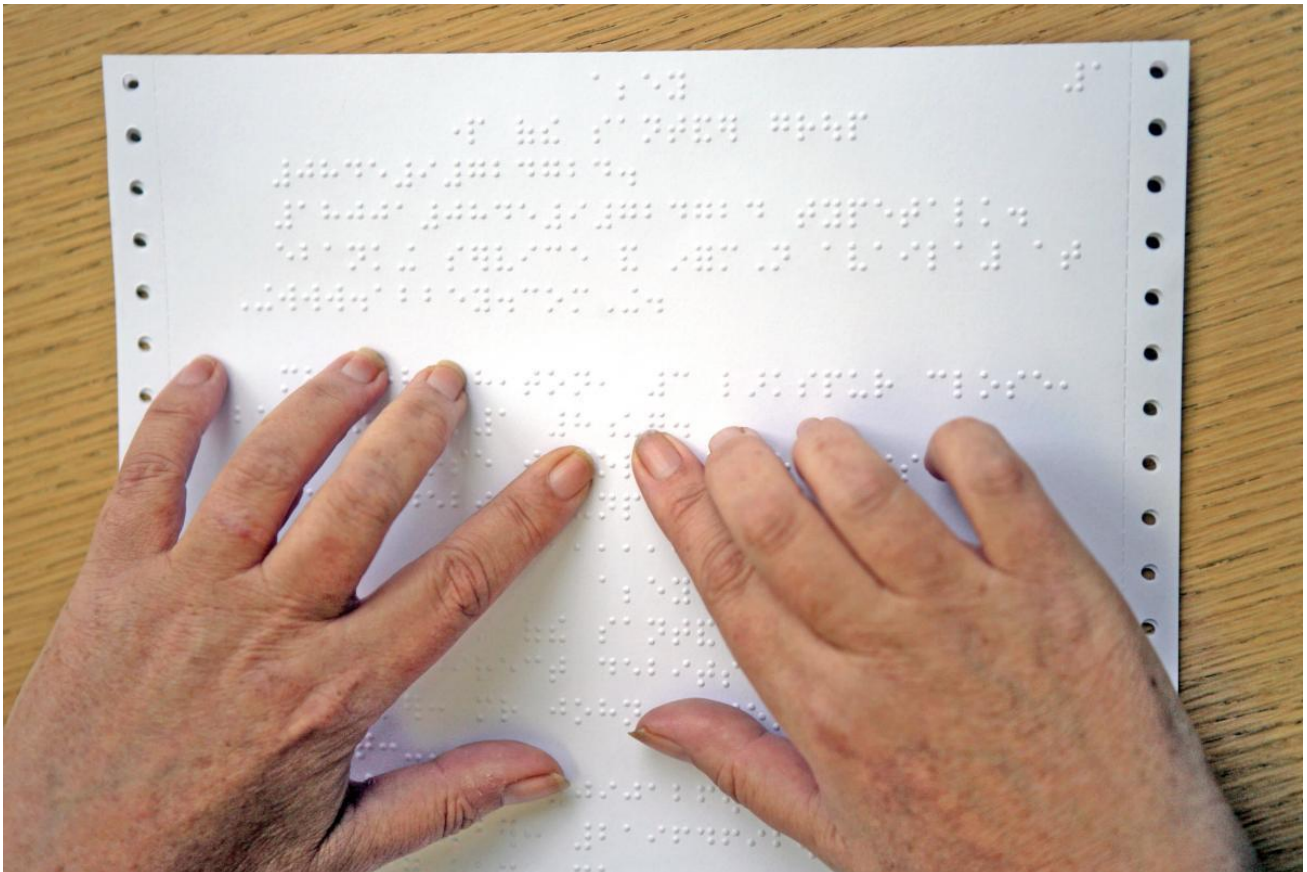
The picture below shows how letters are represented in Braille.



Other Braille devices are Braille printers and keyboards. The printer prints Braille characters that are embossed so that a visually impaired user run a finger along the paper and feel the characters by the sense of touch.

A Braille keyboard consists of a normal keyboard where each key surface has an embossed Braille character.

The following picture shows a printout from a Braille printer.



The picture below shows part of a Braille keyboard.



### *Special-Purpose Keyboards*

Here are some examples:

1. A keyboard with large keys aimed at low-vision users and industrial environments.
2. A special-purpose keyboard designed for audio editing. The keyboard communicates with special software which, as usual, requires special hardware specification (e.g. amount of RAM).



3. A medical keyboard that is washable as it contains no seams or crevices.



4. An industrial keyboard, for example, to instruct a CNC (Computer Numerical Control) machine. CNC is an automated manufacturing technique. A computer acts as a controller of a machine. It is given commands by means of the keyboard (it can be given programs too). The machine can cut materials, drill holes in them and shape them as instructed to do.



### *Speech Recognition*

- Speech recognition is the ability of a machine or program to identify words and phrases in spoken language and convert them to a machine-readable format.
- Simple applications can understand a few words only and these have to be pronounced very clearly. More sophisticated applications can accept natural speech.



- Some applications of speech recognition are:
  - Speech user interfaces where menu choices are spoken out.
  - Voice browser for the Internet.
  - Speech to text processing.
  - Data entry.
  - In games, voice control of selective features.
  - Voice recognition in a wheelchair.
- Speech recognition software is now frequently installed in computers and mobile devices, allowing for easy access.
- The downside of speech recognition includes its inability to capture words due to:
  - Variations of pronunciation.
  - Background noise.

### *Biometric Sensors*

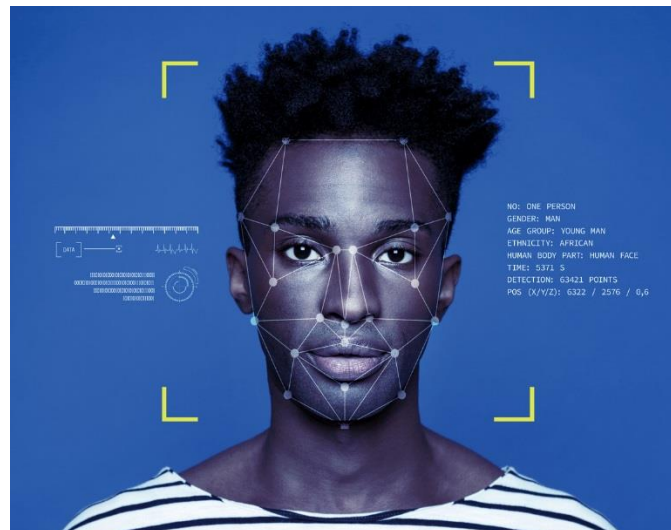
- A biometric sensor changes a biological characteristic of a person into an electrical signal.
- Examples are shown hereunder.
- *Fingerprint Recognition*: the sensor and the software can recognise a fingerprint and associate with a particular person.



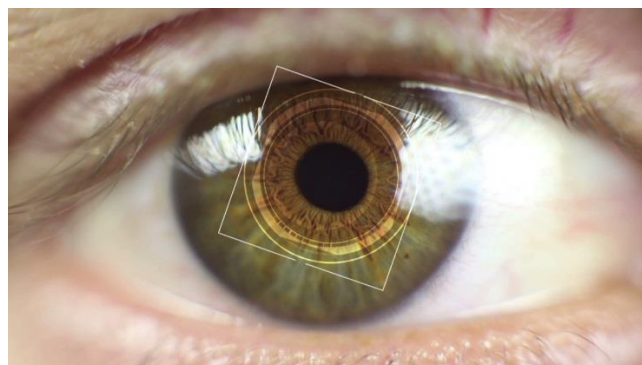
- Present technology employs optical sensors. The scanning of the fingerprint is very stable and also reliable. Some banks have initiated using fingerprint readers for approval at ATMs.
- *Face Recognition*: A face recognition system can identify or verify a person from a digital image. Present facial recognition systems work with face prints and these systems can recognize 80 nodal points on a human face. Nodal points are nothing but endpoints used to measure variables on a person's face, which includes the

length and width of the nose, cheekbone shape, and eye socket depth.

- Social sites like FB uses software for face recognition to tag the users in photographs. This software also increases marketing personalization. For instance, billboards have been designed with integrated software that recognizes the ethnicity, gender and estimated age of onlookers to deliver targeted marketing.



- *Iris Recognition:* Iris recognition is one type of biometric method used to identify the people based on single patterns in the region of ring-shaped surrounded the pupil of the eye. Generally, the iris has a blue, brown, grey or green colour with difficult patterns that are noticeable upon close inspection.



- *Signature Recognition:* It can be operated in different ways. Some applications have a digitized copy of a person's signature and they can compare a signature with their digitized copy. Other go further. They read the signature at real time and can even tell, by the

speed, the pressing of the pen, and the turns made during signing whether the signature is authentic.

