Systems

Approach to Designing:

> 📖 **Systems revolve around inputs, processes and outputs:**
>
> - An input device takes a real world signal like light, sound or movement: and then converts it into an electronic signal like current or voltage
> - Processes are what goes into receiving an input signal and changing in someway that adds functionality or intelligence to it.
> - Output devices are in charge of taking signals and converting it back into real world results. An example being how a speaker would output sound

- Examples of real world inputs include light level, temperature and pressure: Electronic signals may be voltage or current

Typically, input devices are switches or sensors

Switches:

> ⓘ **What are they?**
> Switches allow current to flow through them when the contacts within them are connected. Typically, switches are named after how they work: an example being a push-to-make switch which allows current to flow when pushed.
> Other examples of switches may include:
>
> - Reed Switch
> - Toggle switch
> - Tilt Switch

Type of switch	Uses
PTM/PTB switch	Console controller buttons, eg fire or jump
Reed (magnetic) switch	Window sensors on alarms, eg window opens and switch contacts open
Toggle switch	Power switches
Rocker switch	Light switches
Tilt switch	To detect if something is no longer level

> ⓘ **Info**

The function of a toggle switch and rocker switch can be exactly the same - it is the shape of the case that determines what the switch is called.

Sensors

Sensors can be used to detect changes in light level, temperature and pressure. There are a wide range of applications for sensors and they are an essential in modern systems design.

Microcontrollers

'Microcontrollers provide functionality and give intelligence to products and systems. From mobile phones to washing machines, many everyday products are controlled by these devices.''

> ♨ **Purpose of Process Devices:**
> Processors receive the signal from the input source.
> stage of a system and take action by altering it in some manner, for as by adding a delay, calculating the frequency of an event, or making choices.
> For this, programmable components like microcontrollers are frequently utilized.

> ⓘ **Key fact**
> A microcontroller is an example of a SBC (single board computer) and is manufactured as an integrated circuit (IC). It can be programmed to perform different processing functions.

Microcontrollers are available in various sizes and have varied numbers of pins—8, 14, and 18—for connecting input and output devices. One common type of microcontroller is the peripheral interface controller (PIC).

Benefits and drawbacks of microcontroller use

Benefits

- A circuit can be made substantially smaller. This is so because physical components are replaced with code.
- They are reprogrammable multiple times. This makes it possible to make adjustments without having to replace entire parts.
- To provide flexibility, they feature pins for connecting several input and output devices.

Negative aspects

- Frequently, their cost exceeds that of conventional integrated circuits.
- For simple systems, they are consequently not necessarily the ideal choice.
- Hardware and software programming is necessary. It can be costly to purchase this.

- The system's language needs to be learnt, which raises the price of training.