

Dedicated Computer Systems

A **general-purpose computer** is one that is able to perform many different tasks. Each task will be expressed as a computer program. Personal computers, including desktops, notebooks, smartphones and tablets, are all examples of general-purpose computers.

A **dedicated computer (special-purpose)** is one that is built to perform one particular task.

Computers come in many forms, and input and output peripherals need not be keyboards and screens but can be as simple as a button or a sensor, an LCD display or even a single LED. Embedded systems controlling common appliances are one form of dedicated computers - they have a CPU, I/O devices, software stored in ROM, and some RAM as workspace.

Traffic control system

An example of dedicated systems are Road Traffic Control Systems collect and analyse driving information of vehicles in the area, perform the optimal traffic signal control in accordance with the constantly changing road traffic situation, and provide useful traffic information to drivers based on the data collected.

Advantages:

- Shortening the driving time of vehicles.
- Reducing traffic accidents.
- Decrease in air pollution.
- More comfortable road traffic environment.



Traffic control centre

Process control systems

Process control is the ability to monitor and adjust a process to give a desired output. It is used in industry to maintain quality and improve performance.

An example of a simple process that is controlled is keeping the temperature of a room at a certain temperature using a heater and a thermostat.

But we are interested here with process control being performed by a computer. One example is an automatic watering system for your garden. Once the device is programmed with times of watering you completely leave it up to the device.



Automatic watering system

Embedded systems

An **embedded** computer is a computer that forms part of a larger system. One example is a microwave oven that has its data inputted to the computer (type of heating e.g. grill, defrost etc; duration of heating etc.) and then a program manages the heating process.



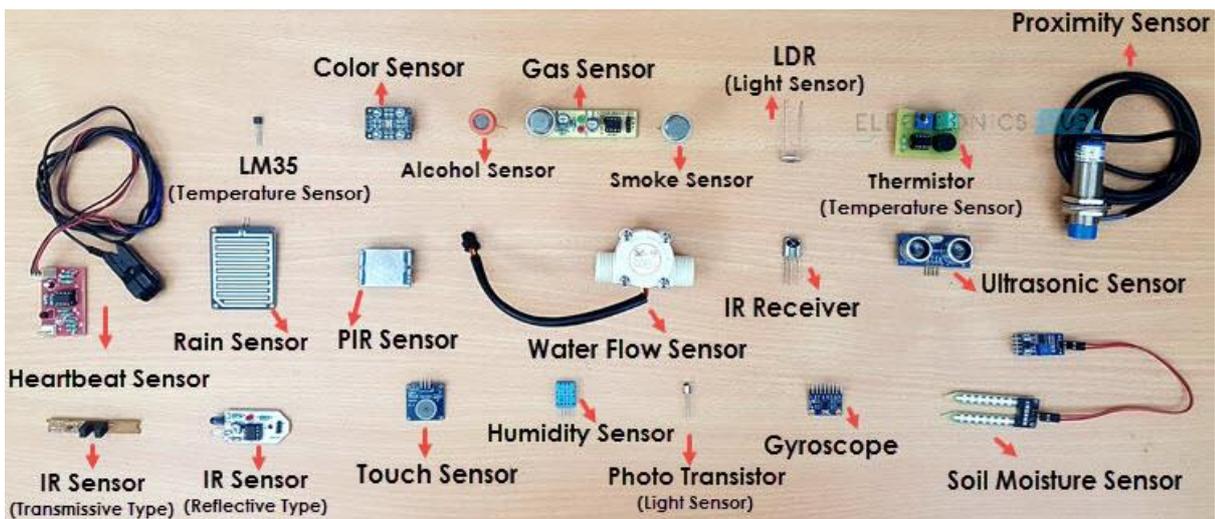
A microwave oven



Examples of embedded computers

Sensors

We live in a world of **sensors**. You can find different types of Sensors in our homes, offices, cars etc. working to make our lives easier by turning on the lights by detecting our presence, adjusting the room temperature, detect smoke or fire, make us delicious coffee, open garage doors as soon as our car is near the door and many other tasks. All these and many other automation tasks are possible because of Sensors.



Different kinds of sensors

A sensor is a device which provides a signal with respect to a specific physical quantity.

Different sensors can detect physical features for example:

- Light
- Humidity
- Temperature
- Pressure
- Proximity
- Smoke
- Alcohol
- Touch
- Colour
- Etc.

Software

Dedicated computers, though having the basic hardware of a computer, will only execute one program. Some programs are very small, for example the ones written for a microwave oven. These small programs may be written in assembly language and when compiled kept in a ROM.