

### Exercise 3

## DESIGN A SMART DEVICE

The manmade world is increasingly 'smart' (quasi-intelligent). It is increasingly inhabited by products or systems in which three things interact: 1) sensors, which detect the state of the world, 2) microcontrollers – simple special-purpose computers – which make decisions based on the sensors, and 3) actuators which the microcontrollers instruct to change the state of the world.

Even if you don't design smart products, your design career will be in this smart world. So, to give you another intuitive understanding of such interactions, this exercise asks you to design a device which has sensors, a microcontroller, and actuators.

- 1 Form teams of 3
- 2 For 15 minutes, invent a device which includes:
  - At least 2 of the sensors which your team members researched in Assignment 1
  - At least 1 actuator to make an output ('actuator' here means something which makes heat, light, sound, movement etc.)
  - A microcontroller which, depending on the input, makes decisions about when and what to output

Your device need not be useful or sensible. But it should do something clearly useful, beautiful, frightening, comic, or tragic etc. What it does must have a definite 'character'

- 3 For 5 minutes, with Post-Its on A3 sheets, make a flowchart of the microcontroller's operating program
- 4 For 5 minutes, make a picture of the device doing whatever it does
- 5 Write your full names (*nomi e cognomi*) on the display
- 6 Fix it to the wall and be prepared to explain them to everyone.

Flowcharts contain 3 kinds of 'box':

Ovals	<u>start</u> or <u>end</u> the whole process, and contain the words 'Start' or 'End'
Rectangles	represent <u>actions</u> , and contain phrases like 'Light the gas'
Lozenges [rombi]	represent <u>decision points</u> , and are usually written as questions like 'Is the water boiling?' They can have 2 or more 'exit points', like 'Yes' or 'No'.

Arrows [freccie] between any 2 boxes indicate the flow sequence.