

Home security system

A security company has made a model flat to demonstrate home security systems to potential customers. To prevent customers being bored, 10 seconds of demonstration represents an hour of real time.

Part 1 – The ‘lights’ system

What to do

- 1 Set up a working model of the flat including:
 - ◆ window blind driven by a motor. Think about the structure that you will use to support the blind and the mechanism that you will use to make it move;
 - ◆ three room lights. Think about how you will mount these lights.

Connect the motor and lamps to outputs on your control interface.
- 2 Set up an LDR and a control switch and connect them to inputs on your interface.
- 3 Use your control software to test that the input and output devices are working correctly.
- 4 Design a program to make the model work like this. When the LDR senses darkness outdoors:
 - ◆ a motorized window blind must drop;
 - ◆ the lights in the kitchen-diner, bathroom and bedroom must go on and off in a pattern that suggests that someone is at home.

When the LDR senses daylight outdoors:

 - ◆ the motorized blind must lift and all the lights must go off.

When someone is at home, they must be able to switch this lights system off.



Student’s Book:

Programs pages 240-4

Time available:

120 minutes

You will learn:

How to program a sequence of events. How to program for feedback.

You will need:

- Computer with control software
- Control interface
- Connecting wires
- Four bulbs
- Two toggle or slide switches
- Push-to-make switches (or pressure mat)
- Two LEDs
- Reed switch and magnet
- Electric motor (or motorized model blind)
- Light-dependent resistor (LDR)
- Sector wheel and light sensor, or two micro-switches
- Buzzer

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What to write

How you design your program depends on the software you are using. Do one of the following.

- ◆ Use a flow chart to describe the sequence of events and use the chart as the program.
- ◆ Use a flow chart to describe the sequence of events and use the chart to help you to write down a series of commands in the control program.
- ◆ Draw a system diagram that defines the input and output signals and the process steps that are required to create the outputs from the inputs. Use this system diagram as the program.

What to do

- 1 Test and modify your program until it works well.
- 2 Get a print-out of the working version for your workbook.

Part 2 – Improving the lights systems

The motor doesn't always move the blind by exactly the same amount.

What to do

- 1 Use either:
 - ◆ two microswitches or
 - ◆ a sector disc and light sensor to stop the motor when the blind is fully up and fully down.
- 2 Design your revised program using either a flowchart or a system diagram.
- 3 Test and modify your program until it works well.
- 4 Get a print-out of the working version for your workbook.

Part 3 – The intruder system

What to do

- 1 Design a program to make the model work like this: When the system is switched on, an LED must flash to show 'system on'; if a switch or mat is then pressed:
 - ◆ there must be a 10-second delay;
 - ◆ all the lights in the flat must flash on and off, and a buzzer must sound on and off until the system is switched off.
- 2 Add an LED as an output and a pressure sensitive mat as an input on your interface.
- 3 Test and modify your program until it works well.
- 4 Get a print-out of the working version for your workbook.

Extension work

Develop improvements for the intruder system by using a reed switch and/or an LDR, and modify your program.

