Common Sense

Sensors for light, temperature and other effects can all be interfaced to a home computer. The information can be used to control a heating system or burglar alarm

Microprocessors are increasingly used in a variety of domestic appliances, such as washing machines, toasters, video recorders, and central heating units. It is not surprising, therefore, that we can interlink these controlling chips so that devices around the home can share information with one another, or report to a central control system. It is perfectly possible to design and build centralised controlling systems that can regulate domestic appliances. Such systems break down into three categories: dedicated systems, interrupt systems and networked controllers.

Dedicated systems are commercially available, although it is possible for you to design your own devices. These couple to a conventional home computer and use specific interfaces to link directly with, and regulate, electrical or electro-mechanical units such as lights or a thermostat. However, in order to assemble such a system, you will need to have extensive knowledge of computer and electrical hardware and be able to write your own control programs. Dedicated systems also have a fundamental limitation in that the program must run continuously. Any interruption to the power supply will leave the device, at best, locked in a steady state and unable to carry out the adjustments and procedures of the control program.

The second category of control systems use 'interrupts' — electronic signals generated by the regulating devices attached to your central heating, burglar alarm, or fire and smoke detectors. When one of these devices has something out of the ordinary to report to the computer, it sends a priority signal that causes the program in use to be interrupted. Although an interrupt system must run continuously, it is more capable of coping with a breakdown in the power supply because the devices it controls are partially self-regulating anyway.

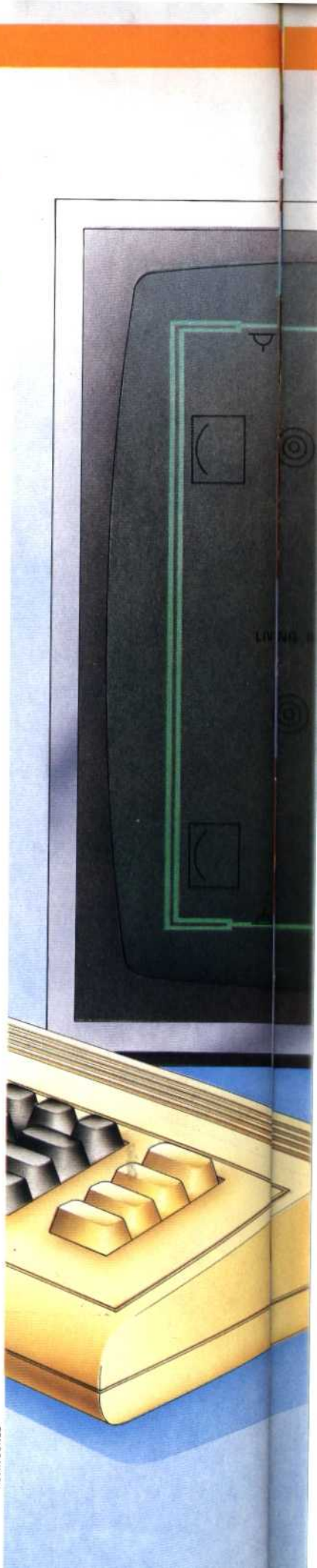
The computer holds several programs in its memory: one for each of the devices connected to it, as well as the program you are using. Let's say that you are playing an adventure game when the smoke detector triggers an interrupt message. In response to this signal, the computer stops playing the game (preserving all the necessary information about the state of play), and starts running the smoke detector program. A message might appear on the screen saying that a potential fire had been detected; or, if the computer was not being used, an alarm might be sounded. Once the source of the smoke had been detected and dealt with, you could return to the precise point in your game at which you were interrupted. If the signal had come, however, from the central heating timer, the computer would check the time and internal and external temperature sensors, and fire up the boiler accordingly — accomplishing all this so quickly that there would appear to be no interruption to your game!

An example of the third category (networked controllers) is a system called the BSR Home Controller. This ingenious device uses the mains wiring in a house to control electrical units plugged into any socket on a particular circuit. Each controller is given a code number (effectively an address), which enables it to be switched on or off by a high frequency signal sent through the mains wiring. However, interfaces of this type are extremely dangerous to install. Only a qualified electrician should attempt to connect outputs from a home computer to the mains.

Once a control system has been installed, the next step is to provide some form of remote operation — so that getting to the office and then remembering that the heating is on or the alarm system is disabled is no longer a problem. Any standard communications device, such as a modem, can be fitted to all of these systems, enabling control to be exercised at a remote terminal. Some form of password to gain access becomes a necessity if this facility is provided.

All the systems we have described are commercially available. Sensors can be anything from simple microswitches of the sort used in burglar alarms to the most complex digital thermometer chips. There are several home computers that are capable of supporting this level of expansion, such as the Apple II, Commodore 64, and the BBC Model B; but other machines would require considerable modification to achieve similar results.

The main cost of setting up computer control of your home is incurred in buying the hardware to connect the computer to the mains power — numerous isolators, relays and solid state switches are required to do this safely and effectively. But it is probable that the most demanding task for the home computer user in setting up such a system would be writing the software. Because these systems rely on speed of response (it's no use raising the fire alarm after the house has burnt down), the control programs must be written in machine code. Off-the-shelf programs are not yet on the market, but may be available in the future.



KEVIN JONES