PERFECT COPY

STEVE CROSS

Moving Together
When robot arms are engaged in a common task there is a real need for choreography in order that they do not interfere with one another. Here, one arm must pick up and hold the toy in position while the other picks up and fixes a drum; the first arm then places the completed toy in its packing box. If the movement of the arms is properly managed then conveyor belts can be placed in any arrangement that suits the rest of the assembly, whereas a human operator's ergonomic requirements would limit this freedom

We've spent some time in this series considering the different methods that may be used to allow robots to act 'intelligently'. However, the typical computer user is unlikely to have access to a robot and therefore cannot put these ideas into action. The simple answer is to simulate a robot's behaviour by using a computer.

The development of computer technology has led to an increasing use of simulations: computer 'models' may be constructed that will faithfully mimic events in the 'real' world. Most people are familiar with the idea of flight simulators — extremely complex devices that enable trainees to gain flying experience without having to pilot a real aircraft. But many other activities can benefit from computer simulation — business forecasting, engineering operations and physical processes of all types can very easily be simulated on a computer model. In some cases, the computer model can carry out experiments that would be too dangerous to attempt by any other means. It might be vitally important to discover what happens in a nuclear power station when coolant leaks from the reactor. In this instance, it would obviously be impossible to use a real power station for the experiment, so a computer simulation is used. If the model is sufficiently detailed, it is then possible to see exactly what would happen if the leak occurred.

Similarly, in robotics, computer simulations are used to design new robots. It is obviously possible to proceed by trial and error — building a robot, watching how it behaves, and then making any necessary modifications — but this is time-consuming and expensive. A computer simulation allows you to design your robot and monitor its actions without spending money and without the physical labour involved in making frequent design changes.