One-Armed Bandits

Small robot arms can provide an insight into control programming, and they can be interfaced to any home computer with a parallel port

Have you ever wished there was some way that your computer could perform a simple task like make a cup of tea? There is no problem, given the correct interface, in programming a computer to switch the kettle on and off. But when it comes to physically manipulating objects, like tipping a kettle to pour hot water into a teapot, then a mechanical arm is needed. Recently, such devices — called robot arms — have become available for home computer users. These are smaller versions of the industrial arms used by companies like British Leyland and Fiat for welding and painting work on their car assembly lines. The Colne Robotics 'Armdroid', which was probably the first robot arm suitable for use with a home computer, first appeared in 1981. Although the arm is not mobile (unless you were to mount it on a floor robot), it does allow objects to be manipulated with a remarkable degree of precision.

The main components of the robot arm, apart from the metal sections themselves, are the stepper motors that facilitate movement of the sections by precise amounts. There are six motors: one to rotate the arm at the 'waist', one each to control the 'shoulder' and 'elbow' joints, and three to control movement in the 'hand'. All these motors can be controlled very simply by a computer.

All that is needed to interface the arm to a computer is a single eight-bit parallel port. One bit determines whether information is passed to or from the robot. Three address bits are used to select the desired motor, and the other four bits control the direction and speed of movement. Clock signals are also sent to synchronise the movements of the robot arm with the computer's instructions. To speed things up and enable the arm to perform more complex manoeuvres, electronic latches are built into the circuitry that allow any combination of motors to operate simultaneously by 'holding' the instruction to one motor while the other motors are being instructed.