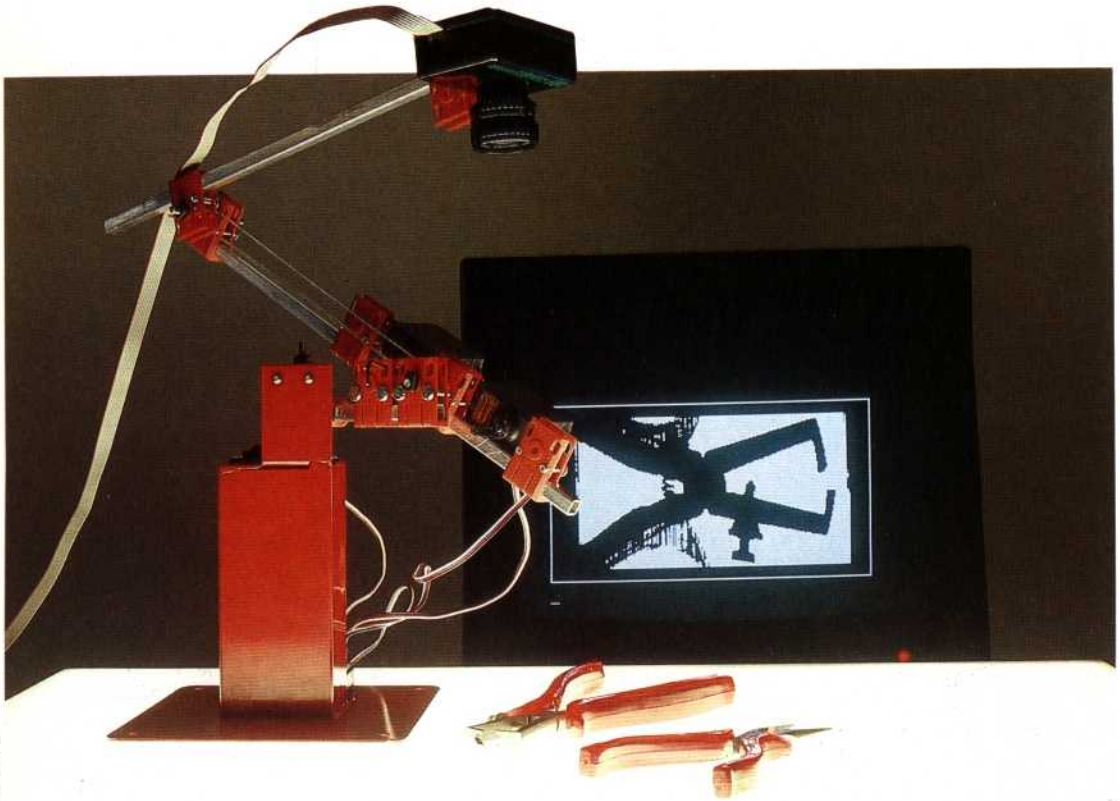
OBSTACLE COURSE



IAN McKINNELL

Building Sight
If their processors are sufficiently sophisticated, mobile robots can learn a catalogue of archetypal objects for use with shape-recognition and pattern-matching algorithms. The Beasty robotic arm here is equipped with a Snap camera, which produces a digital picture, and the Snap software, which includes an object recognition module. Once the object has been 'seen' from different viewpoints, the arm has a reasonable chance of being able to recognise it in any position

In this series we have shown how an 'unintelligent' wheeled vehicle might be made to move under the control of either a human operator or a computer, and we have looked at the ways in which a robot arm can move 'intelligently'. Now we consider what needs to be done to design a robot that moves in a truly 'intelligent' fashion.

First of all, we do not want to control the robot by using a human operator. If the operator must watch the robot and control its every move then in many applications there would be no point at all in using a robot — the person might just as well perform the task the robot carries out. This does not, of course, apply in all situations. Robots used in bomb disposal work are human-controlled, because human expertise is still needed to guide them correctly.

There is also little point in controlling a robot via a fixed sequence of instructions stored in a computer. This would result in little more than an automaton — a device that will slavishly follow the built-in sequence regardless of circumstances. Again, there are times when such a device is useful: robot arms are often considered 'intelligent', even though they carry out a pre-programmed set of actions.

However, our definition of an 'intelligent' robot was one that would bring you an early-morning cup of tea. This cannot be human-controlled, as its function is to carry out its task before a human is awake. If this tea-bringing device is programmed with a fixed sequence of instructions, problems will arise if you move your bed or leave a pile of clothes on the floor.

So our definition of intelligent movement is the ability of a robot to move around in its environment without being controlled by a human and without blindly following a fixed sequence of instructions. It should be able to travel from one point to another, avoiding any obstacle on the way.

There is a tradition in the field of artificial intelligence of using games of one kind or another to examine complex problems of this sort. Just as chess-playing programs have given considerable insights into other branches of artificial intelligence, so maze-running robots can help in the definition of truly intelligent movement. In the late 1970s, 'micromouse' contests began in the USA, and in 1980 the first such competition was held in Britain. The idea was very simple — a large maze some three metres square was constructed, and contestants had to design robot 'mice' that could find their way unaided to the centre. The maze consisted of small squares of equal size, the sides of which were sometimes open to show a