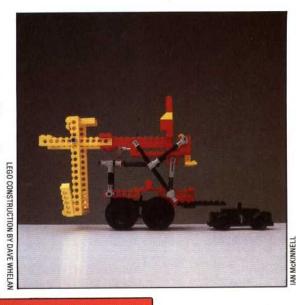
90 POKEDATREG=1:REM TURN ON 100 FORI=1TOSPEED:NEXT:REM DELAY2 110 IFA\$="D"THENSPEED=SPEED-5 120 IFAS="Z"THENSPEED=SPEED+5 130 IFAS <> "X"THEN60 140 POKEDATREG, O: REM TURN OFF

In this program the variable SPEED is used to determine the length of each delay loop. The loop code is such that as one delay increases, the other decreases and vice-versa. DELAY 1 determines the period when the motor is off and DELAY 2 the period when the motor is on. For large values of SPEED, the first delay is short and the second is long, making the motor turn more quickly. Smaller values of SPEED will produce longer periods when the motor is off during each cycle, making the motor appear to turn more slowly. The pulsing effect that the program has can be observed in the flicker of line 1's LED.

So Far, So Good

Driving wire guided toy cars around on the floor may not seem an enormous return on the effort and capital invested, but building and programming even these simple artefacts has introduced us to the reality of electronic and electromechanical construction, and demonstrated some of the problems and opportunities involved in making software interact with the real world



Exercise Answers

1) Assuming that the sensors are connected to lines 6 and 7, and the motor is connected between the positive terminals of lines 0 and 1:

18 REM BBC VERSION 3.1 20 DDR=&FESE:DATREG=&FESØ 30 7DDR#63:REM LINES 6&7 INPUT 40 forward=lireverse=2 50 7DATREG=forward SØ FORT=1T02000:NEXT:REM DELAY 70 REPEAT UNTIL (PDATREG AND192) ()192

88 ?DATREG=reverse 98 FORT=1T02000:NEXT REM DELAY 188 IF (70ATREG AND 198) (>192 THEN50 ELSE GOTO 100

10 REM CBM 64 VERSION 3.1 20 DDR=56579:DATREG=56577 30 POKEDDR, 63: REM LINES 687 INPUT 40 FW=11RV=2 50 POKE DATREG, FW 60 FOR1=1T01000:NEXT:REM DELAY 70 IF (PEEK (DATREG) AND192)=192THEN70 80 POKE DATREG,RV SØ FOR I = ITO 1000 : NEXT : REM DELAY 100 IF (PEEK (DATREG) AND 192) () 192THEN50 110 GOTO100

3) Assuming that the 40 and 70 degree sensors are connected to lines 6 and 7 respectively, and the heater is attached to line 0:

10 REM BBC VERSION 3.3 20 DDR=AFE62:DATREG=3FE60 30 PODR=63:REM LINES 647 INPUT 40 REPEAT 50 AS=INKFYS(1) 60 TOATREG=1:REM TUPN ON HEATER 70 REPEAT 38 UNITIL (7DATREG AND 192) =0:REM 70 DEG 90 POATREG=0:REM HEATER OFF 100 REFEAT UNTIL (PDATREG AND 192)=192 110 UNTIL A#()**:REM KEYPRESS 10 REM CBM 64 VERSION 3.3 20 DDR=56579:DATREG=56577 30 POKE DRR,631REM LINES 667 INPUT 40 GET AS 50 7DATREG=1:REM TURN HEATER ON 60 IF (PEEK (DATREG) AND 192) (>0 THENGO 78 POKE DATREG,0:REM HEATER OFF 80 IF (PEEK (DATREG) AND 192) (>192THEN80 80 IF AS=" "THEN40

2) Assuming that the sensor connects to line 7 and the motor connects between lines 0 and 1:

10 REM BEC VERSION 3.8 20 DDR=&FES2:DATREG=&FEB0

30 700R=127:REM LINE 7 INPUT 40 speed=30:forward=1:reverse=2

50 direction=forward

SO REPEAT

70 7DATREG=0:REM OFF

90 FORT=ITO(100-speed) INEXT

90 7DATREG=direction

100 FORI=1TOspeed:NEXT
110 UNTIL (?DATREG ANDIZ8)=0:REM SWITCH
120 FORI=1TO:1000:NEXT:REM DELAY
130 REM TEST FOR OVER PAD
140 1F(?DATREG ANDIZ8)=0THEN?DATREG=0:

END

150 REM REVERSE SLOWLY

160 speed=2:direction=reverse:GOTO60

10 REM CBM 64 VERSION 3.2

20 DDR=56579:DATREG=56577

30 POKE DOR, 127 REM LINE 7 INPUT

40 SP=30:FW=1:RV=2

50 DR=FW

60 POKE DATRES, 8: REM OFF

78 FOR 1=1TO (100-SP) : NEXT

80 POKE DATREG.DR

98 FORI=ITOSP:NEXT

100 IF (PEEK (DATREG) AND 128) () OTHENSO

110 FORT=1T01000:NEXT:REM DELAY

120 IF (PEEK (DATRES) AND 128) = 0 THENPOKE DATREG, 0: END

130 REM REVERSE BACK SLOWLY

140 SP=2:DR=RV:GOTO60

4) Assuming that the first switch is on line 6 and the second is on line 7:

18 REM REC VERSION 3.4

20 DDR=AFE62:DATREG=AFE60:DISTANCE=1

30 200R=63

40 REPEAT UNITIL (7DATREG ANDG4)=0

50 PDATREG=!

SE TIME START TIMER

78 REPEAT UNTIL (7DATRES AND 128) =0

80 PRINT"SPEED="DISTANCE/(TIME/100)

90 ?DATREG=0

10 REM CBM 64 VERSION 3.4

28 DDR=56579:DATREG=56577:DS=1

36 FOKE DDR,63

40 IF (PEEK (DATRES) AND 64) (>0 THE N40

50 POKE DATREG, 1 60 T=T1:REM START TIMER

70 IF (PEEK (DATRES) AND 128) (>0 THEN68

80 PRINT"SPEED="DS/((T1-T)/60)

90 POKE DATREG, 0