DEVICES AND COMMUNICATION BUSES FOR DEVICES NETWORK–

Lesson-8: Parallel Port Interfacing with Stepper Motor

Port Interfacing — Parallel port outputs O0 to O7

- Four outputs may be used as driver to four coils of a stepper motor

Stepper-motor rotation

- One step angle when its four coils are given the currents in a specific sequence and that sequence is altered.
- Assume that currents at an instance equal + *i*, 0, 0, 0 in four coils X, X', Y, Y'. The motor rotates by one step when the currents change to 0, + i, 0, 0.

Forward motion Sequences at the intervals of *T*

- Sequences at the intervals of *T* are changed as follows: 1000, 0100, 0010, 0001, 1000, 0100, …. [The bits in the nibble (set of 4 bits) rotate by right shift.]
- Here 1 corresponds to + i. The motor rotates *n* step angles in interval = (*n*.T).

Reverse motion Sequences at the intervals of *T*

- Sequences are changed to rotate the motor in reverse direction
- 0001, 00010, 0100, 1000, 0001, 0010, ….[The bits in the nibble (set of 4 bits) rotate by left shift.]

Half Angle Change

- Coils are given the currents in the sequences of 1100, 0110, 0011, 1001, 1100, 0110, …. or 0011, 0110, 1100, 1001, 0011, 0110, ….
- The motor rotates (n/2) steps in interval = (n.T/2). T is the period of clock pulses, which drive the motor by change of coil currents to next sequence.

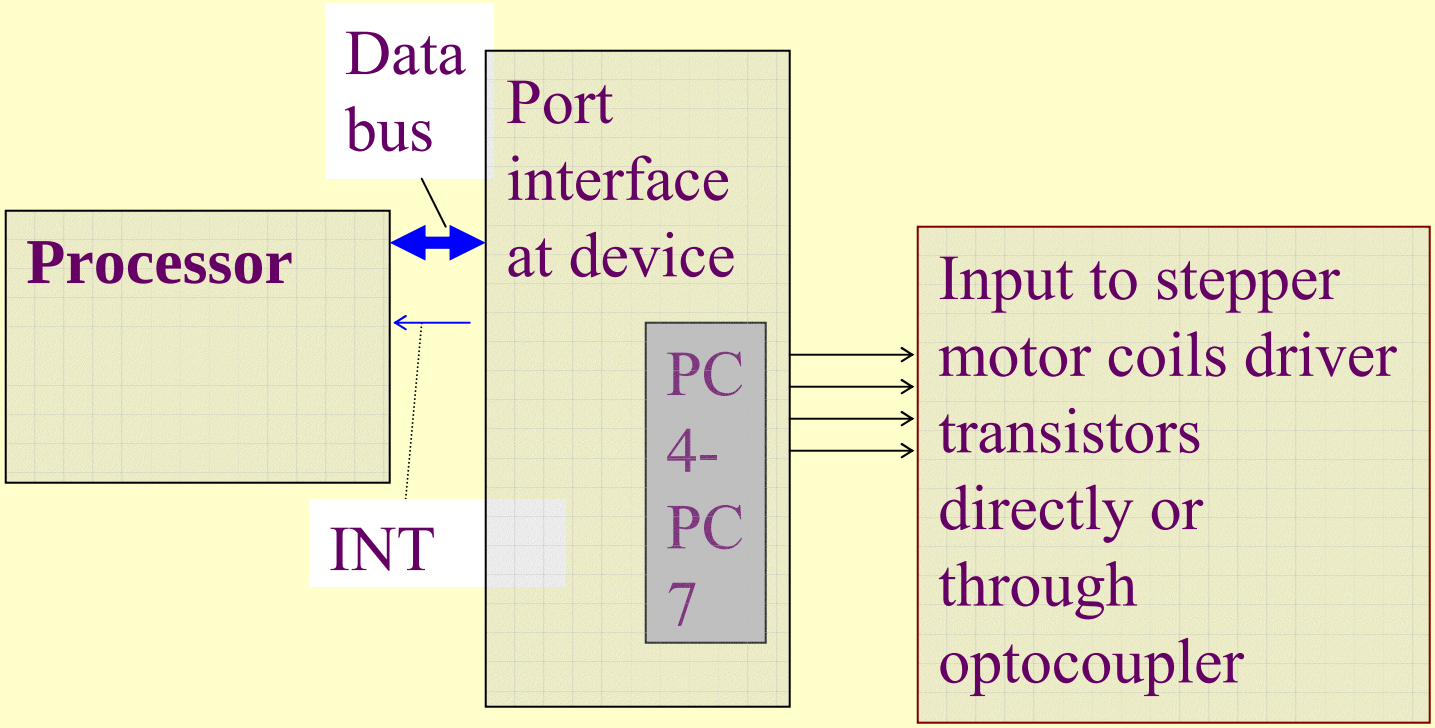
Port Interfacing

- 4 coils connect to parallel-port 4 outputs

Stepper motor driver— a processing element

- Driver is given two outputs from the port— clock pulses and rotating direction bit *r*. For example, if r = 1, the motor rotates clockwise and 0 then anti-clockwise. The motor rotates as long as clock pulses are given at the output pin.

Four-bit parallel output port C connected to a stepper motor



Summary

We learnt

- Stepper motor four coils
- Sequences of current inputs to the coils
- 1000, 0100, 0010, 0001, 1000, 0100, ….
  Full step forward
- 0001, 00010, 0100, 1000, 0001, 0010, ….
  Full step reverse
- 1100, 0110, 0011, 1001, 1100, 0110, ….
  Half step forward
- 0011, 0110, 1100, 1001, 0011, 0110, ….
  Half step reverse

End of Lesson 8 of Chapter 3