SNS COLLEGE OF TECHNOLOGY

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DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

19ECT221 – MICROPROCESSORS AND MICROCONTROLLERS

II YEAR - IV SEM

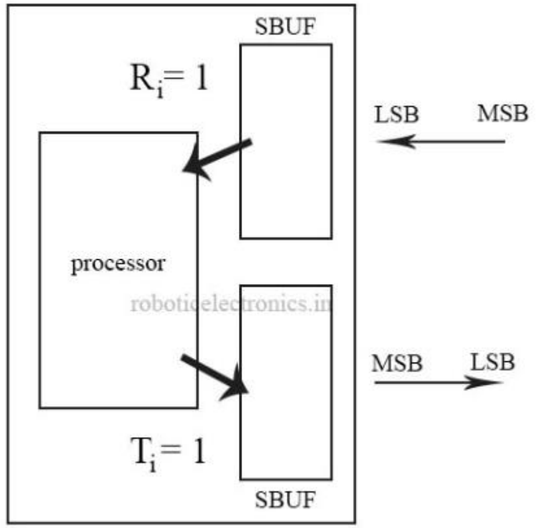
UNIT 4– INTERFACING MICROCONTROLLER

Topic- 1: Serial Port Programming of 8051

Serial Port of 8051

- The 8051 transfers and receives data serially at many different baud rates.
- Serial communications of the 8051 is established with PC through the COM port.
- The baud rate in the 8051 is programmable. This is done with the help of Timer.
- When used for serial port, the frequency of timer tick is determined by (XTAL/12)/32 and 1 bit is transmitted for each timer period (the time duration from timer start to timer expiry).

SBUF Register



TxD:

- This pin basically acts as a transmitter (sending data), but in some other modes it doesn't do the job of transmitter. As it is serial communication, it sends bit by bit, the processor gives 8-bit at 1 time and those 8-bits are stored in a register named **SBUF**.
- Timer T1 (here T1 only needs to trigger, T1 does not require its overflow flag , mode 3 in timers).
- Here we can vary the delay, so data transmission delay can be varied (frequency can be varied). It has a variable baud rate.
- There is an internal clock in 8051 (f_{osc} / 12 = 1Mhz) , where delay cannot be varied, this has fixed trigger delay. So frequency cannot be varied.It has a fixed baud rate.
- Whenever SBUF transferred 8bit of data , T_i flag becomes 1. Whenever processors go to ISR(in other interrupts the flag is auto cleared whenever processor goes to ISR) , in this the T_i flag is not auto cleared.

SCON Register

RxD

- This pin is basically for data reception . It received data bit by bit (as the transmitter sends LSB first, it received LSB first).
- There is also a register **SBUF** which stores 8 received bits. Once the 8 bits are received, instead of sending an interrupt it firstly checks for errors (errors caused due to transmission, how error is checked is discussed in upcoming tutorials).
- Once there is no error in the received information R_i flag is set and an interrupt is sent to the processor. Processor goes to ISR (here also R_i is not cleared automatically).

SCON Register

SM_0	SM_1	SM_2	REN	TB_8	RB_8	T_i	R_i

SM_0 and SM_1:

These are used to select the mode.

SM_0	SM_1	Mode
0	0	0
0	1	1
1	0	2
1	1	3

SM_2:

If SM_2 = 1, error is checked

Or else no error checking is done.

SCON Register

REN:

Receiver enable, If REN=1, receiver will receive the data or else not.

TB_8:

This is the 9th bit to be transmitted.

RB_8:

This is the 9th bit to be received.

T_i :

When 8-bits are received in SBUF , then R_i = 1, that would send an interrupt to the processor.

R_i :

When 8-bits are sent from SBUF,and SBUF is empty , then R_i = 1, that would send an interrupt to the processor. Before R_i=1, it checks for error based on SM_2.

References

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