Interfacing Keypad with 8051

Aim of the experiment:

Write a program in C to interface a hex keypad with 8051 microcontroller.

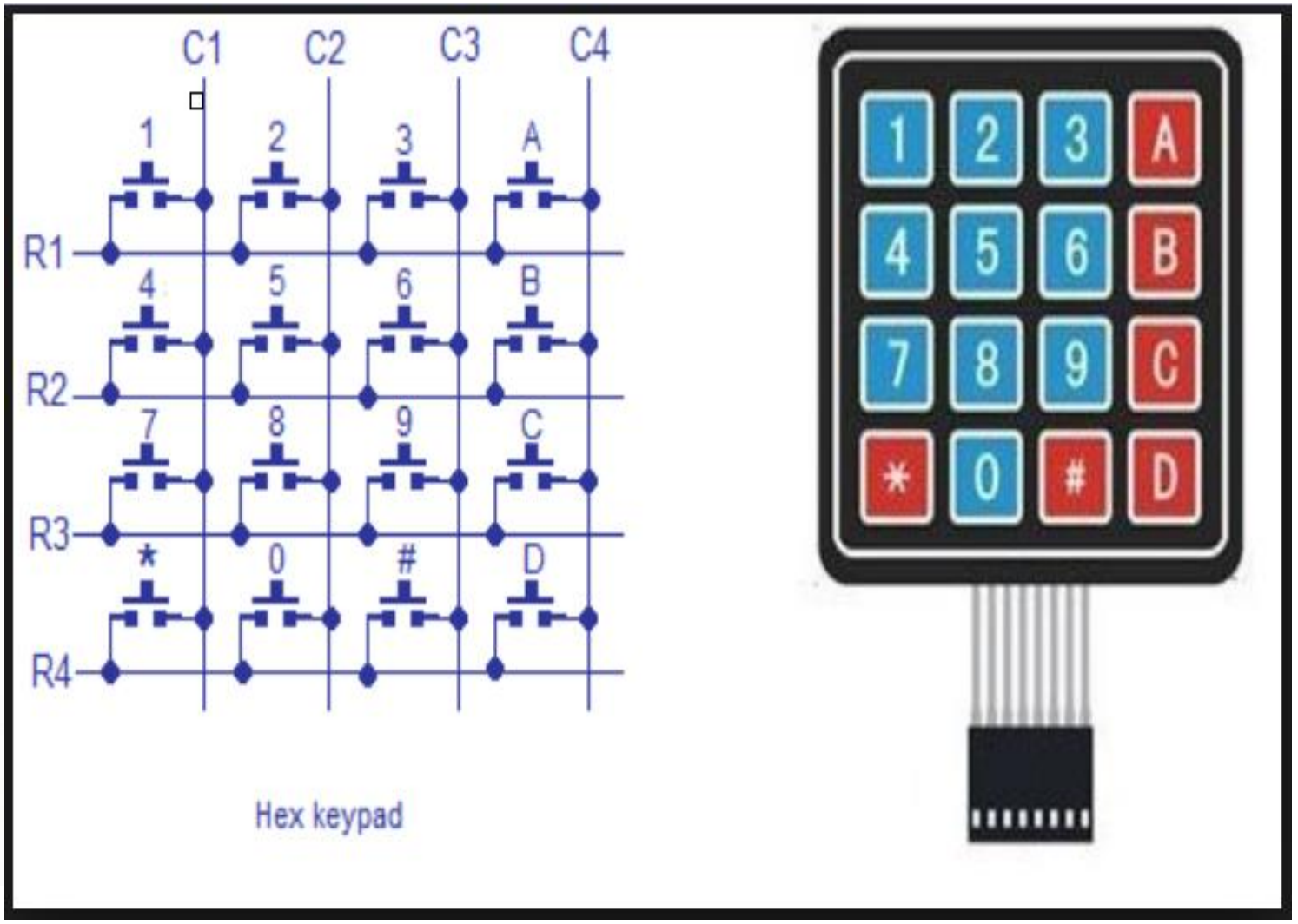
--Display the character in virtual terminal

--Display the character in 16x2 LCD. (Home work-Marks)

Outcomes:

- Logic behind the interfacing of keypad with 8051
- How does serial communication of 8051 works?

Different keypad




1
2
3
4
5
6
7
8
9
*
0
#


1
2
3
4
5
6
7
8
9
*
0
#


1 QZ
2 ABC
3 DEF
CANCEL
4 GHI
5 JKL
6 MNO
7 PRS
8 TUV
9 WXY
ENTER
0

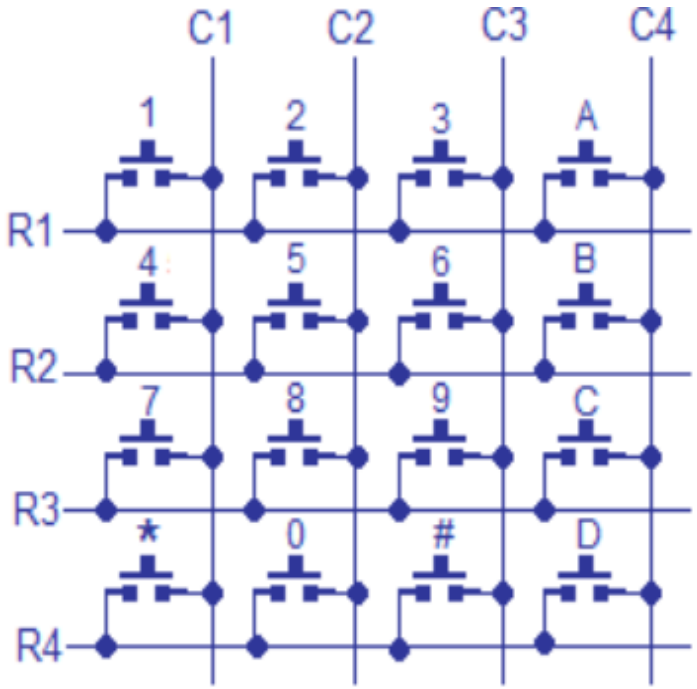

KINESIS
Tab
Back Space
Paste
Num Lock
Home
PgUp
PgDn
End
Ins
Del
Enter


esc
delete
tab
caps lock
return
shift
control
option
command
fn
home
page up
clear
end
page down
enter

Logic behind the interfacing of keypad with 8051

4x4 hex keypad


```
//////////////////////////////////// For 4th row
R1=1; R2=1; R3=1; R4=0;
if(C1==0)
{transmit('*'); delay(100);}
else if(C2==0)
{transmit('0'); delay(100);}
else if(C3==0)
{transmit('#'); delay(100);}
else if(C4==0)
{transmit('D'); delay(100);}
```

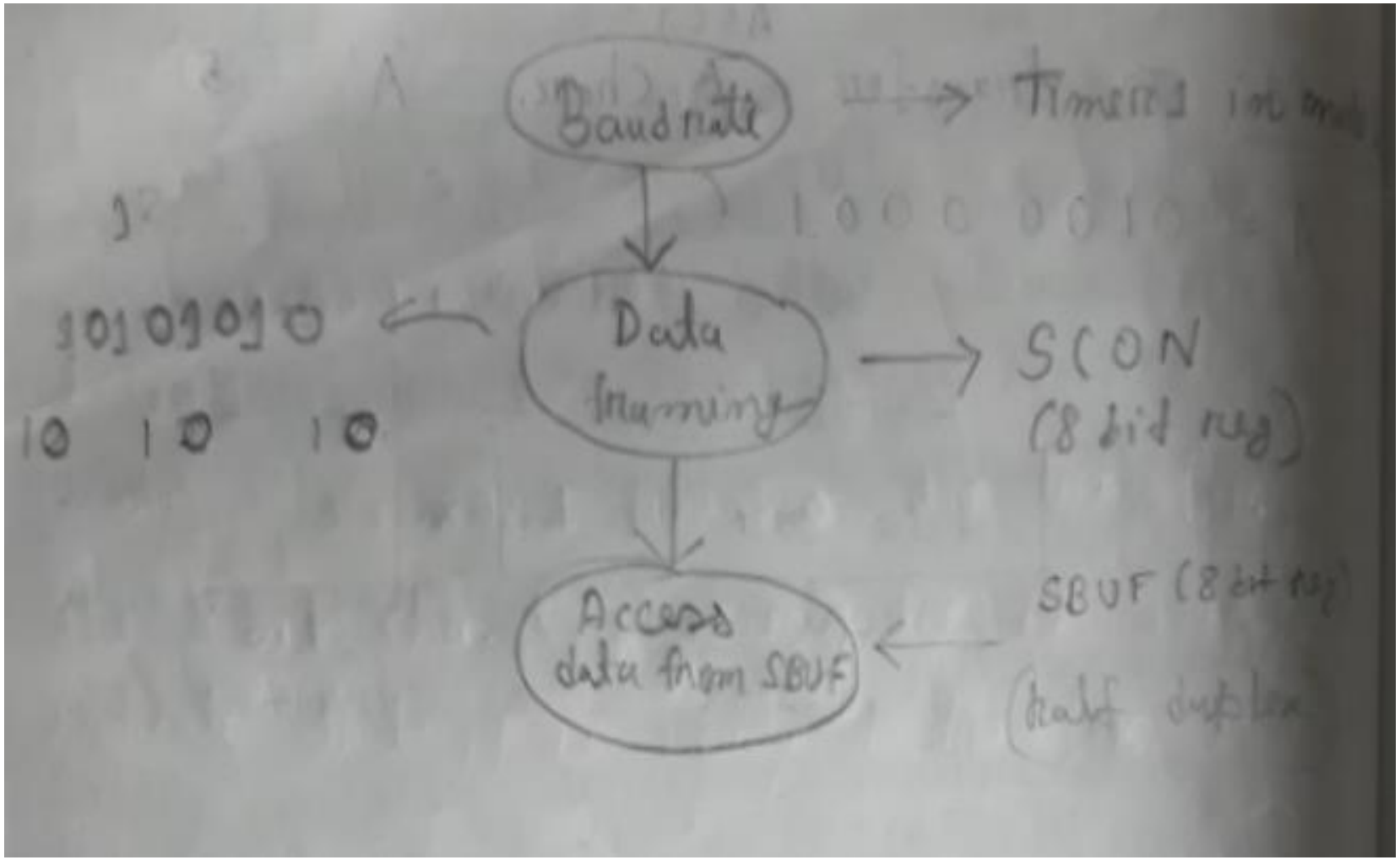


Debounce Delay

```
}
}
```

How does serial communication of 8051 works?

Serial communication



How to set the baud rate?

The 8051's serial communication UART circuitry divides the machine cycle frequency of 921.6KHz by 32 ~~once~~ one more before it is used by Timer 1 to set the baud rate.

$$\frac{921.6\,KHz}{32} = 28,800\,Hz.$$

Baud rate	TH1
9600	FD
4800	FA
2400	F4

$\frac{28800}{3} = 9600$ → FD, FE, FF, 00

$\frac{28800}{6} = 4800$

$\frac{28800}{12} = 2400$

SCON register:

D7	D6	D5	D4	D3	D2	D1	D0
SM0	SM1	SM2	REN	TB8	RB8	TI	RI
0	1	0	1	0	0	0	0

SM0/SM1: These two bits determine the framing of data by specifying the number of bits per character and the start and stop bit

SM0	SM1	
0	0	Serial mode 0
0	1	Serial mode 1, 8bit data, 1 stop bit, 1 start bit
1	0	Serial mode 2
1	1	Serial mode 3

SM2: (This bit not used, we need diff config to use this bit) This bit enables multiprocessing capability of 8051 µC [i.e µC can transmit data to two diff device at the same time or from demonstration] For our applications we will make SM2 = 0.

REN: (Receive enable)

This bit of register enables 8051 to receive or transmit data. and bin for serial communication REN = 1.

TB8 / RB8:

These two bits are used in serial mode 2 and 3. In our case we will make TB8=0, RB8=0

TI: (Transmit interrupt)

(This one is extremely important bit)

When the 8051 finishes the transfer of the 8 bit cha., it raises the TI flag to indicate that it is ready to transfer another byte (explain)

RI: (Receive interrupt)

When the 8051 finishes the receive of the 8bit cha. it raises the RI flag to indicate that it is ready to receive another byte.

SBUF register:

SBUF is an 8 bit reg. used in serial communication. When a data is transmitted (Receive / transfer) then it passes through SBUF register.

It can be accessed like any other register

eg: MOV A, SBUF

MOV R0, SBUF etc.

```
//////////////////////////////////// Function to initialize serial communication
void initialize_serial()
      {
      TMOD=0x20;  //use Timer 1, 8 bit ,auto reload
      TH1=0xFD;   //9600 baudrate
      SCON=0x50; //// To enable the Serial communication
      TR1=1;     //start timer
      TI=1;
      }
////////////////////////////////////Function to transmit data_
void transmit(unsigned char cmd)
      {
       while(TI==0);
       SBUF=cmd;
       TI=0;
      }
```

Header file

Any doubt??


thank
you