

23VLS1401: Microcontroller and Computer architecture

Lecture 3 (U6)

Keyboard Interfacing

A presentation by

Dr. Shubhangi Rathkanthiwar

Professor

Department of Electronics Engineering, YCCE, Nagpur, India

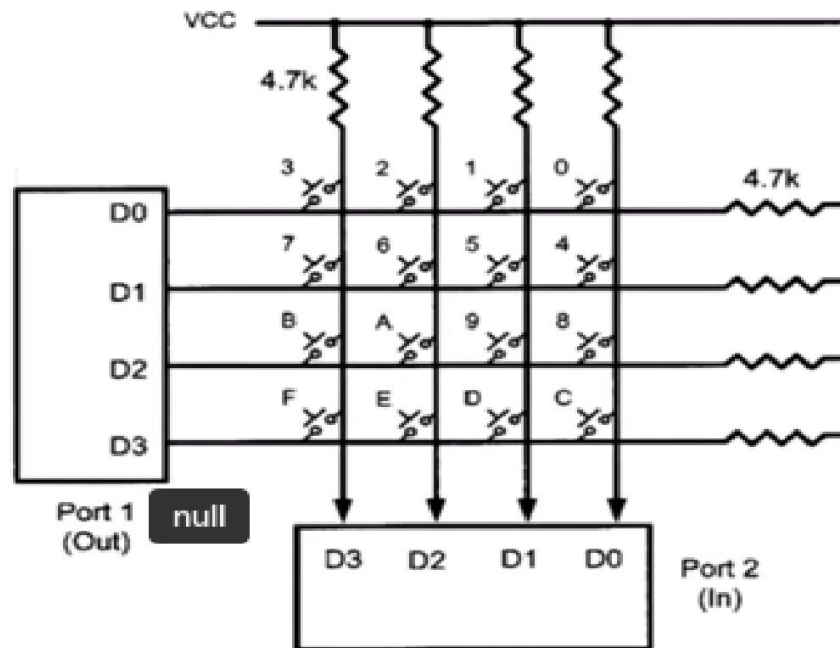


Session objective

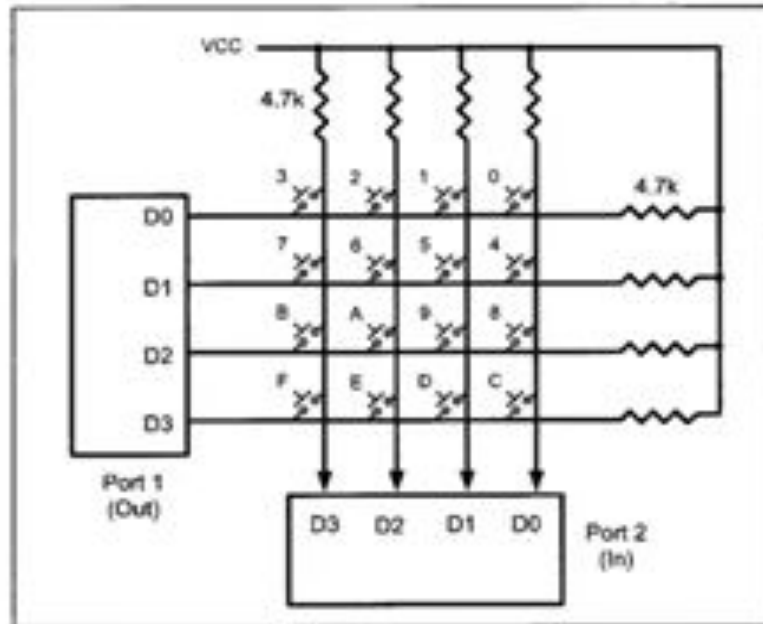
To study the basic interfacing concepts for Keyboard with 8051 Microcontroller



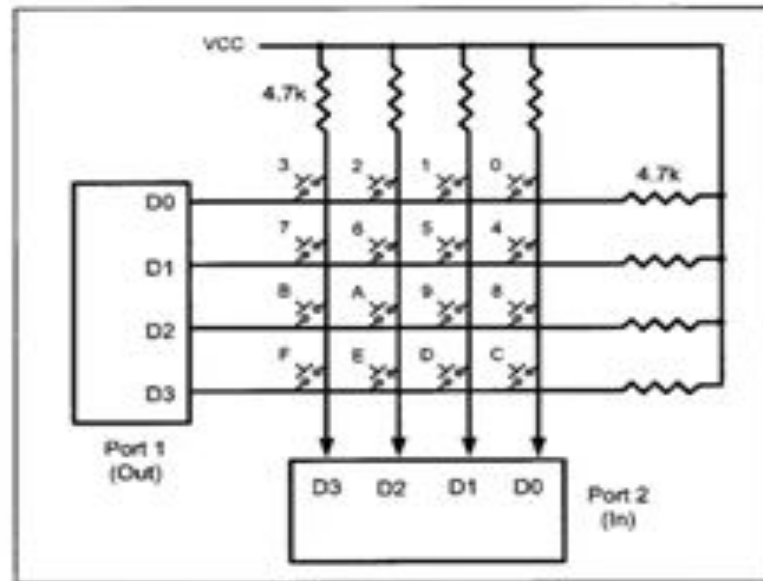
4 X 4 Keyboard interface



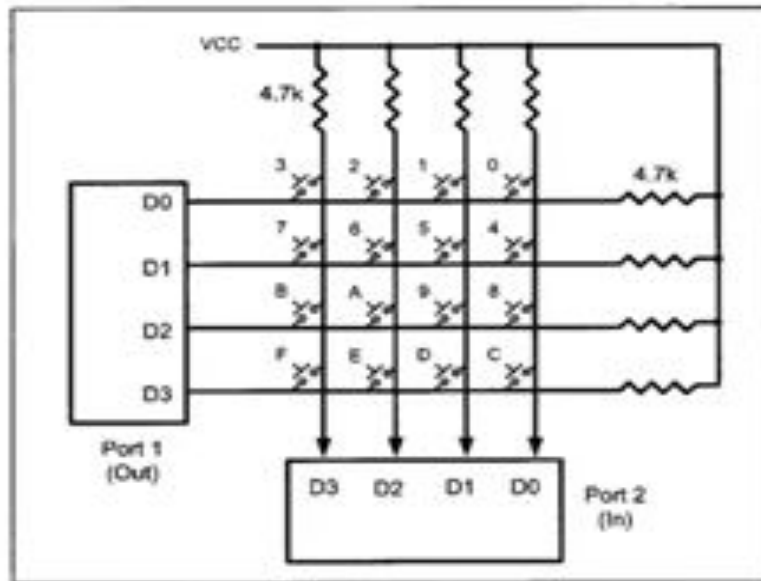
Key Release check



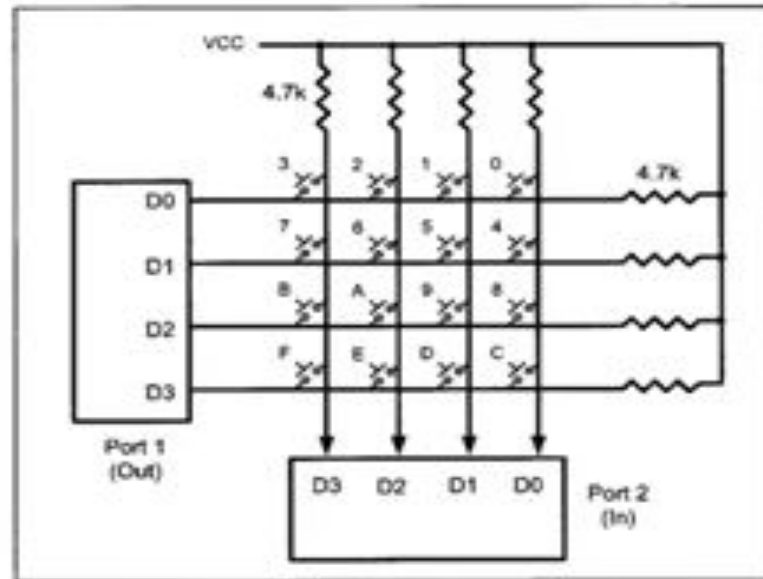
Identification of Key Press



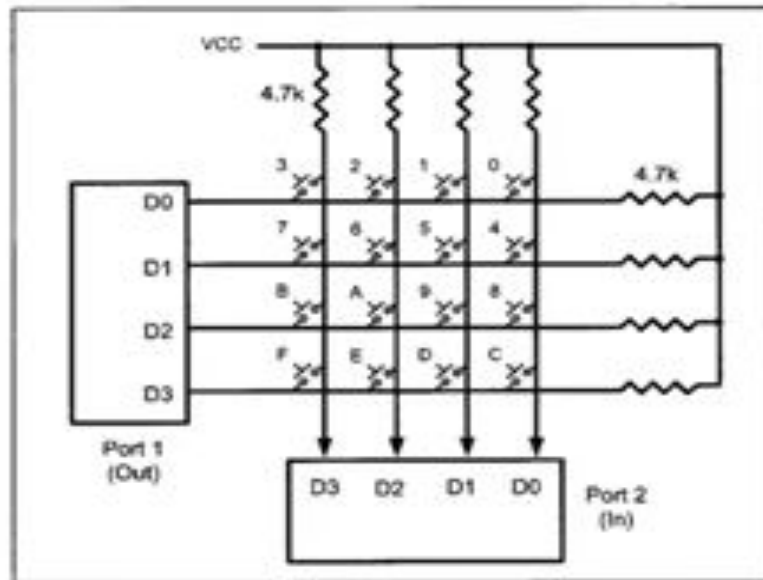
Key debounce check



Identification of row



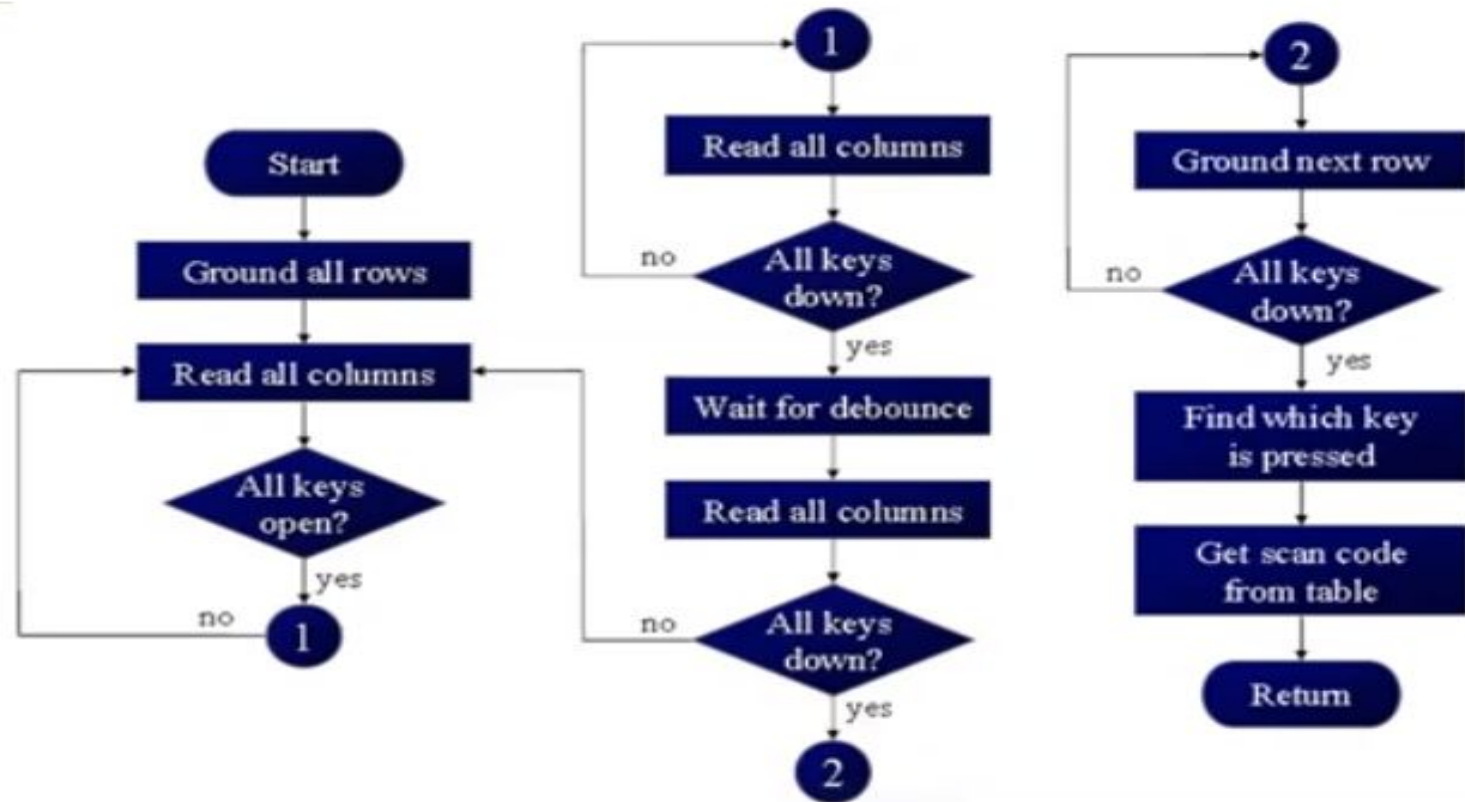
Identification of key



Look up table

```
ORG 300H  
KCODE0: DB    '0','1','2','3' ;ROW 0  
KCODE1: DB    '4','5','6','7' ;ROW 1  
KCODE2: DB    '8','9','A','B' ;ROW 2  
KCODE3: DB    'C','D','E','F' ;ROW 3
```

Flowchart for Keyboard Interface



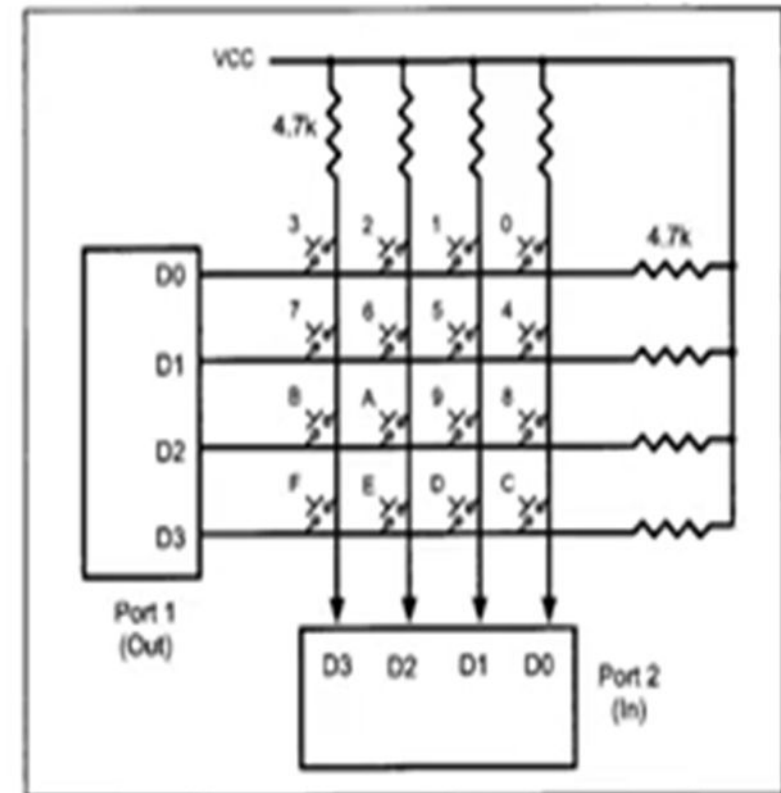
Assembly Language Program to Interface 4x4 Matrix Keyboard with 8051

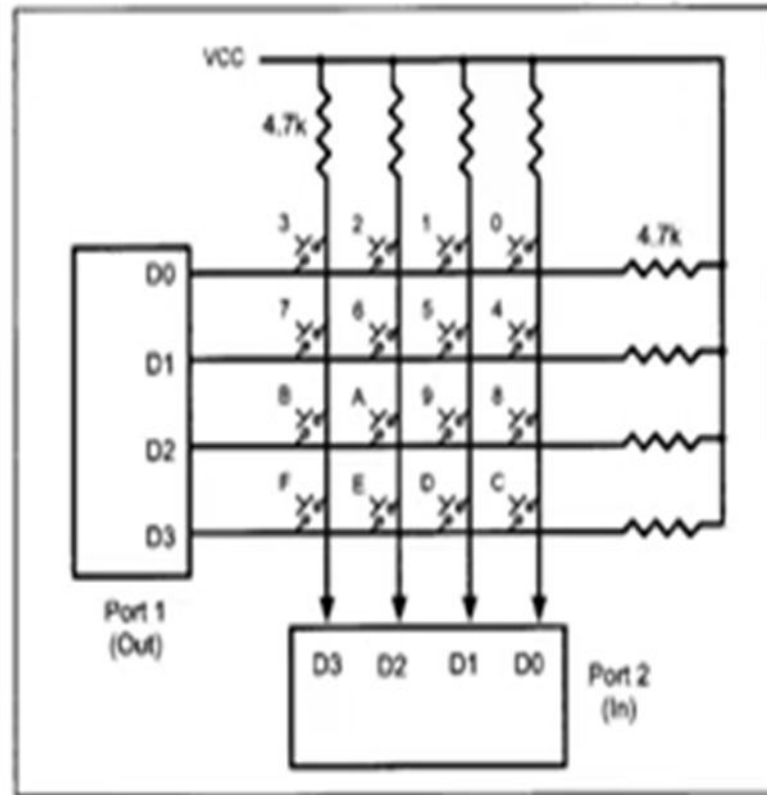
✓ MOV P2, #0FFH ;make P2 an input port
 K1: MOV P1, #00H ;ground all rows at once
 MOV A, P2 ;read all col
 ANL A, #00001111B ;masked unused bits
 CJNE A, #00001111B, K2
 SJMP K1
 K2: ACALL DELAY ;call 20 msec delay
 MOV A, P2 ;see if any key is pressed
 ✓ ANL A, #00001111B ;mask unused bits CJNE
 ✓ CJNE A, #00001111B, CheckRow ;key pressed, find row

0F
01111

H D

1010 1111
0000





CheckRow : MOV P1, #1111~~1110~~B ;ground row 0

MOV A,P2 ;read all columns

ANL A,#00001111B ;mask unused bits

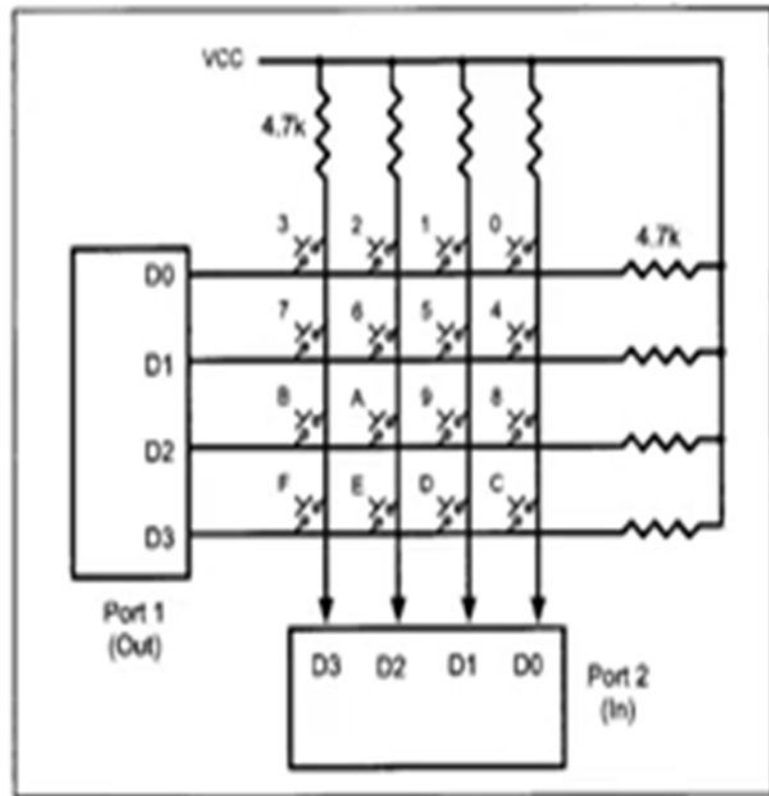
CJNE A,#00001111B,ROW_0 ;key row 0, find col.

MOV P1,#1111~~1101~~B ;ground row 1

MOV A,P2 ;read all columns

ANL A,#00001111B ;mask unused bits

CJNE A,#00001111B,ROW_1 ;key row 1, find col.



```
MOV P1,#11111011B
```

;ground row 2

```
MOV A,P2
```

;read all columns

```
ANL A,#00001111B
```

;mask unused bits

```
CJNE A,#00001111B,ROW_2
```

;key row 2, find col

```
✓MOV P1,#11110111B
```

;ground row 3

```
MOV A,P2
```

;read all columns

```
ANL A,#00001111B
```

;mask unused bits

```
CJNE A,#00001111B,ROW_3
```

;key row 3, find col

```
✓LJMP K1
```

;if none, false input, ;repeat

✓ ROW_0: MOV DPTR, #KCODE0

SJMP FIND

ROW_1: MOV DPTR, #KCODE1

SJMP FIND

ROW_2: MOV DPTR, #KCODE2

SJMP FIND

ROW_3: MOV DPTR, #KCODE3 ;set DPTR=start of row 3

SJMP FIND

;set DPTR=start of row 0

;find col. Key belongs to

;set DPTR=start of row

;find col. Key belongs to

;set DPTR=start of row 2

;find col. Key belongs to

FIND: RRC A

JNC **MATCH**

INC DPTR

SJMP **FIND**

MATCH: CLR A

MOVC A, @A+DPTR

MOV P0, A

LJMP **K1**

; see if any CY bit low

;if zero, get ASCII code

;point to next col. addr

;keep searching

MOV A, 7F 00 H

;set A=0 (match is found)

;get ASCII from table

;display pressed key

;ASCII LOOK-UP TABLE FOR EACH ROW

Write ALP to detect the key press and identify the key

K1: Checks for key release

```
MOV P2,#0FFH
MOV P1,#0
MOV A,P2
ANL A,00001111B
CJNE A,#00001111B, K1
```

K2: Detects key press

```
ACALL DELAY
MOV A,P2
ANL A,00001111B
CJNE A,#00001111B,OVER
SJMP K2
```

OVER: Debounce

```
ACALL DELAY
MOV A,P2
ANL A,00001111B
CJNE A,#00001111B, OVER1
SJMP K2
```

OVER1: Identifying the row

```
MOV P1, #11111110B
MOV A,P2
ANL A,#00001111B
CJNE A,#00001111B,ROW_0
MOV P1,#11111101B
```


Identifying the Row

```
ANL A,#00001111B
CJNE A,#00001111B,ROW_1
MOV P1,#11111011B
MOV A,P2
ANL A,#00001111B
CJNE A,#00001111B,ROW_2
MOV P1,#11111011B
MOV A,P2
ANL A,#00001111B
CJNE A,#00001111B,ROW_3
LJMP K2
```

```
ROW_0:  MOV DPTR,#KCODE0
        SJMP FIND
ROW_1:  MOV DPTR,#KCODE1
        SJMP FIND
ROW_2:  MOV DPTR,#KCODE2
        SJMP FIND
ROW_3:  MOV DPTR,#KCODE3
FIND:   RRC A
        JNC MATCH
        INC DPTR
        SJMP FIND
```

Identifying the key

```
MATCH:  CLR A
        MOVC A,@A+DPTR
        MOV P0,A
        LJMP K1
```

```
ORG 300H
KCODE0: DB '0','1','2','3' ;ROW 0
KCODE1: DB '4','5','6','7' ;ROW 1
KCODE2: DB '8','9','A','B' ;ROW 2
KCODE3: DB 'C','D','E','F' ;ROW 3
```


Thank
you