

**23VLS1401: Microcontroller and Computer architecture**  
**Lecture 3 (U6)**

# **Keyboard Interfacing**

A presentation by

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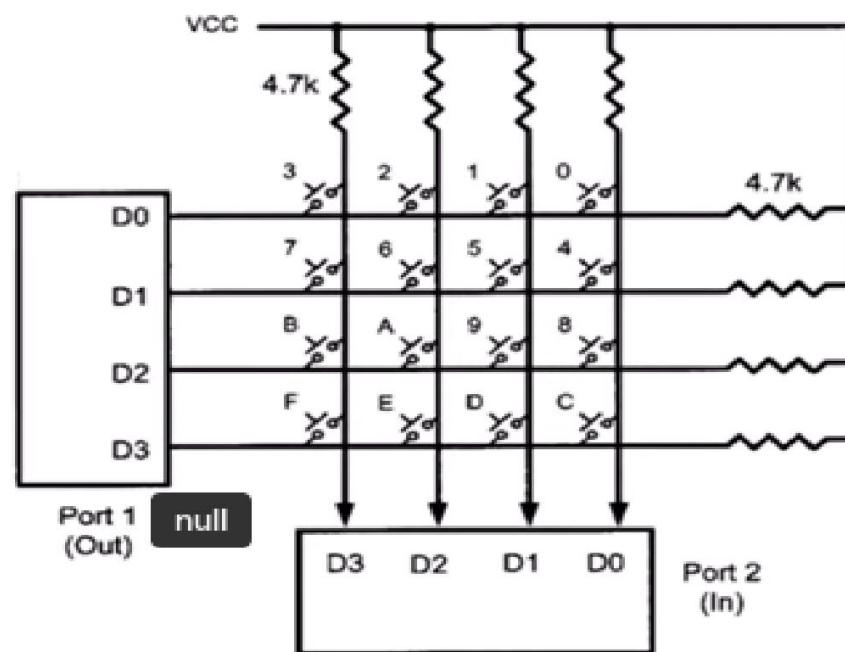
# Session objective

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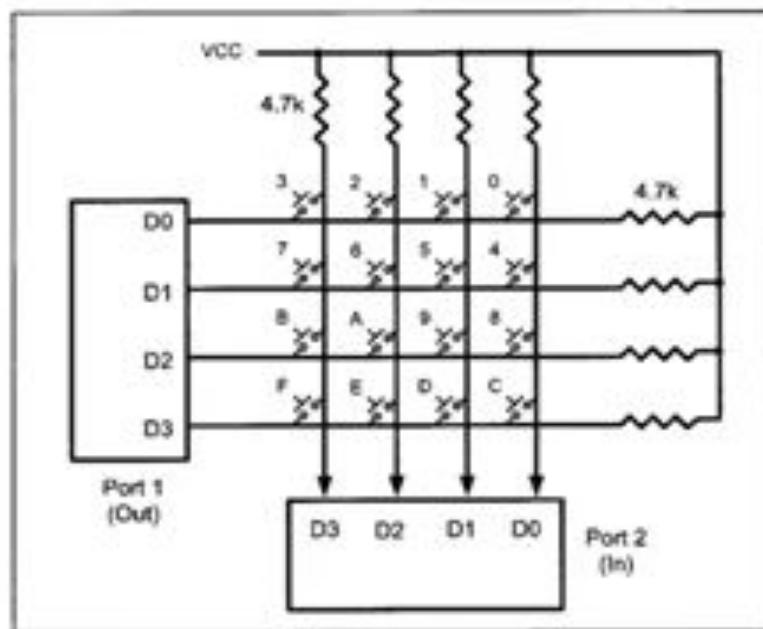
To study the basic interfacing concepts for Keyboard with 8051 Microcontroller



# 4 X 4 Keyboard interface

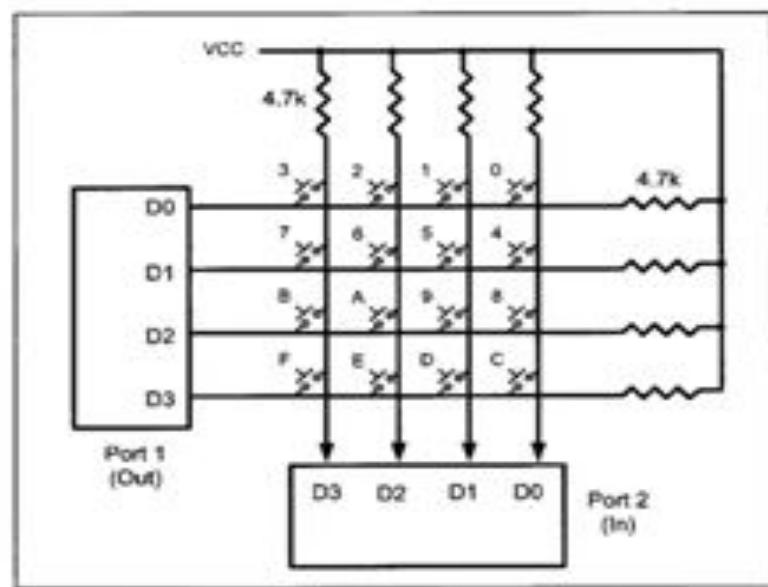


# Key Release check



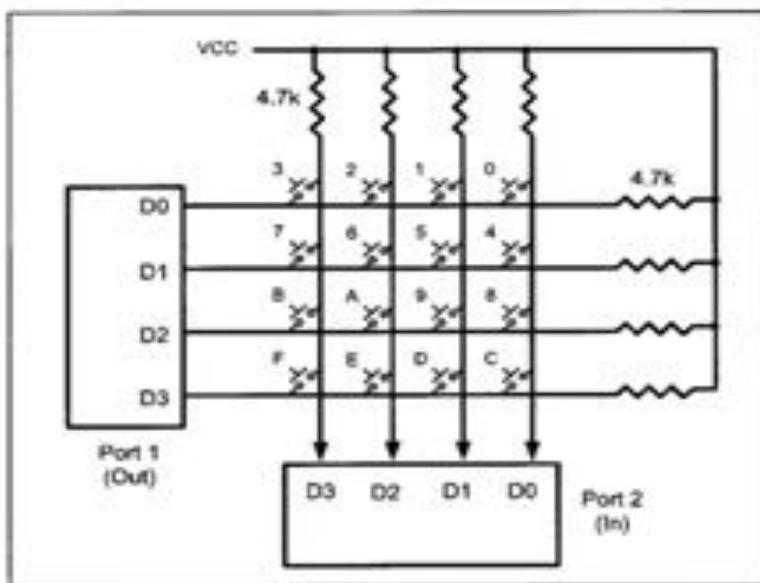
# Identification of Key Press

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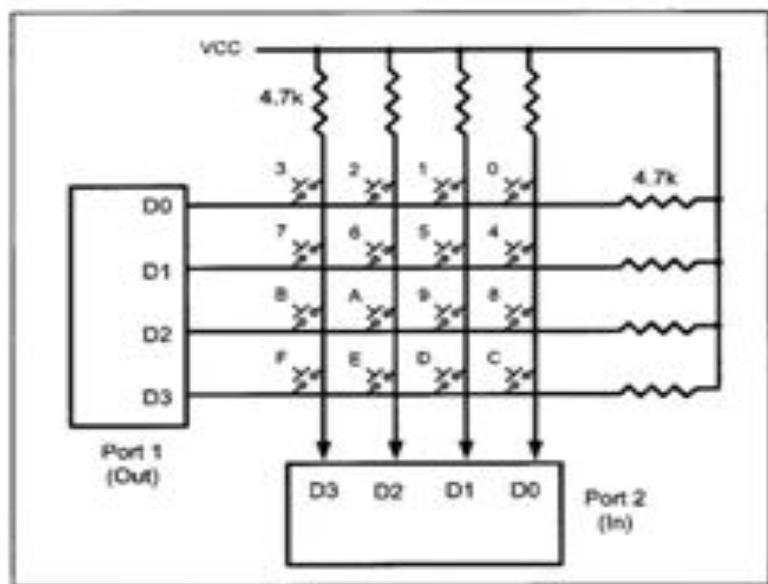


# Key debounce check

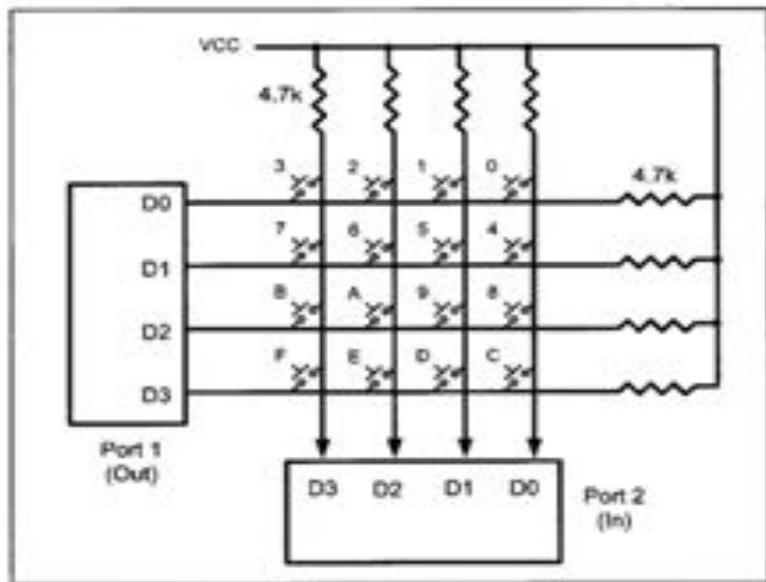
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# Identification of row



# Identification of key

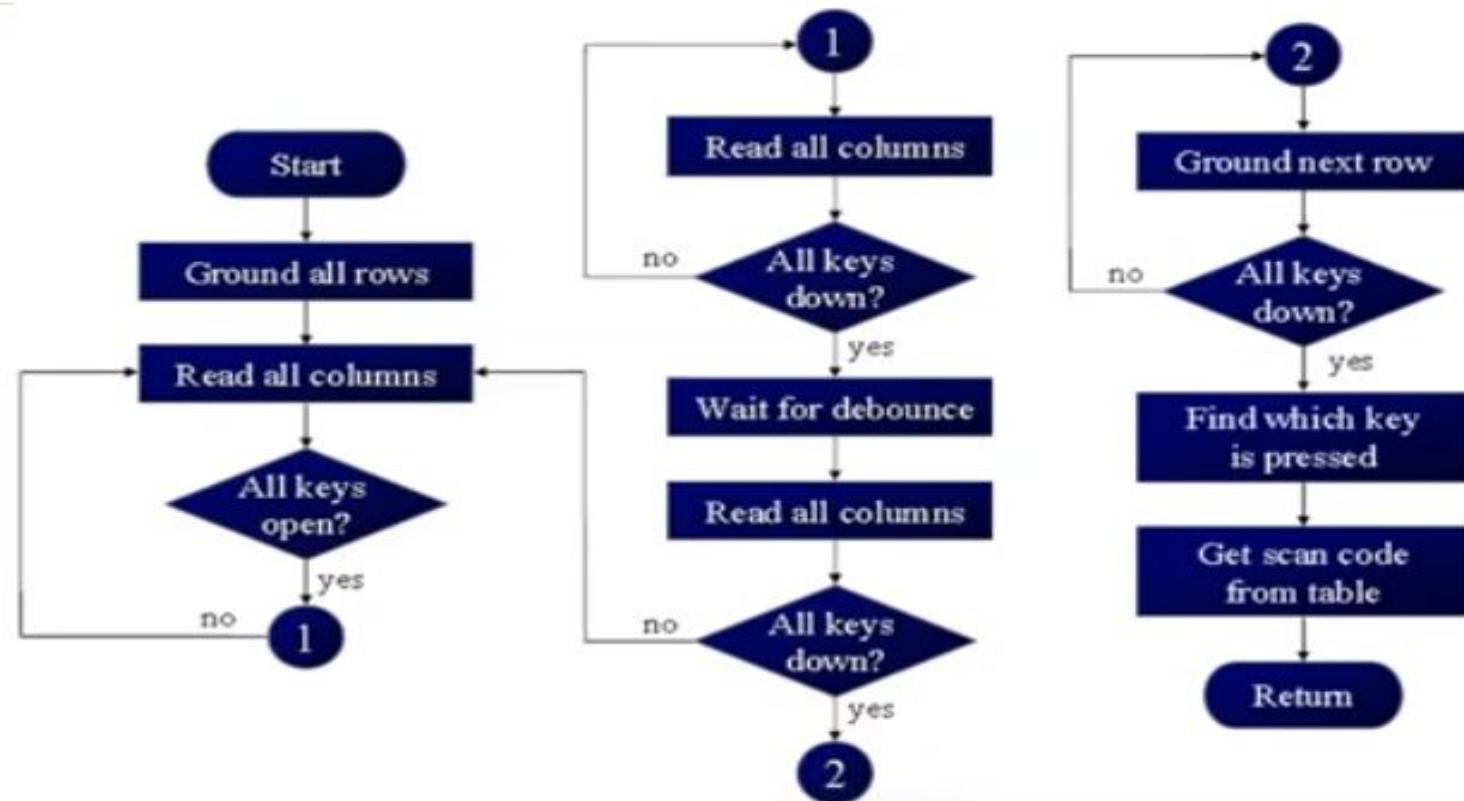


# Look up table

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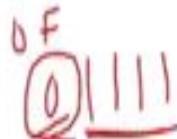
```
        ORG 300H  
KCODE0: DB    '0','1','2','3' ;ROW 0  
KCODE1: DB    '4','5','6','7' ;ROW 1  
KCODE2: DB    '8','9','A','B' ;ROW 2  
KCODE3: DB    'C','D','E','F' ;ROW 3
```

# Flowchart for Keyboard Interface



## Assembly Language Program to Interface 4x4 Matrix Keyboard with 8051

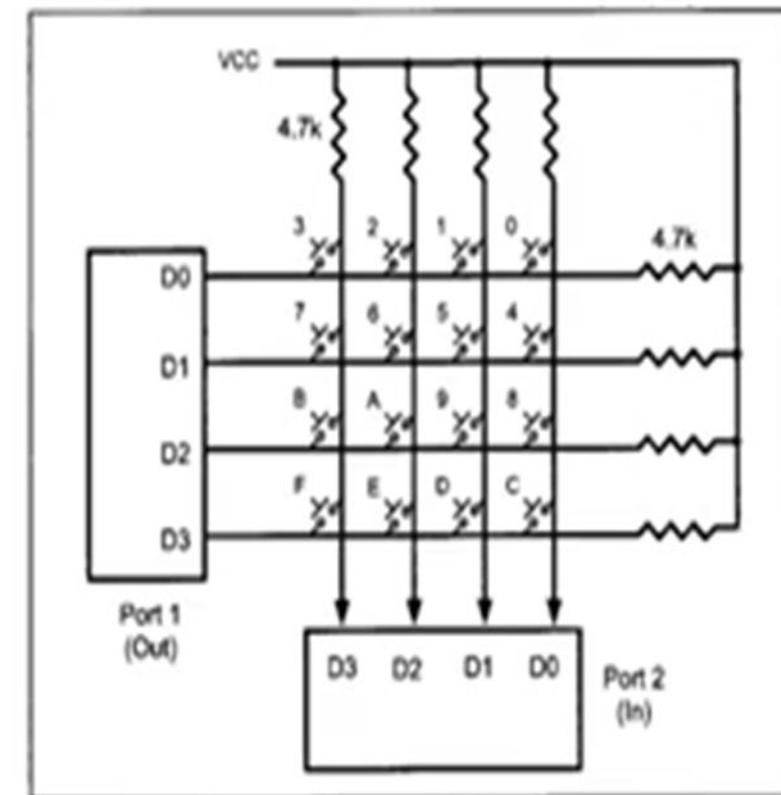
```
✓ MOV P2,#0FFH          ;make P2 an input port  
K1: MOV P1,#00H          ;ground all rows at once  
MOV A,P2                ;read all col  
ANL A,#00001111B        ;masked unused bits  
CJNE A,#00001111B,K2      ;call 20 msec delay  
SJMP K1  
K2: ACALL DELAY  
  
MOV A,P2                ;see if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

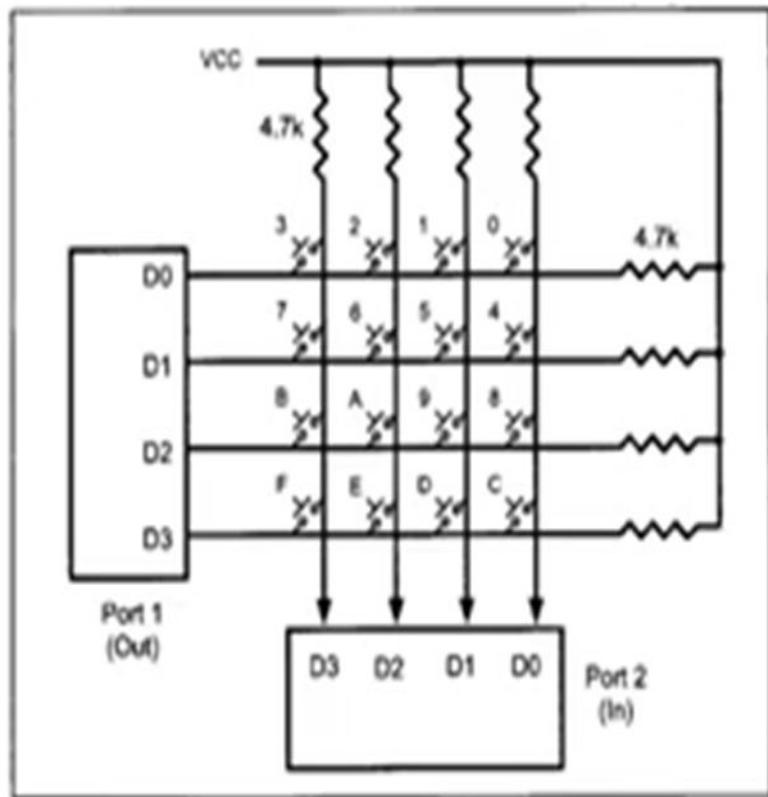


H P

1010 1111

0000



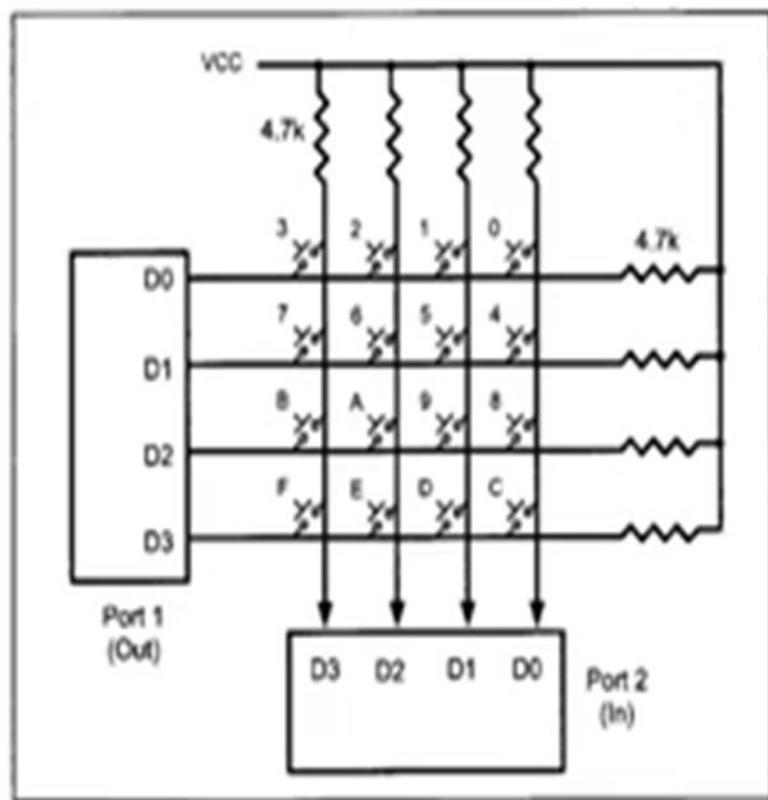


```

CheckRow : MOV P1, #11111110B ;ground row 0
MOV A,P2
ANL A,#00001111B ;read all columns
CJNE A,#00001111B,ROW_0 ;mask unused bits
;key row 0, find col.

MOV P1,#11111101B ;ground row 1
MOV A,P2
ANL A,#00001111B ;read all columns
CJNE A,#00001111B,ROW_1 ;mask unused bits
;key row 1, find col.

```



MOV P1,#1111~~1011~~<sup>B</sup>

;ground row 2

MOV A,P2

;read all columns

ANL A,#00001111B

;mask unused bits

CJNE A,#00001111B,<sup>ROW\_2</sup>

;key row 2, find col

✓ MOV P1,#1111~~0111~~<sup>B</sup>

;ground row 3

MOV A,P2

;read all columns

ANL A,#00001111B

;mask unused bits

CJNE A,#00001111B,<sup>ROW\_3</sup>

;key row 3, find col

LJMP K1

;if none, false input, ;repeat

✓ **ROW\_0:** MOV DPTR,#KCODE0  
SJMP FIND

;set DPTR=start of row 0  
;find col. Key belongs to  
;set DPTR=start of row

**ROW\_1:** MOV DPTR,#KCODE1  
SJMP FIND

;find col. Key belongs to  
;set DPTR=start of row 0

**ROW\_2:** MOV DPTR,#KCODE2  
SJMP FIND

;set DPTR=start of row 2  
;find col. Key belongs to

**ROW\_3:** MOV DPTR,#KCODE3

;set DPTR=start of row 3

SJMP FIND

**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, ~~77~~ 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

<p>K1: </p> <pre>MOV P2,#0FFH MOV P1,#0 MOV A,P2 ANL A,00001111B CJNE A,#00001111B, K1</pre>	<p>OVER: </p> <pre>ACALL DELAY MOV A,P2 ANL A,00001111B CJNE A,#00001111B, OVER1 SJMP K2</pre>
<p>K2: </p> <pre>ACALL DELAY MOV A,P2 ANL A,00001111B CJNE A,#00001111B,OVER SJMP K2</pre>	<p>OVER1: </p> <pre>MOV P1, #11111110B MOV A,P2 ANL A,#00001111B CJNE A,#00001111B,ROW_0 MOV P1,#11111101B</pre>

### Identifying the Row

```
ANL A,#00001111B  
CJNE A,#00001111B,ROW_1  
MOV P1,#11110111B  
MOV A,P2  
ANL A,#00001111B  
CJNE A,#00001111B,ROW_2  
MOV P1,#11110111B  
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