

Car Parking assistance:

Students:

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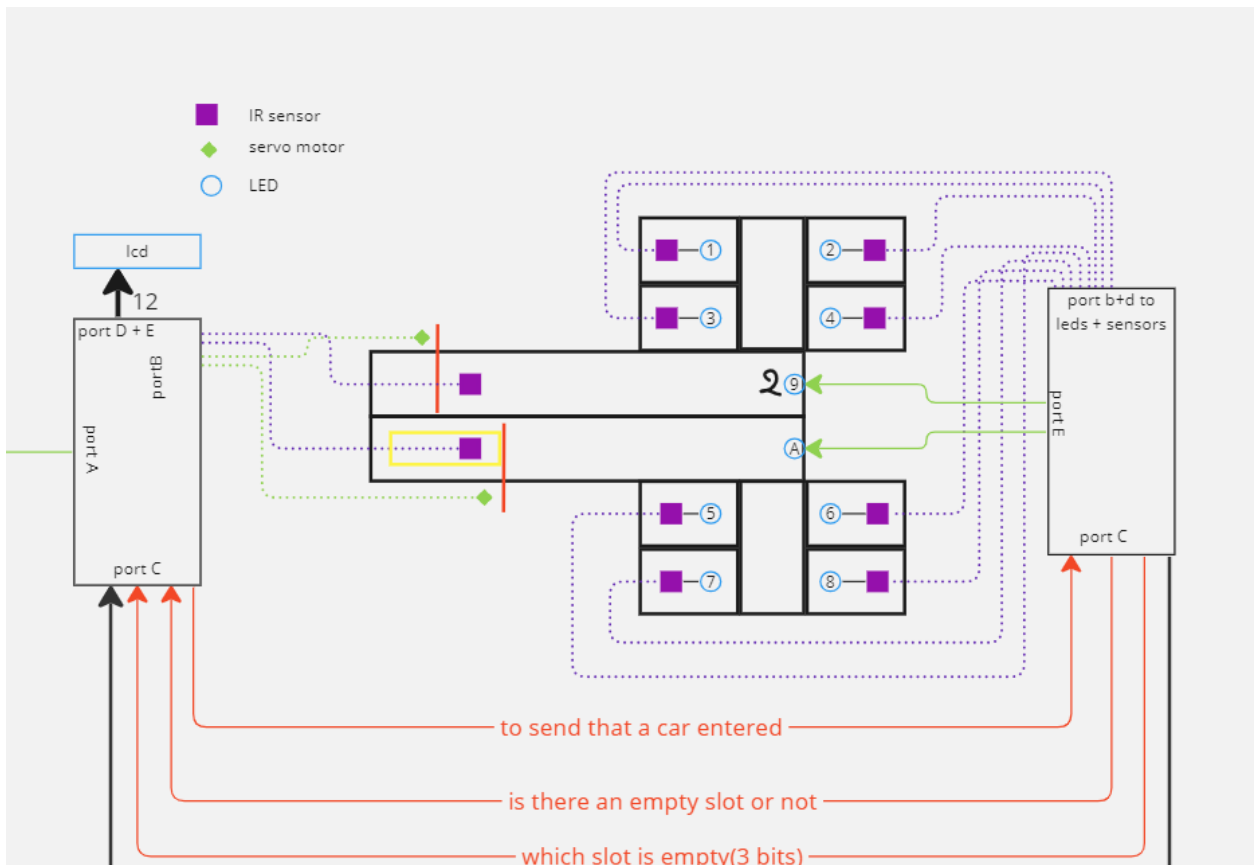
Abed Al Rida Nehme

Objective:

Our project's objective was to make a parking system that offers the following features:

- Entrance and exit barriers equipped with IR sensors for car detection.
- A lcd to communicate with the entering car.
- 2 parking area each with 4 parking slots each equipped with an IR sensor to check availability.
- Guiding LEDs to help the entering car reach the nearest free parking slot.

Sketch of connection:



Code:

First PIC:

```
INCLUDE "P16F877A.INC"
```

```
__CONFIG _CP_OFF & _WDT_OFF & _PWRTE_OFF & _BODEN_OFF & _LVP_OFF & _HS_OSC
```

```
REGB EQU 0X20
```

```
REG1 EQU 0X21
```

```
REG2 EQU 0X22
```

```
REG3 EQU 0X23
```

```
ORG 0X00
```

```

CONF1    BSF        STATUS,RP0

          MOVLW      H'EF'

          MOVWF      TRISC

          MOVLW      H'00'

          MOVWF      TRISD

          MOVLW H'02' ; PORTA ANALOG ; PORTE DIGITAL

          MOVWF ADCON1 ;

          MOVLW H'00' ; PORTE OUTPUT

          MOVWF TRISE

          MOVLW      B'00111111'

          MOVWF      TRISB

          BCF        STATUS,RP0

```

```

INIT     CLRF  PORTB

          CLRF  PORTC

          CLRF  PORTD

          CLRF  PORTE

          CALL  CONFILCD

```

```

CALL     DELAY2S

MAIN     MOVLW      H'01'

          CALL  COMMAND

          BTFSS PORTB,5

          GOTO  CAREXIT

          BTFSC PORTB,4

          GOTO  MAIN

          BSF   PORTC,RC4

          CALL  WAIT

```

```
BTFSC PORTC,3
GOTO CARENTER
CALL  NOSPACE
GOTO  MAIN
```

```
CARENTER      CALL  HELLO
               CALL  OPEN_BARRIER
               CALL  WAIT2
               CALL  DELAY3S
               CALL  CLOSE_BARRIER
               GOTO  MAIN
```

```
CAREXIT       CALL  OPEN_BARRIERX
               CALL  WAIT3
               CALL  CAROUT
               CALL  DELAY3S
               CALL  CLOSE_BARRIERX
               GOTO  MAIN
```

```
OPEN_BARRIER MOVLW      D'40'
               MOVWF      REGB
               BSF         PORTB,6
               CALL  DELAY1MS
               BCF         PORTB,6
               CALL  DELAY2MS
               DECFSZ      REGB
               GOTO  $-5
               RETURN
```

```
CLOSE_BARRIER  MOVLW      D'40'
                  MOVWF      REGB
                  BSF         PORTB,6
                  CALL  DELAY2MS
                  BCF         PORTB,6
                  CALL  DELAY1MS
                  DECFSZ      REGB
                  GOTO  $-5
                  RETURN
```

```
OPEN_BARRIERX  MOVLW      D'40'
                  MOVWF      REGB
                  BSF         PORTB,7
                  CALL  DELAY1MS
                  BCF         PORTB,7
                  CALL  DELAY2MS
                  DECFSZ      REGB
                  GOTO  $-5
                  RETURN
```

```
CLOSE_BARRIERX  MOVLW      D'40'
                  MOVWF      REGB
                  BSF         PORTB,7
                  CALL  DELAY2MS
                  BCF         PORTB,7
                  CALL  DELAY1MS
                  DECFSZ      REGB
                  GOTO  $-5
                  RETURN
```

```
HELLO    MOVLW      H'01'
          CALL  COMMAND
          MOVLW      H'85'
          CALL  COMMAND
          MOVLW      A'H'
          CALL  CHAR
          MOVLW      A'E'
          CALL  CHAR
          MOVLW      A'L'
          CALL  CHAR
          MOVLW      A'L'
          CALL  CHAR
          MOVLW      A'O'
          CALL  CHAR
          MOVLW      H'C1'
          CALL  COMMAND
          MOVLW      A'P'
          CALL  CHAR
          MOVLW      A'a'
          CALL  CHAR
          MOVLW      A'r'
          CALL  CHAR
          MOVLW      A'k'
          CALL  CHAR
          MOVLW      A' '
          CALL  CHAR
```

```
MOVLW      A'S'
CALL  CHAR
MOVLW      A'I'
CALL  CHAR
MOVLW      A'o'
CALL  CHAR
MOVLW      A't'
CALL  CHAR
MOVF  PORTC,W
ANDLW      H'07'
CALL  TABLE
CALL  CHAR
RETURN
```

```
NOSPACE MOVLW      H'01'
CALL  COMMAND
MOVLW      H'87'
CALL  COMMAND
MOVLW      A'N'
CALL  CHAR
MOVLW      A'O'
CALL  CHAR
MOVLW      H'C5'
CALL  COMMAND
MOVLW      A'S'
CALL  CHAR
MOVLW      A'P'
CALL  CHAR
MOVLW      A'A'
CALL  CHAR
```

```
MOVLW      A'C'  
CALL  CHAR  
MOVLW      A'E'  
CALL  CHAR  
RETURN
```

```
NOSPACE MOVLW      H'01'  
CALL  COMMAND  
MOVLW      H'87'  
CALL  COMMAND  
MOVLW      A'N'  
CALL  CHAR  
MOVLW      A'O'  
CALL  CHAR  
MOVLW      H'C5'  
CALL  COMMAND  
MOVLW      A'S'  
CALL  CHAR  
MOVLW      A'P'  
CALL  CHAR  
MOVLW      A'A'  
CALL  CHAR  
MOVLW      A'C'  
CALL  CHAR  
MOVLW      A'E'  
CALL  CHAR  
RETURN
```

```
CAROUT  MOVLW      H'01'
```



```
CALL  COMMAND
MOVLW      H'84'
CALL  COMMAND
MOVLW      A'C'
CALL  CHAR
MOVLW      A'A'
CALL  CHAR
MOVLW      A'R'
CALL  CHAR
MOVLW      A''
CALL  CHAR
MOVLW      A'O'
CALL  CHAR
MOVLW      A'U'
CALL  CHAR
MOVLW      A'T'
CALL  CHAR
RETURN
```

```
MOVE      MOVLW      H'01'
          CALL  COMMAND
          MOVLW      H'86'
          CALL  COMMAND
          MOVLW      A'M'
          CALL  CHAR
          MOVLW      A'O'
          CALL  CHAR
          MOVLW      A'V'
          CALL  CHAR
```

```
    MOVLW    A'E'  
    CALL    CHAR  
    RETURN
```

```
DELAY1MS MOVLW    D'05'  
        MOVWF    REG1  
        MOVLW    D'66'  
        MOVWF    REG2  
        DECFSZ   REG2  
        GOTO    $-1  
        DECFSZ   REG1  
        GOTO    $-5  
        RETURN
```

```
DELAY2MS MOVLW    D'05'  
        MOVWF    REG1  
        MOVLW    D'133'  
        MOVWF    REG2  
        DECFSZ   REG2  
        GOTO    $-1  
        DECFSZ   REG1  
        GOTO    $-5  
        RETURN
```

```
DELAY3MS MOVLW D'1'  
        MOVWF REG3  
        MOVLW D'6'  
        MOVWF REG2  
        MOVLW D'166'
```

```
        MOVWF REG1
    DECFSZ REG1,F
        GOTO $-1
    DECFSZ REG2,F
        GOTO $-5
    DECFSZ REG3,F
        GOTO $-9
    RETURN
```

```
DELAY20MS    MOVLW D'1'
              MOVWF REG3
              MOVLW D'25'
              MOVWF REG2
              MOVLW D'255'
              MOVWF REG1
              DECFSZ REG1,F
                  GOTO $-1
              DECFSZ REG2,F
                  GOTO $-5
              DECFSZ REG3,F
                  GOTO $-9
              RETURN
```

```
DELAY2S    MOVLW    D'10'
            MOVWF    REG3
            MOVLW    D'255'
            MOVWF    REG2
            MOVLW    D'255'
            MOVWF    REG1
```

DECFSZ REG1

GOTO \$-1

DECFSZ REG2

GOTO \$-5

DECFSZ REG3

GOTO \$-9

RETURN

DELAY3S MOVLW D'15'

MOVWF REG3

MOVLW D'255'

MOVWF REG2

MOVLW D'255'

MOVWF REG1

DECFSZ REG1

GOTO \$-1

DECFSZ REG2

GOTO \$-5

DECFSZ REG3

GOTO \$-9

RETURN

TABLE ADDWF PCL,F

RETLW A'1'

RETLW A'2'

RETLW A'3'

RETLW A'4'

RETLW A'5'

RETLW A'6'

RETLW A'7'

RETLW A'8'

TABLE2 ADDWF PCL,F

RETLW A'A'

RETLW A'A'

RETLW A'A'

RETLW A'A'

RETLW A'B'

RETLW A'B'

RETLW A'B'

RETLW A'B'

WAIT BTFSS PORTC,5

 GOTO WAIT

 BCF PORTC,4

 RETURN

COMMAND BCF PORTE,2 ; command mode

 BCF PORTE,0 ;E=0

 MOVWF PORTD ;BYTE TO BE SENT

 NOP ; 1 MICROSECOND DELAY

 BSF PORTE,0 ; E = 1

 NOP ; PULSE DELAY

 BCF PORTE,0 ; FALLING WITH THE E

 CALL DELAY3MS ; TIME OF EXECUTION

 RETURN

CHAR BSF PORTE,2 ; CHAR MODE

BCF PORTE,0

MOVWF PORTD

NOP

BSF PORTE,0

NOP

BCF PORTE,0

CALL DELAY3MS

RETURN

CONFILCD CALL DELAY20MS; WARMING UP

MOVLW H'3C'

CALL COMMAND

MOVLW H'0C'

CALL COMMAND

MOVLW H'06'

CALL COMMAND

MOVLW H'01' ; CLEAR SCREEN

CALL COMMAND

RETURN

WAIT2 BTFSS PORTB,4

GOTO WAIT2

RETURN

WAIT3 BTFSS PORTB,5

GOTO WAIT3

RETURN

END

Second PIC:

INCLUDE "P16F877A.INC"

__CONFIG __CP_OFF & __WDT_OFF & __PWRTE_OFF & __BODEN_OFF & __LVP_OFF & __HS_OSC

TEMP EQU 0X20

TEMPB EQU 0X22

COUNTER EQU 0X21

REG1 EQU 0X23

REG2 EQU 0X24

REG3 EQU 0X25

SLOT EQU 0X26

ORG 0X00

CONFI BSF STATUS,RP0

MOVLW H'FF'

MOVWF TRISB

MOVLW H'00'

MOVWF TRISD

MOVLW H'02' ; PORTA ANALOG ; PORTE DIGITAL

MOVWF ADCON1 ;

MOVLW H'00' ; PORTE OUTPUT

MOVWF TRISE

MOVLW H'D0'

MOVWF TRISC

BCF STATUS,RP0

INIT	CLRF PORTD
	CLRF PORTE
	CLRF PORTC
	CLRF COUNTER
MAIN	BTFSC PORTC,4
	GOTO CHECK
	GOTO MAIN
CHECK	BSF PORTE,0
	MOVF PORTB,W
	MOVWF TEMP
	SUBLWH'00'
	BTFSC STATUS,Z
	GOTO NOTFOUND
	LOOP1 BTFSC TEMP,0
	GOTO FOUND
	RRF TEMP,F
	INCF COUNTER,F
	GOTO LOOP1
NOTFOUND	BCF PORTC,3
	BSF PORTC,5
	CLRF PORTD
	GOTO MAIN
FOUND	
	MOVF COUNTER,W


```
MOVWF     SLOT
SUBLWH'00'
BTFSC STATUS,Z
GOTO  SLOT1
GOTO  SLOTX
```

```
SLOT1 MOVLW     H'01'
MOVWF     PORTD
MOVWF     PORTC
GOTO  GUIDE
```

```
SLOTX MOVLW     H'01'
MOVWF     TEMP
DECF  COUNTER,F
MOVF  COUNTER,W
LOOP2 BCF      STATUS,C
RLF      TEMP,F
MOVF  COUNTER,W
SUBLWH'00'
BTFSC STATUS,Z
GOTO  PUTIND
DECF  COUNTER,F
GOTO  LOOP2
```

```
PUTIND  MOVF  TEMP,W
MOVWF     PORTD
MOVLW     H'F8'
ANDWF     PORTC,W
IORWF SLOT,W
```

```
MOVWF    PORTC
GOTO  GUIDE
```

```
GUIDE MOVF PORTD,W
      ANDLW    B'11110000'
      SUBLW    H'00'
      BTFSC    STATUS,Z
      BSF      PORTE,2
      BTFSS    STATUS,Z
      BSF      PORTE,1
      BSF      PORTC,3
      BSF      PORTC,5
```

```
WAIT  MOVF PORTB,W
      MOVWF    TEMPB
LOOPB MOVF TEMPB,W
      SUBWF    PORTB,W
      BTFSS    STATUS,Z
      GOTO     OFF
      GOTO     LOOPB
CSIGNAL BSF      PORTC,0
```

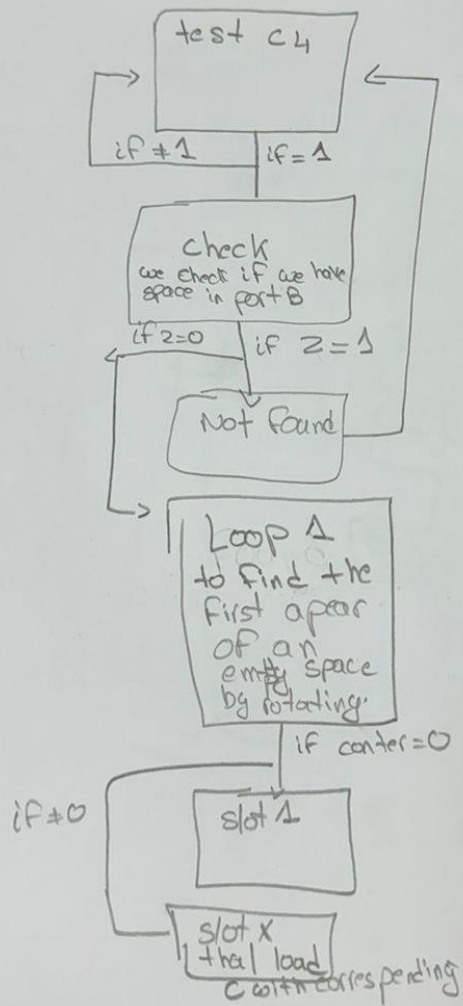
```
OFF      MOVF PORTB,W
      ADDWF    PORTD,W
      BTFSC    STATUS,Z
      GOTO     OFF
      CLRF     PORTD
      CLRF     PORTE
```

GOTO MAIN

END

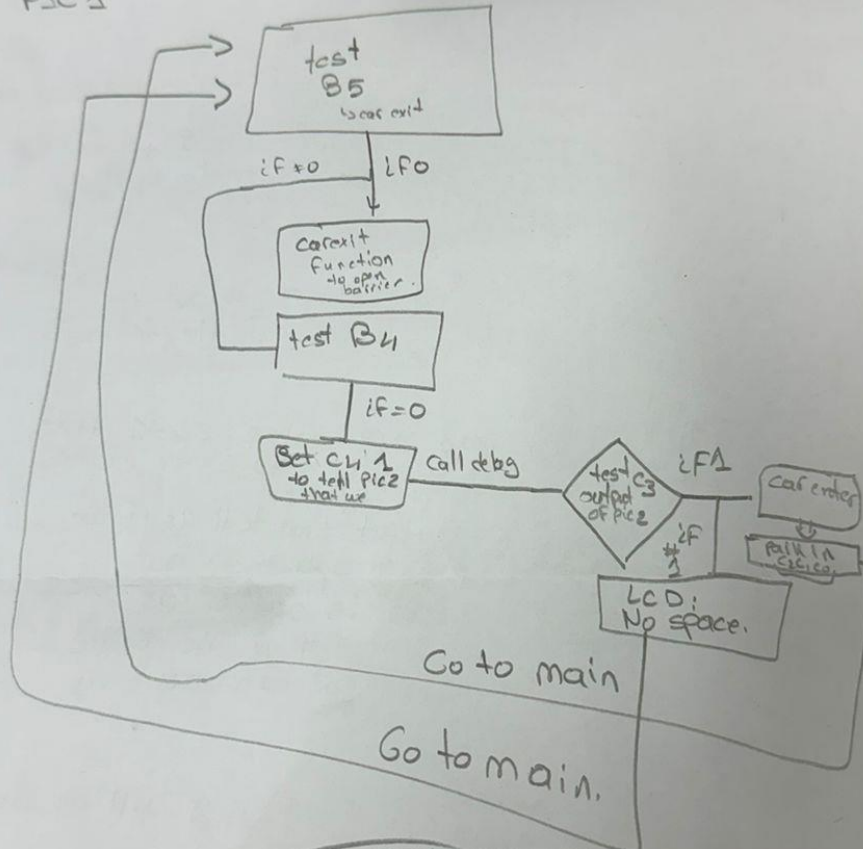
Flowcharts and connections:

PIC 2

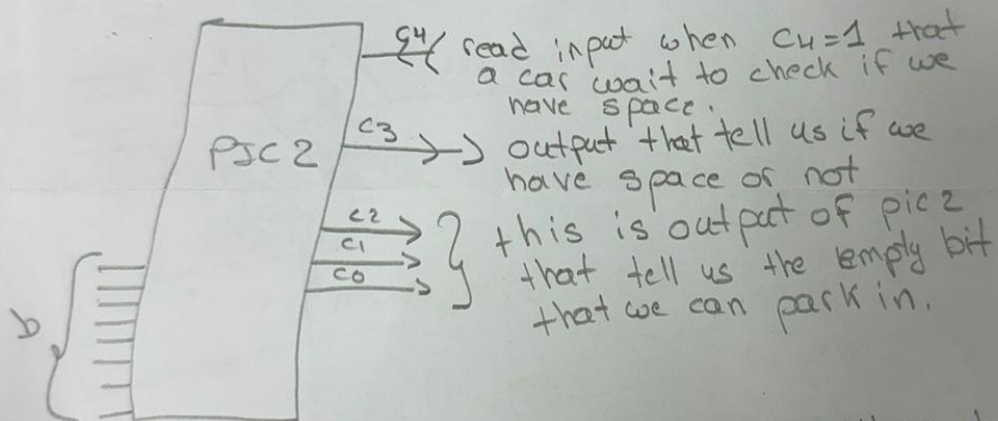
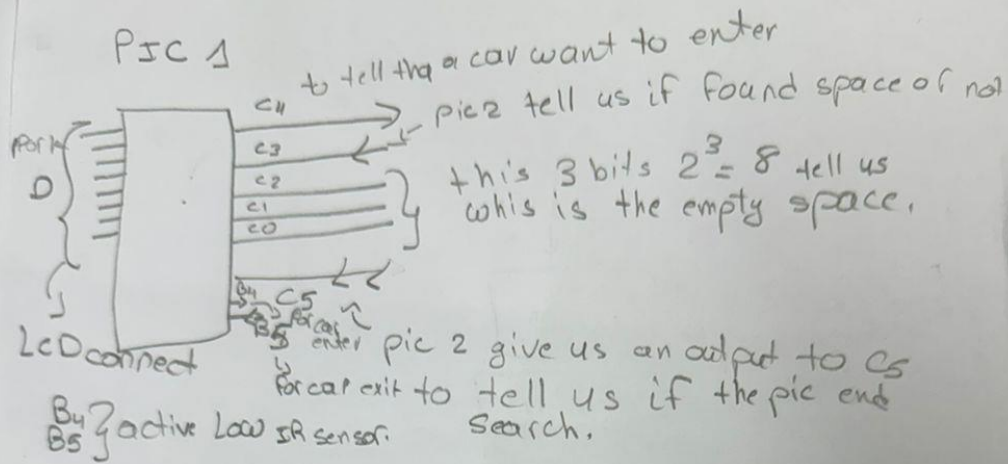


Simulation ✓

PSC 1



simulation ✓
on board ✓



port B is the input in pic 2 that tell us where
is the empty space

0 Full
1 empty } we put it
in switches.
when a car park.
port = 0