

INSTITUTO POLITÉCNICO NACIONAL
ESCUELA SUPERIOR DE CÓMPUTO

ESCOM

Ejercicio 10
“Scroll usando Timer/Counter”

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Grupo:3CM15

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Problema

Escribir un programa que muestre en un display de 7 segmentos cátodo común conectados de forma multiplexada en los puertos A, y C, hasta 3 mensajes de texto, cambiándolos con reset,int0 e int1. Estos mensajes deberán correr/detener al pulsar int2, se Debra hacer uso de timer0 para barrido y timer2 para el scroll(250 mseg).

Código

```
.include"m8535def.inc"
```

```
.def aux =r16
```

```
.def col=r17
```

```
.equ A = $77
```

```
.equ B = $7c
```

```
.equ C = $39
```

```
.equ D = $5e
```

```
.equ E = $79
```

```
.equ F = $71
```

```
.equ G = $7d
```

```
.equ H = $76
```

```
.equ I = $06
```

```
.equ J = $1e
```

```
.equ L = $38
```

```
.equ N = $37
```

```
.equ O = $3f
```

```
.equ P = $73
```

```
.equ Q = $67
```

```
.equ R = $50  
.equ S = $6d  
.equ T = $78  
.equ U = $3e  
.equ Ye = $6e
```

```
.macro ldb
```

```
ldi aux,@1  
mov @0,aux  
.endm
```

```
.macro mensaje
```

```
ldb r9,@0  
ldb r8,@1  
ldb r7,@2  
ldb r6,@3  
ldb r5,@4  
ldb r4,@5  
ldb r3,@6  
ldb r2,@7  
ldb r1,@8  
ldb r0,@9  
.endm
```

reset:

```
rjmp main ; vector de reset  
rjmp texto1;verctor INT0  
rjmp texto2;verctor INT1  
.org $008  
rjmp corre;vector timer1  
rjmp barre;vector timer0  
.org $012  
rjmp stop ;vector INT2
```

main:

```
ldi aux,low(ramend)  
out spl,aux  
ldi aux,high(ramend)  
out sph,aux  
rcall config_io  
rcall texto0  
clr zh  
clr zl  
ldi col,1  
out portc,col  
ld aux,z  
out porta,aux
```

```
uno:  nop
      nop
      rjmp uno

config_io:
      ser aux
      out ddra,aux
      out portb,aux
      out ddrc,aux
      out portd,aux
      ldi aux,3
      out tccr0,aux; preescala ck/64
      ldi aux,2
      out tccr1b,aux; preescala ck/8
      ldi aux,$01; 0000 0001
      out timsk,aux; toie0
      ldi r18,193; para contar 63 4ms
      ldi aux,$0a; 0000 1010
      out mcucr,aux
      ldi aux,$e0; 1110 0000
      out gicr,aux
      sei
      ret
```

texto0:

```
mensaje 0,0,I,N,I,C,I,O,0,0  
rcall limpia  
ret
```

texto1:

```
mensaje 0,N,N,E,D,I,O,0,0,0  
rcall limpia  
reti
```

texto2:

```
mensaje F,I,N,A,L,0,0,0,0,0  
rcall limpia  
reti
```

limpia:

```
clr r10  
clr r11  
clr r12  
clr r13  
clr r14  
clr r15  
ret
```

barre:

```
out tcnt0,r18  
out porta,zh  
inc zl
```

lsl col

brne dos; si z = 0

ldi col,1

clr zl

dos:

com col

out portc,col

com col

ld aux,z

out porta,aux

reti

corre:

mov r15,r14

mov r14,r13

mov r13,r12

mov r12,r11

mov r11,r10

mov r10,r9

mov r9,r8

mov r8,r7

mov r7,r6

mov r6,r5

mov r5,r4

mov r4,r3

mov r3,r2

mov r2,r1

mov r1,r0

mov r0,r15

reti

stop:

push aux

push col

in aux,timsk

ldi col,\$04; 0000 0100

eor aux,col

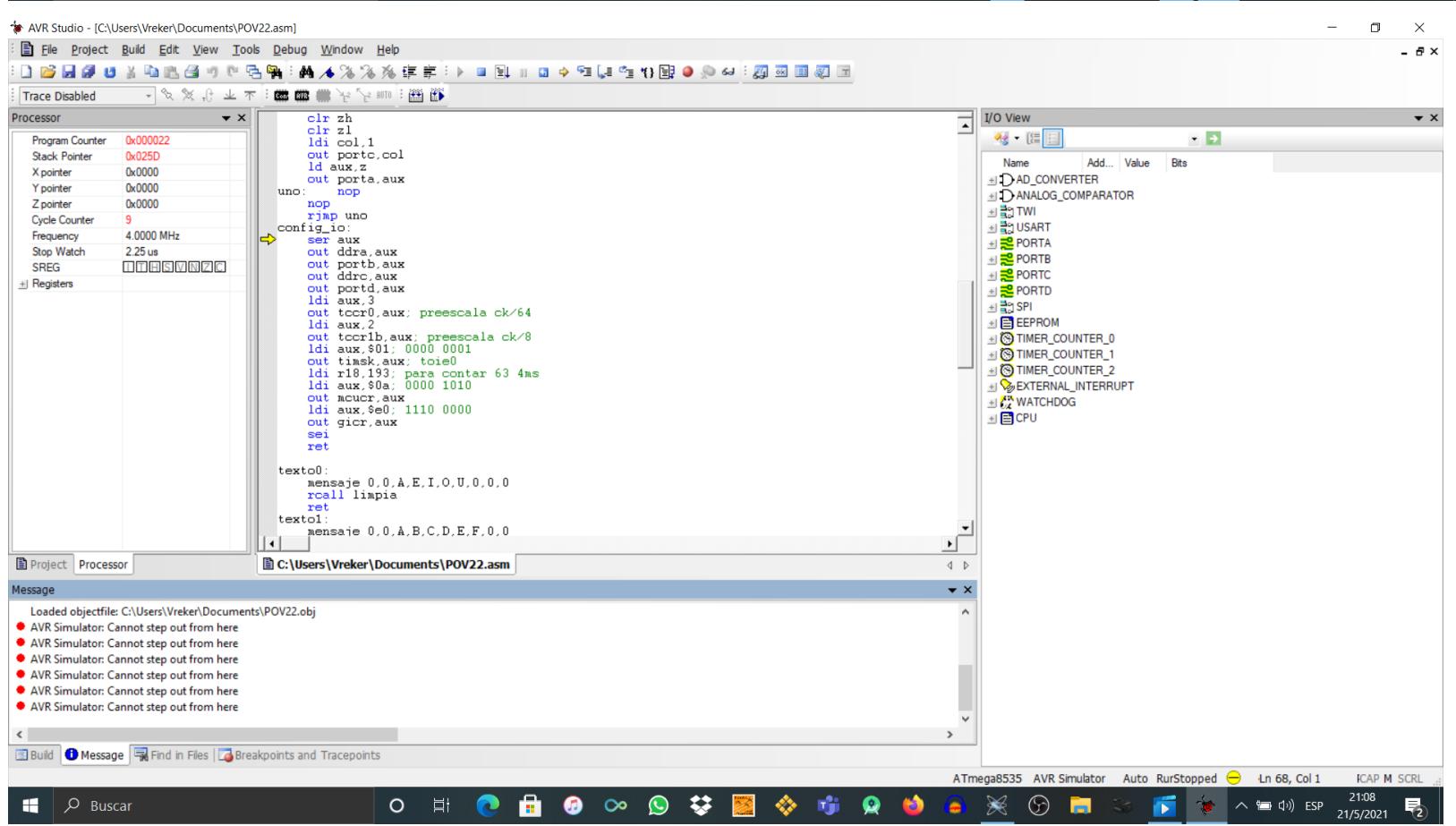
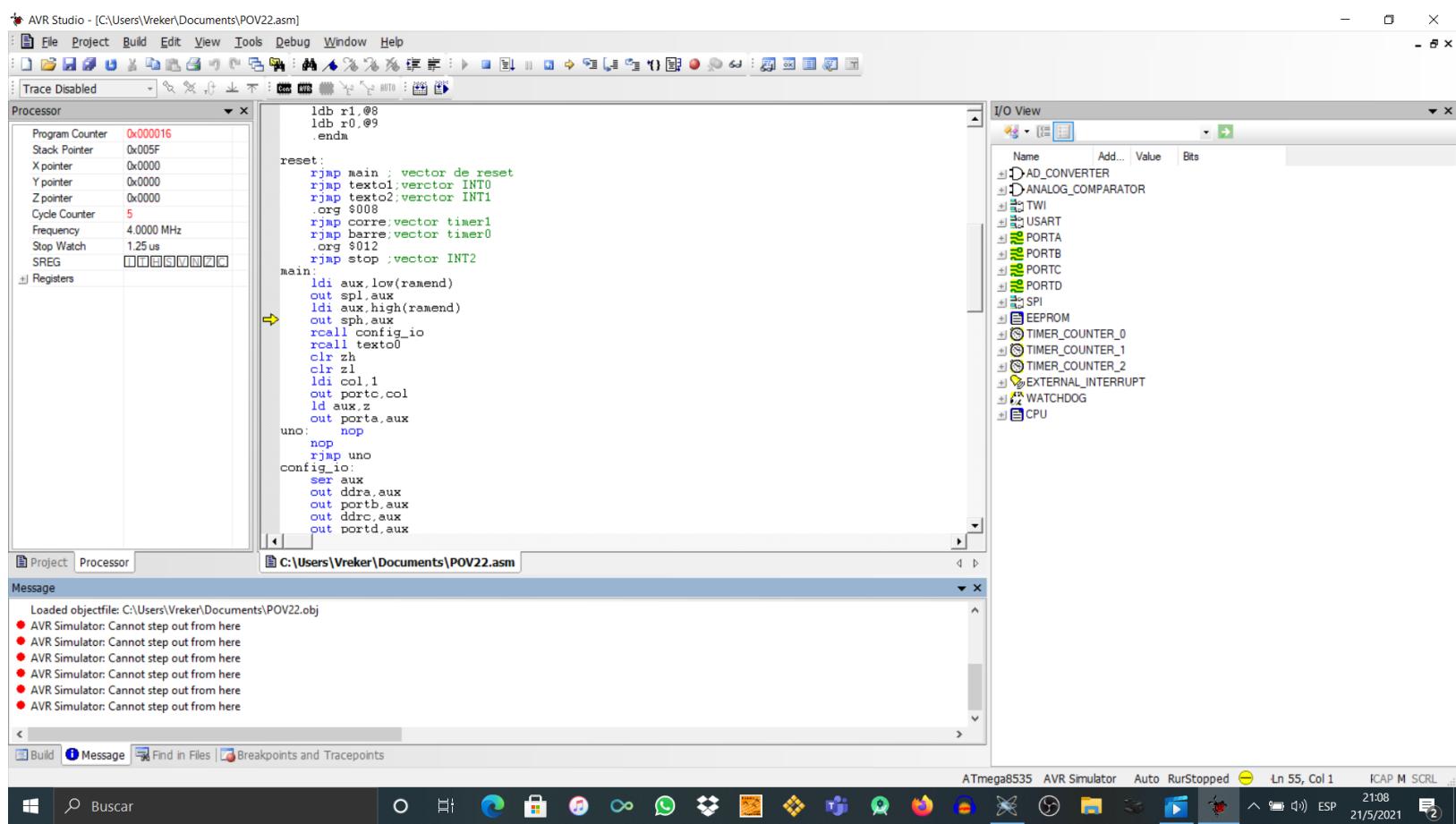
out timsk,aux

pop col

pop aux

reti

Simulación en AVR Studio 4



AVR Studio - [C:\Users\Vreker\Documents\POV22.asm]

File Project Build View Tools Debug Window Help

Trace Disabled

Processor

Program Counter	0x00002F
Stack Pointer	0x025D
X pointer	0x0000
Y pointer	0x0000
Z pointer	0x0000
Cycle Counter	22
Frequency	4.0000 MHz
Stop Watch	5.50 us
SREG	0000 0000 0000

Registers

```

clr zh
clr zl
ldi col,1
out portc,col
ld aux,z
out porta,aux
uno:
nop
rjmp uno
config_io:
ser aux
out ddra,aux
out portb,aux
out ddrc,aux
out portd,aux
ldi aux,3
out tccr0,aux; preescal ck/64
ldi aux,2
out tccrlb,aux; preescal ck/8
ldi aux,$01; 0000 0001
out timsk,aux; toie0
ldi r18,193; para contar 63 4ms
ldi aux,$0A; 0000 1010
out mcucr,aux
ldi aux,$E0; 1110 0000
out gicr,aux
sei
ret

texto0:
mensaje 0,0,A,E,I,O,U,0,0,0
rcall limpia
ret
text01:
mensaje 0,0,A,B,C,D,E,F,0,0

```

I/O View

Name	Add...	Value	Bits
PORTA	PORTA	0x1B...	0x00
	DDRA	0x1A...	0xFF
	PINA	0x19...	0x00
PORTB	PORTB	0x18...	0xFF
	DDRB	0x17...	0x00
	PINB	0x16...	0x04
PORTC	PORTC	0x15...	0x00
	DDRC	0x14...	0xFF
	PINC	0x13...	0x00
PORTD	PORTD	0x12...	0xFF
	DDRD	0x11...	0x00
	PIND	0x10...	0x0C
SPI			
EEPROM			
TIMER_COUNTER_0	TCCR0	0x33...	0x03
	TCNT0	0x32...	0x00
	OCR0	0x3C...	0x00
	TIMSK	0x39...	0x01
	TIFR	0x38...	0x00
	SFIOR	0x30...	0x00
TIMER_COUNTER_1	TIMSK	0x39...	0x01
	TIFR	0x38...	0x00
	TCCR1A	0x29...	0x00
	TCCR1B	0x2E...	0x02
	TCNT1H	0x2...	0x00
	TCNT1L	0x2C...	0x00
	OCR1AH	0x28...	0x00
	OCR1AL	0x2A...	0x00
	OCR1BH	0x29...	0x00
	OCR1BL	0x2B...	0x00
	ICR1H	0x27...	0x00

Project Processor C:\Users\Vreker\Documents\POV22.asm

Message

Loaded objectfile: C:\Users\Vreker\Documents\POV22.obj

- AVR Simulator: Cannot step out from here

Build Message Find in Files Breakpoints and Tracepoints

ATmega8535 AVR Simulator Auto Stopped Ln 81, Col 1 CAP NUM SCRLL 21:10 21/5/2021

AVR Studio - [C:\Users\Vreker\Documents\POV22.asm]

File Project Build View Tools Debug Window Help

Trace Disabled

Processor

Program Counter	0x000018
Stack Pointer	0x025F
X pointer	0x0000
Y pointer	0x0000
Z pointer	0x0000
Cycle Counter	30
Frequency	4.0000 MHz
Stop Watch	7.50 us
SREG	0000 0000 0000

Registers

```

ldi aux,low(ramend)
out spl,aux
ldi aux,high(ramend)
out sph,aux
rcall config_io
rcall texto0
clr zh
clr zl
ldi col,1
out portc,col
ld aux,z
out porta,aux
uno:
nop
rjmp uno
config_io:
ser aux
out ddra,aux
out portb,aux
out ddrc,aux
out portd,aux
ldi aux,3
out tccr0,aux; preescal ck/64
ldi aux,2
out tccrlb,aux; preescal ck/8
ldi aux,$01; 0000 0001
out timsk,aux; toie0
ldi r18,193; para contar 63 4ms
ldi aux,$0A; 0000 1010
out mcucr,aux
ldi aux,$E0; 1110 0000
out gicr,aux
sei
ret

texto0:
mensaje 0,0,A,E,I,O,U,0,0,0
rcall limpia
ret
text01:
mensaje 0,0,A,B,C,D,E,F,0,0

```

I/O View

Name	Add...	Value	Bits
PORTA	PORTA	0x1B...	0x00
	DDRA	0x1A...	0xFF
	PINA	0x19...	0x00
PORTB	PORTB	0x18...	0xFF
	DDRB	0x17...	0x00
	PINB	0x16...	0x04
PORTC	PORTC	0x15...	0x00
	DDRC	0x14...	0xFF
	PINC	0x13...	0x00
PORTD	PORTD	0x12...	0xFF
	DDRD	0x11...	0x00
	PIND	0x10...	0x0C
SPI			
EEPROM			
TIMER_COUNTER_0	TCCR0	0x33...	0x03
	TCNT0	0x32...	0x00
	OCR0	0x3C...	0x00
	TIMSK	0x39...	0x01
	TIFR	0x38...	0x10
	SFIOR	0x30...	0x00
TIMER_COUNTER_1	TIMSK	0x39...	0x01
	TIFR	0x38...	0x10
	TCCR1A	0x29...	0x00
	TCCR1B	0x2E...	0x02
	TCNT1H	0x2...	0x00
	TCNT1L	0x2C...	0x01
	OCR1AH	0x28...	0x00
	OCR1AL	0x2A...	0x00
	OCR1BH	0x29...	0x00
	OCR1BL	0x2B...	0x00
	ICR1H	0x27...	0x00

Project Processor C:\Users\Vreker\Documents\POV22.asm

Message

Loaded objectfile: C:\Users\Vreker\Documents\POV22.obj

- AVR Simulator: Cannot step out from here

Build Message Find in Files Breakpoints and Tracepoints

ATmega8535 AVR Simulator Auto Stopped Ln 57, Col 1 CAP NUM SCRLL 21:10 21/5/2021

AVR Studio - [C:\Users\Vreker\Documents\POV22.asm]

File Project Build Edit View Tools Debug Window Help

Trace Disabled

Processor

Program Counter 0x00001F

Stack Pointer 0x025F

Xpointer 0x0000

Ypointer 0x0000

Z pointer 0x0000

Cycle Counter 93

Frequency 4.0000 MHz

Stop Watch 23.25 us

SREG

Registers

```

out spl.aux
ldi aux high(ramend)
out sph.aux
recall config.io
recall text0
clr zh
clr zl
ldi col.1
out portc.col
ld aux.z
out porta.aux
    uno:    nop
    rjmp uno
config.io:
    ser aux
    out ddrx.aux
    out portb.aux
    out tincr.aux
    out portd.aux
    ldi aux.3
    out tccr0.aux; preescal ck/64
    ldi aux.2
    out tccr1b.aux; preescal ck/8
    ldi aux.$01; 0000 0001
    out timsk.aux; toie0
    ldi r18.193; para contar 63 4ms
    ldi aux.$0a; 0000 1010
    out mcucr.aux
    ldi aux.$e0; 1110 0000
    out gicr.aux
    sei
    ret
text0:

```

I/O View

Name	Add...	Value	Bits
PORTA	0x1B...	0x00	██████████
DDRA	0x1A...	0xFF	██████████
PIN A	0x19...	0x00	██████████
PORTB	0x18...	0xFF	██████████
DDRB	0x17...	0x00	██████████
PIN B	0x16...	0x04	██████████
PORTC	0x15...	0x01	██████████
DDRC	0x14...	0xFF	██████████
PIN C	0x13...	0x01	██████████
PORTD	0x12...	0xFF	██████████
DDRD	0x11...	0x00	██████████
PIN D	0x10...	0x0C	██████████
SPI			
EEPROM			
TIMER_COUNTER_0			
TCCR0	0x33...	0x03	██████████
TCNT0	0x32...	0x01	██████████
OCR0	0x3C...	0x00	██████████
TIMSK	0x39...	0x01	██████████
TIFR	0x38...	0x12	██████████
SFIOR	0x30...	0x00	██████████
TIMER_COUNTER_1			
TIMSK	0x39...	0x01	██████████
TIFR	0x38...	0x12	██████████
TCCR1A	0x2F...	0x00	██████████
TCCR1B	0x2E...	0x02	██████████
TCNT1H	0x2...	0x00	██████████
TCNT1L	0x2C...	0x09	██████████
OCR1AH	0x2B...	0x00	██████████
OCR1AL	0x2A...	0x00	██████████
OCR1BH	0x29...	0x00	██████████
OCR1BL	0x28...	0x00	██████████
ICR1H	0x27...	0x00	██████████

Project Processor

C:\Users\Vreker\Documents\POV22.asm

Message

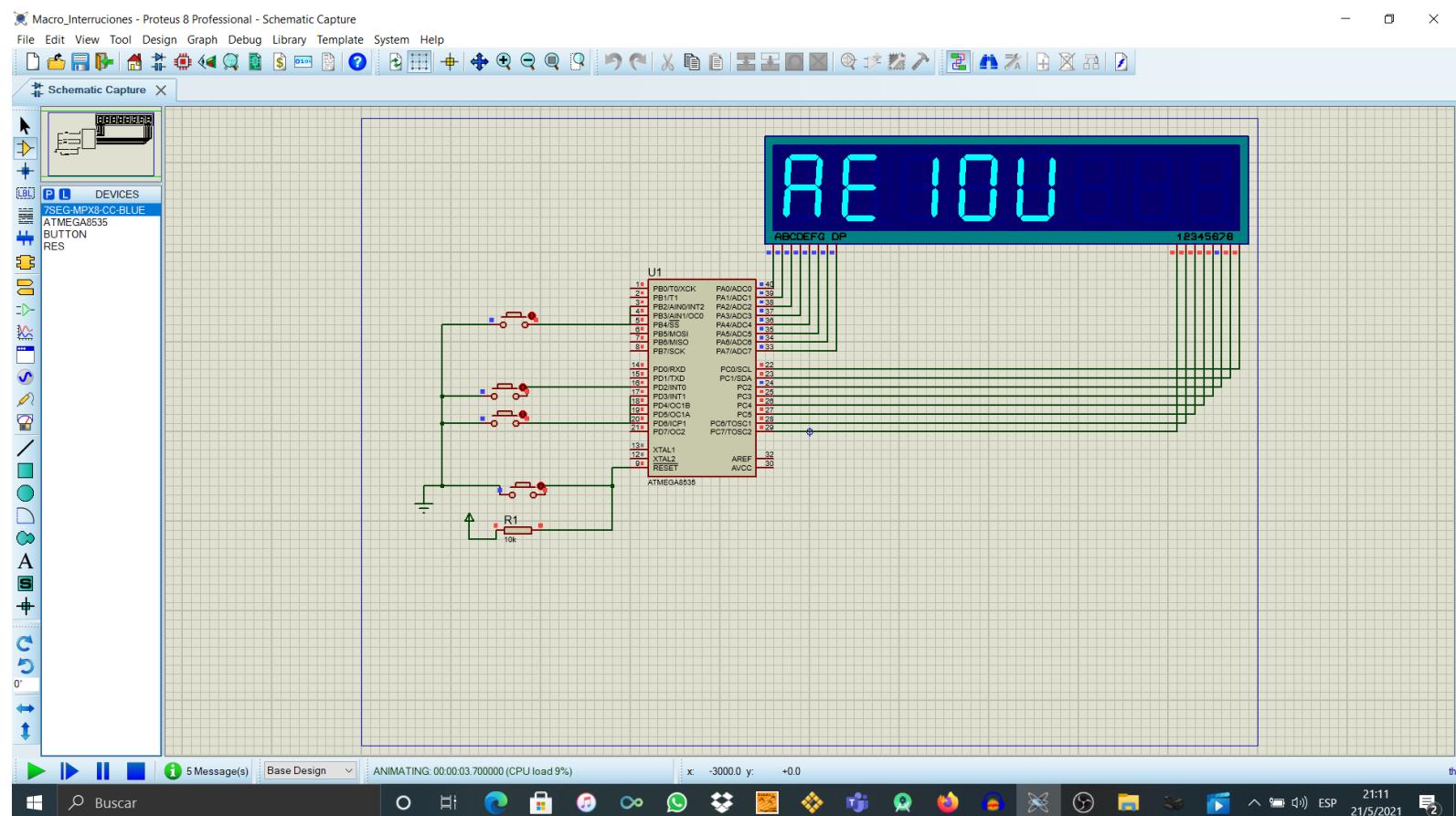
Loaded objectfile: C:\Users\Vreker\Documents\POV22.obj

- AVR Simulator: Cannot step out from here

Build Message Find in Files Breakpoints and Tracepoints

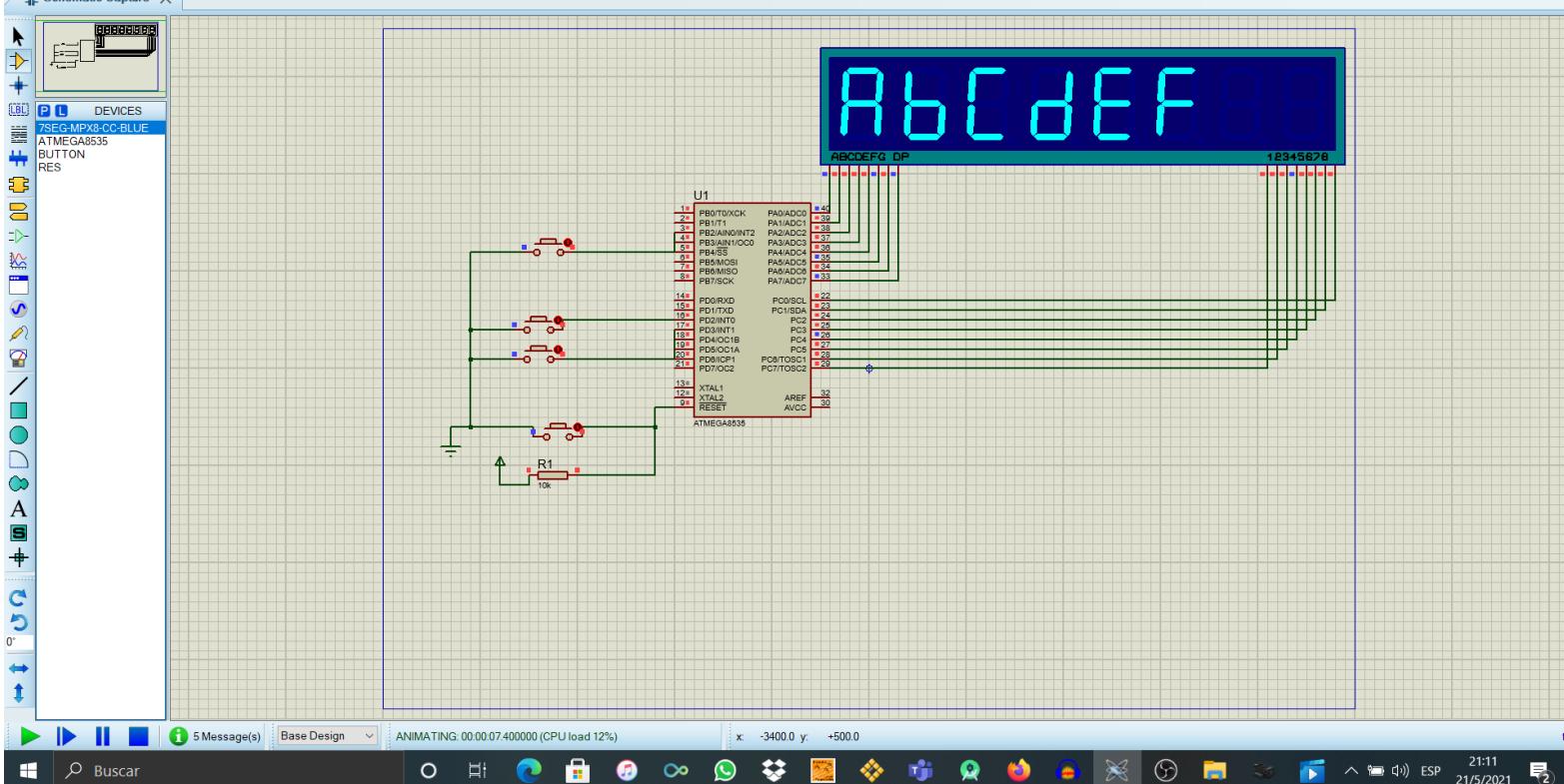
ATmega8535 AVR Simulator Auto Stopped 21:11 21/5/2021

Simulación en Proteus

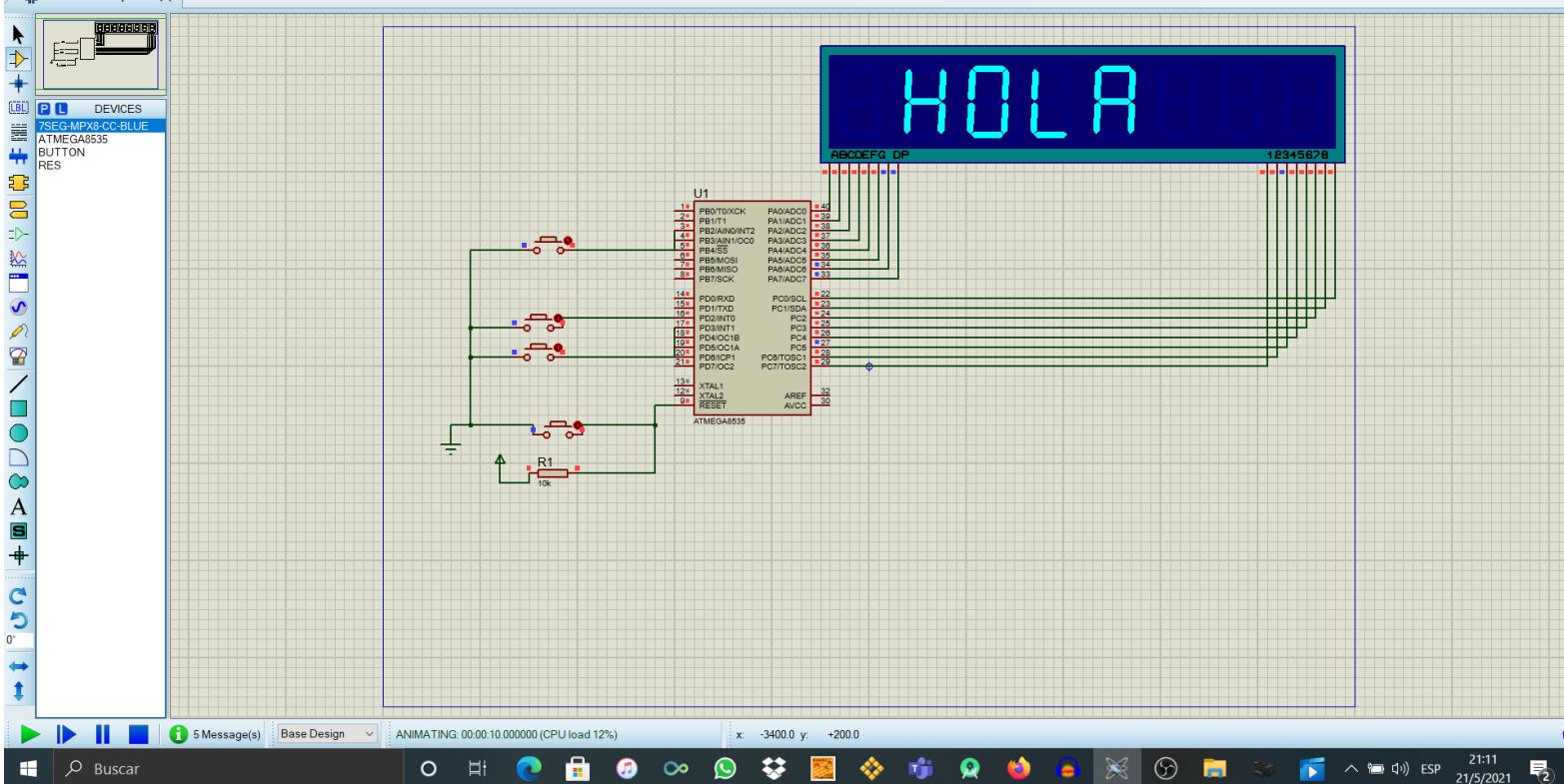




Schematic Capture X

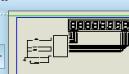


Schematic Capture X

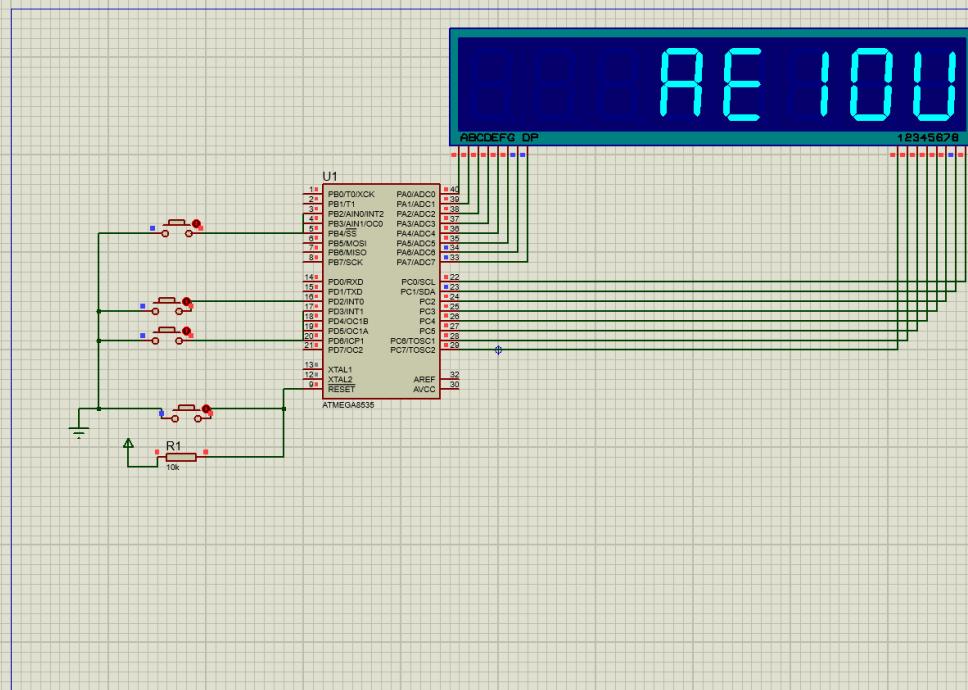




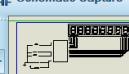
Schematic Capture X



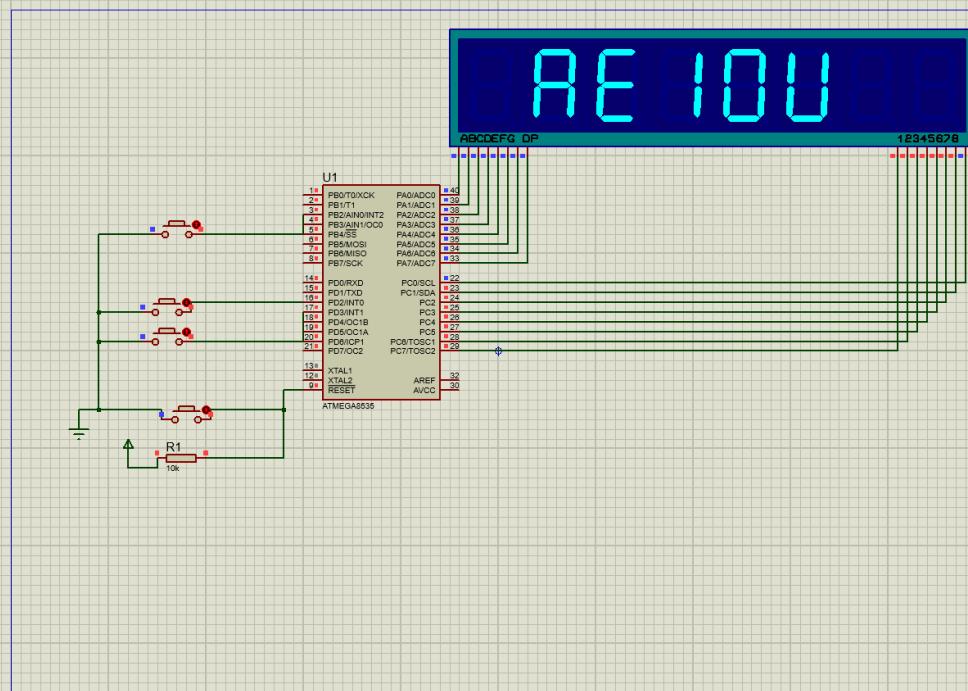
P L DEVICES
7SEG-MPX8 CC-BLUE
ATMEGA8535
BUTTON
RES

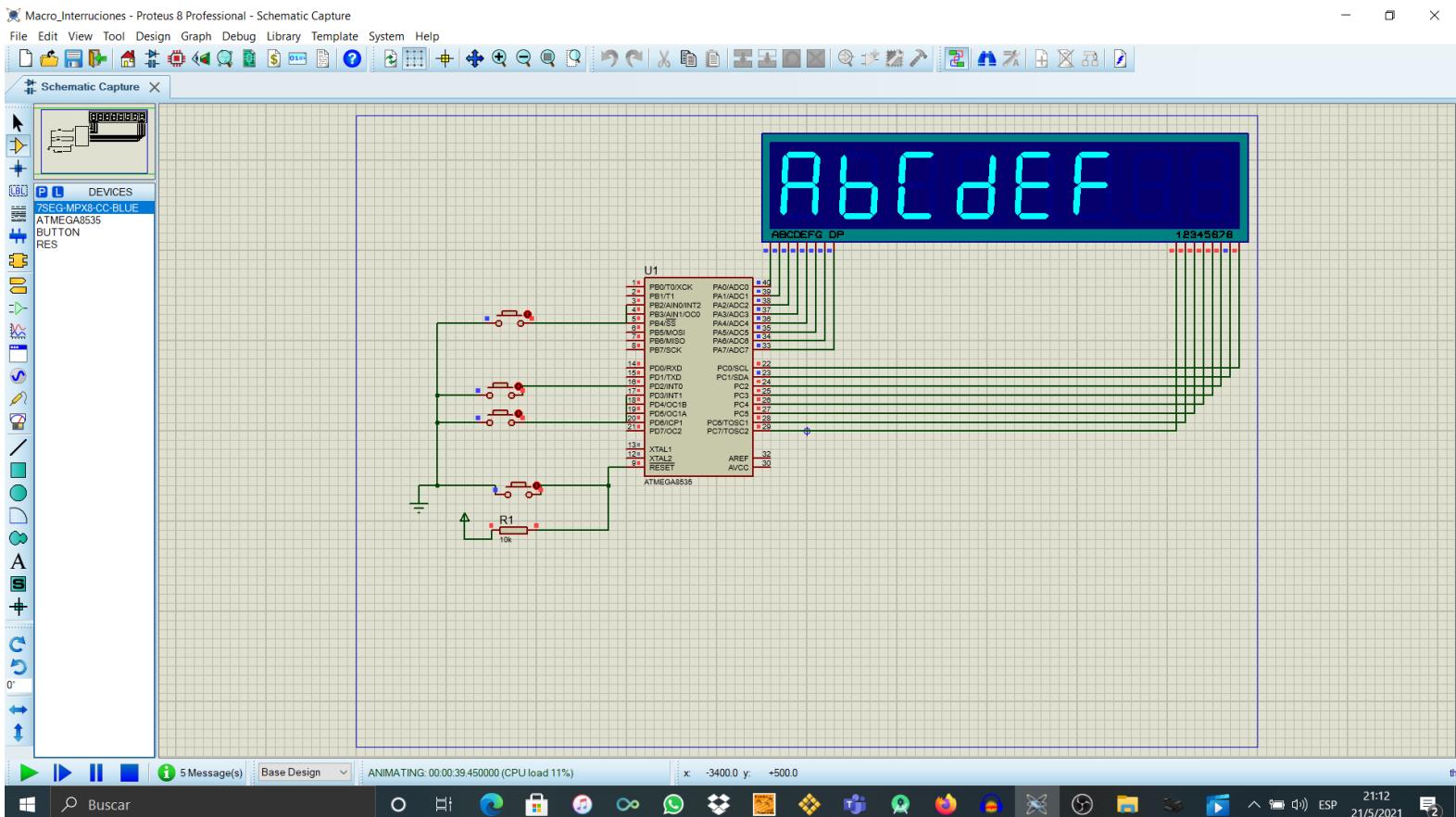
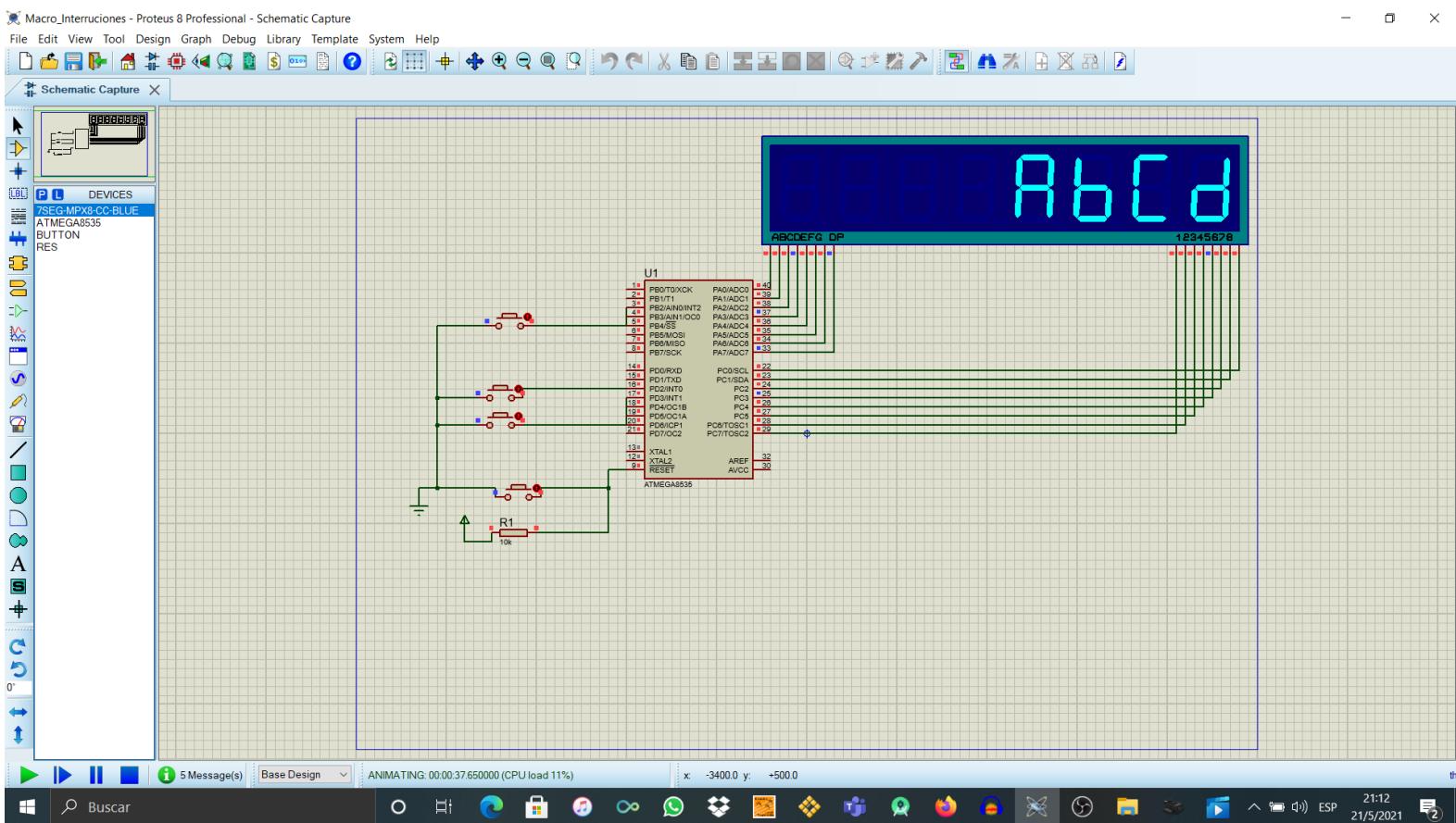


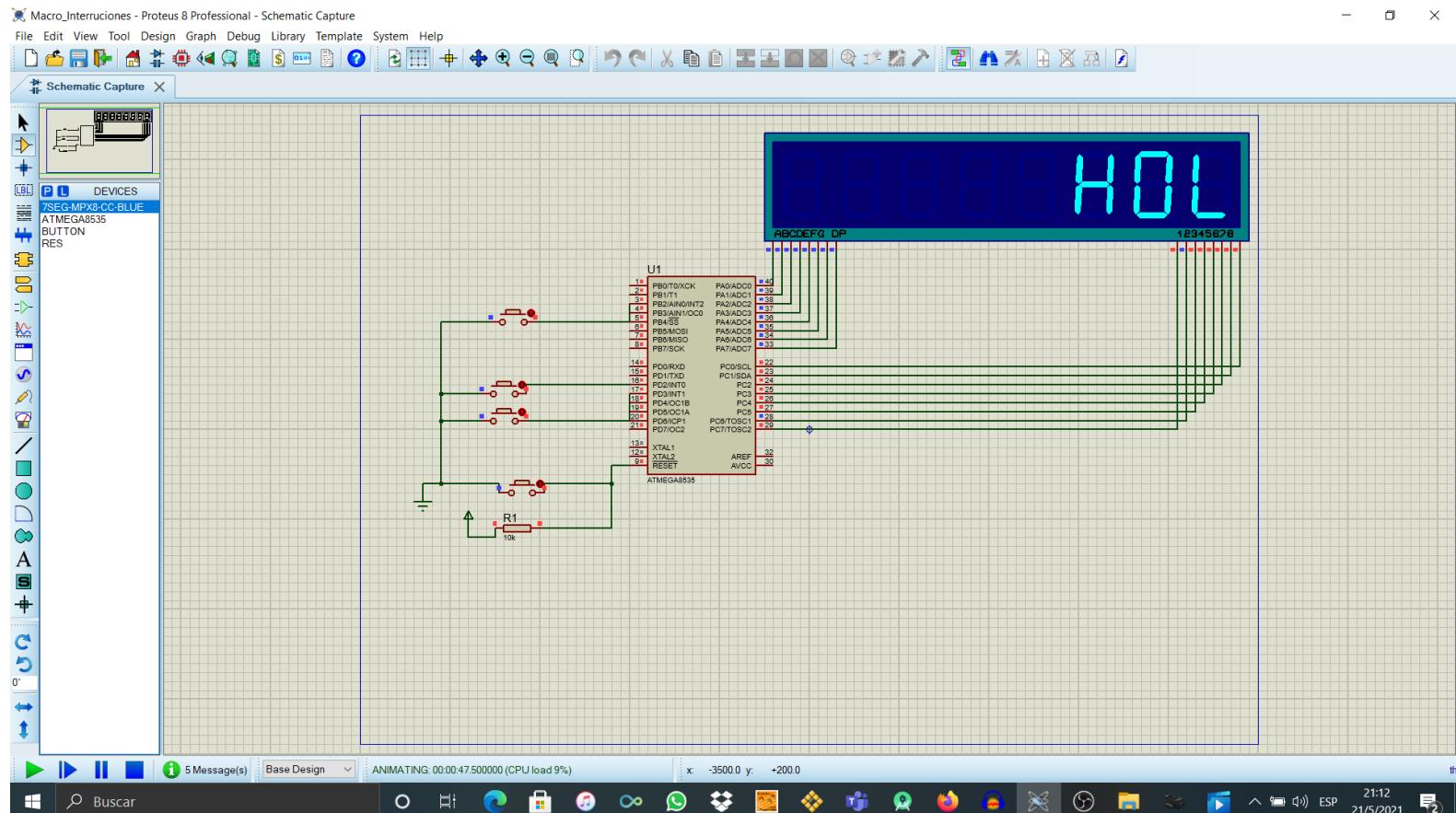
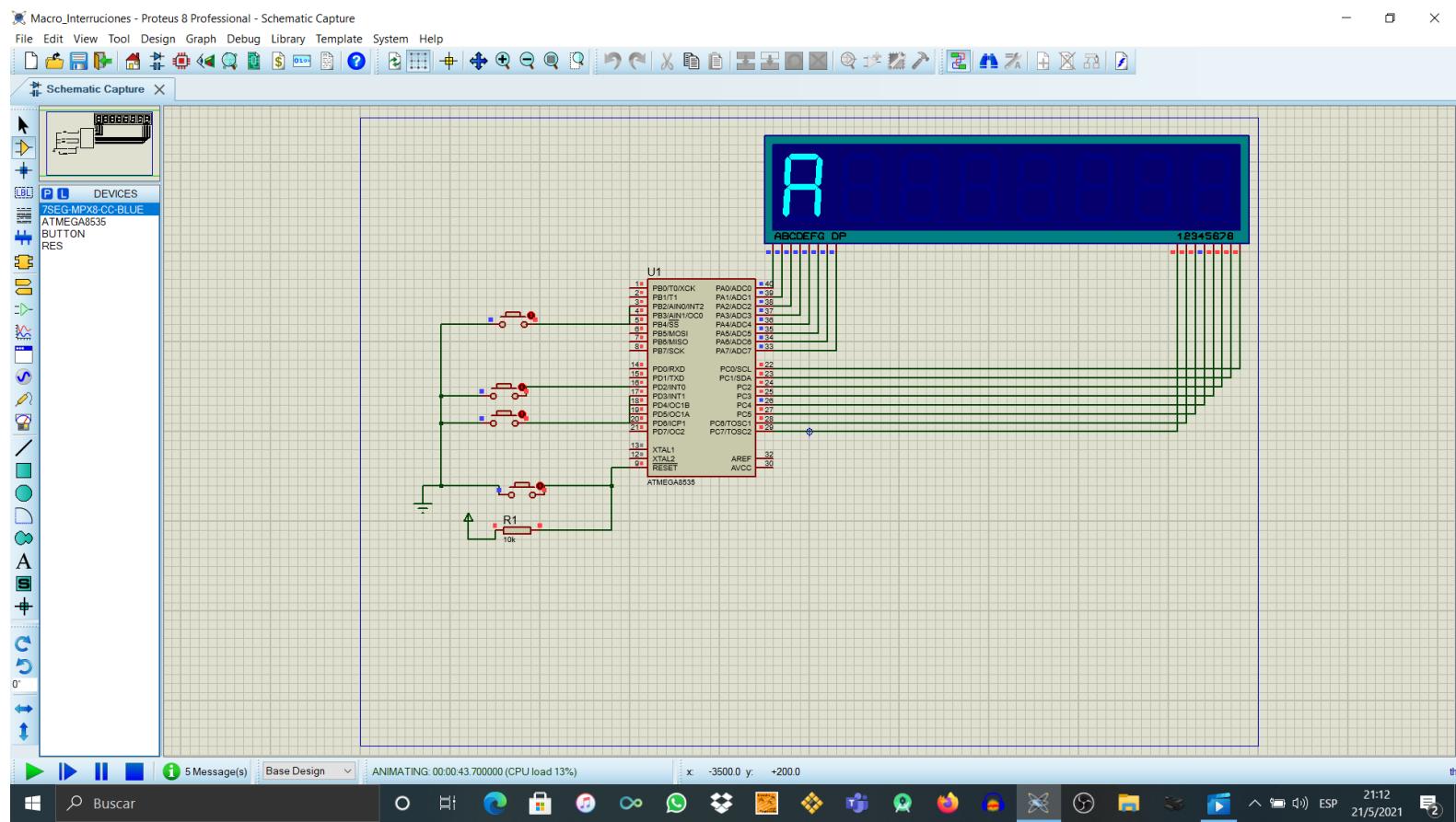
Schematic Capture X



P L DEVICES
7SEG-MPX8 CC-BLUE
ATMEGA8535
BUTTON
RES









Schematic Capture X

