* Component by DIO

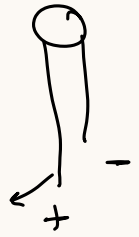
① led → Power + - gnd.

↳ Notification

↳ Digital value

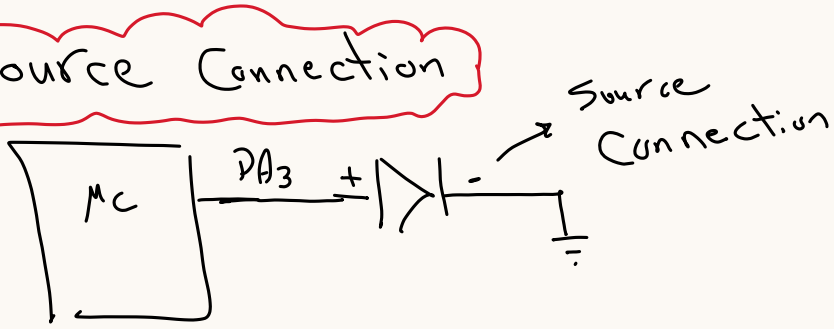
↳ 1 →

↳ 0



↳ Connection type

↳ Source Connection



Set Direction as output

↳ DDRA |= (1<<3)

↳ SetBit (DDRA, 3);

① Direction as out

② led on → High

③ led off → low

↳ PORTA |= (1<<3);

↳ setBit (PORTA, 3);

↳ clearBit(PORTA, 3);

led on → 1

led off → 0

---

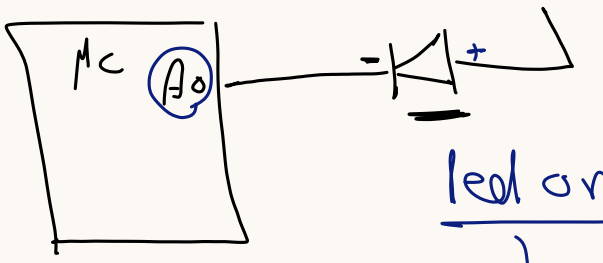
led on

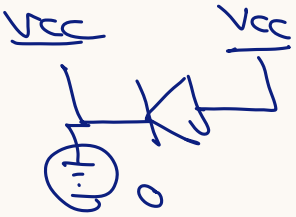
① Output Direction

SetBit(DDRA, 0);

② ClearBit(PORTA, 0);

↳ Sink Connection





led on → 0

Led off → 1

Led off

① Direction the same ② SetBit(,)

led

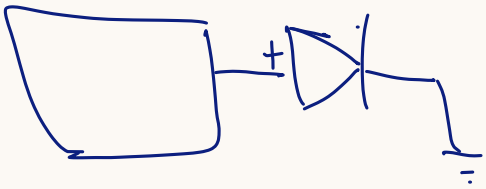
Source Connection

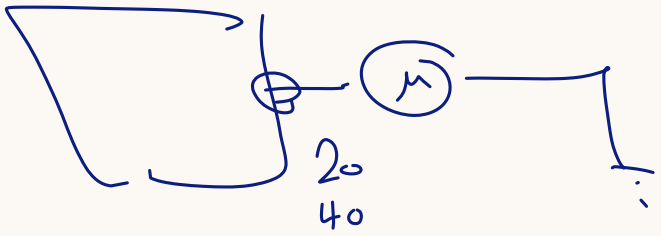
- ① led on → Port 1
- ② led off → Port 0

Sink

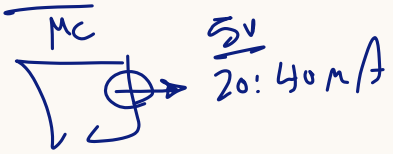
- ① led on → Port 0
- ② led off → Port 1

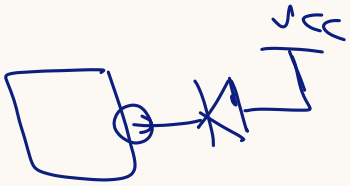
Source logic





Sink →





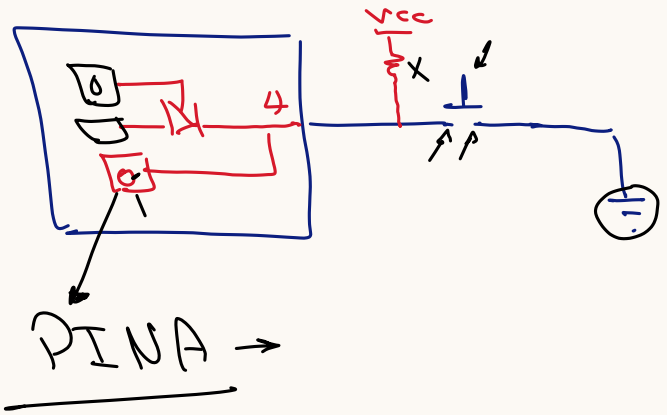
Switch → Input devices

- ① Mechincal
  - Push Button
  - Dip switch
- ② electrical (electricity)
  - Relay | transistorunt

Switch Connection

1. External Pull up
2. External Pull down
3. Internal Pull up

1. External Pull up →



→ Direction → Input

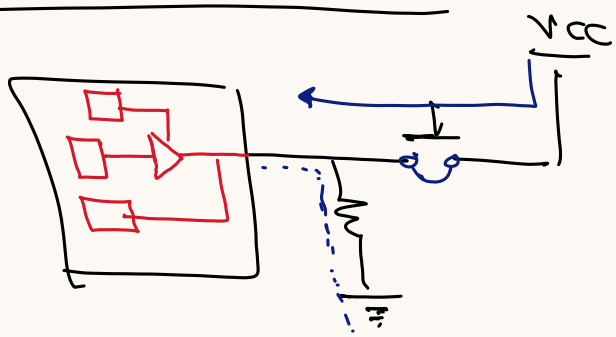
→ if Read PINA1

↳ 0 → Btn Pressed

↳ 1 → Btn Not Presseed.

---

2. External Pull down



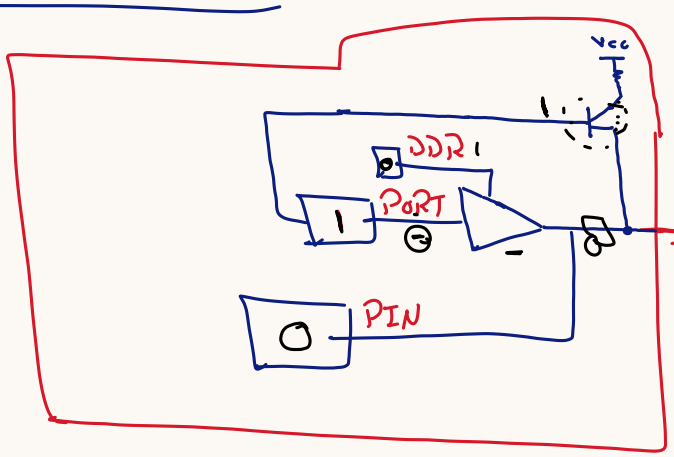
Direction ⇒ Input

if Read PINA4

↳ 0 ⇒ Not Pressed

↳ 1 ⇒ Pressed

↳ interal Pull up



→ switch | Internal Pullup

→ Direction Input

ClearBit(DDRD, 0)

→ Enable Internal Pullup

→ PORT → write

setBit(PORTD, 0);

↳ Read → PIN = 0 ⇒ Pressed

↳ PIN = 1 ⇒ Not Pressed.

waiting type in Mcu

- ① Busy wait → inside loop empty

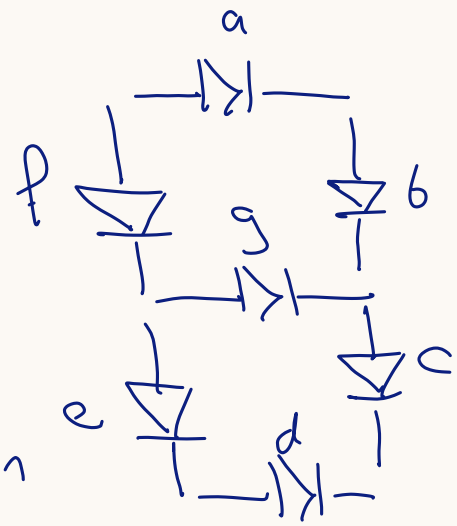
```
for(i=0; i < 40; i++)
{ asm("NOP"); }
```

- <util/delay.h>
  - _delay_ms(2000); → Max Input ?!
  - _delay_us(40);

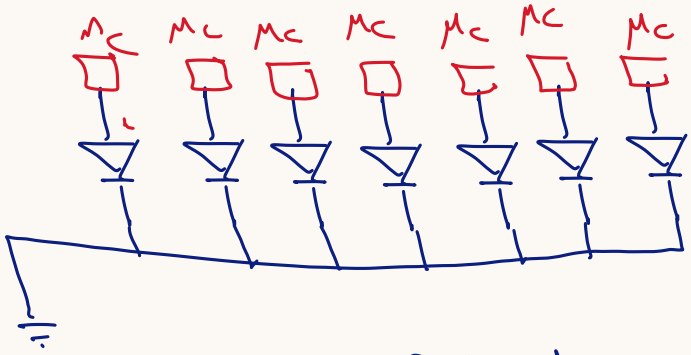
- timer
- Rtos → Real time operating system

SSD

- Display for No
- 7-segment

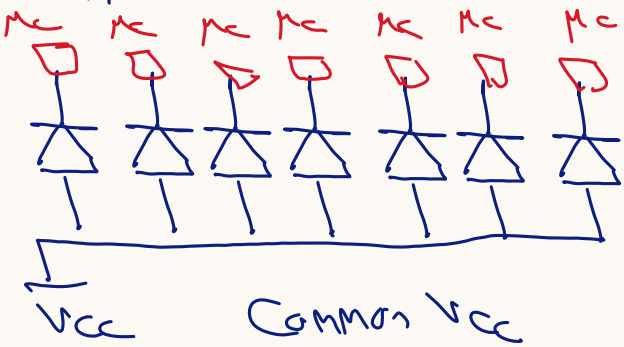


SSD type Connection



Common Ground
Common Cathod
Source Connection

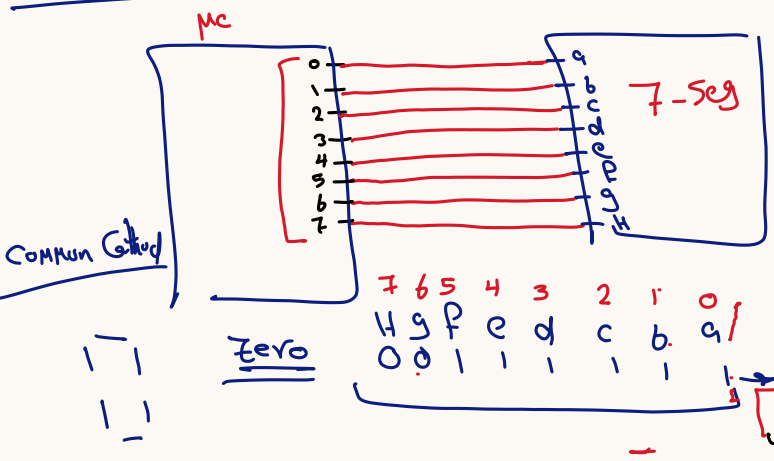
Led on = 1
Led off = 0

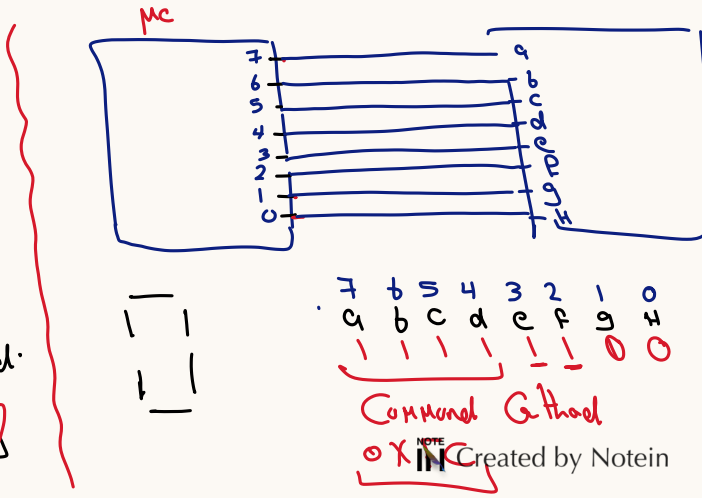


Common Vcc
Common Anode
Sink Connection

Led on = 0
Led off = 1

Connect with MicroController



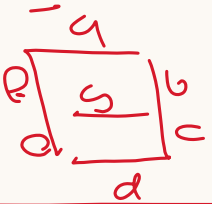


→ table For All Number From Zero to Nine

① 7 6 5 4 3 2 1 0
H g f e d c b a
0 1 0 0 1 1 1 1
0x4F

Command Cathod
↳ on = 1
↳ all = 0

0x4F



② 7 6 5 4 3 2 1 0
a b c d e f g H

Command Cathod
↳ on = 1
↳ all = 0

③ 7 6 5 4 3 2 1 0
H g f e d c b a

Command Anod
↳ on = 0
↳ all = 1

④ 7 6 5 4 3 2 1 0
a b c d e f g H

Command Anod
↳ on = 0
↳ all = 1

Break until 1:30 → 1:45

```
#define Cathod1_Zero
        Cathod1_One
        Cathod1_Two

#define Cathod2_Zero

#define Cathod1_Three 0x4F
```