CSE 2037, week 8

Digital Input and Output

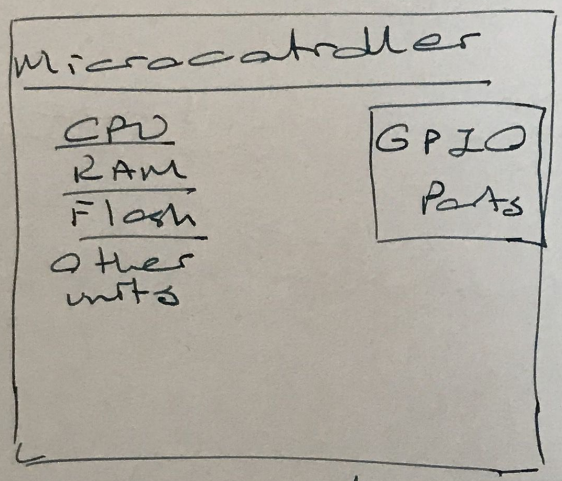
- Bit values as voltage levels
- Interfacing voltage levels with the MC
  - Digital input from a button
    - active high / low setup
  - Digital output to an LED
- Mbed based operations
  - Port definitions
  - Reading / writing to a port
  - ⇒ simulator.mbed.com
  - Examples

Digital Input and Output

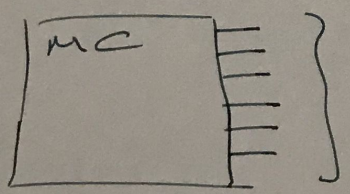
→ Up to this point, we focused on the MC itself.

→ Interface with the outside world "outside of the microcontroller"

→ Get in touch with the outside world.



GPIO → general purpose input output
→ collection of pins
→ pin is a wire, connected to the MC.



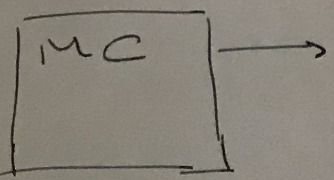
pins ⇒ port

Port A → 16 pins
B → 16 pins
C
| |

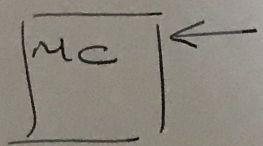
⇒ under mbed simulator, we just have pins.

→ Pins can be used

for output



for input



→ GPIO
→ Digital Input and output.

Digital		Voltage Levels
Logic Level { 0	→	0V
1	→	3.3V (example, Vcc)

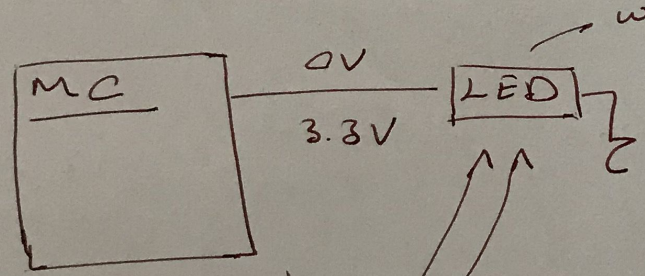
bit

code form ⟷ outside world

⇒ Let's go with an actual code example.

blinky demo

turn on and off (toggle) an LED available on the board.



write code

→ led = 0;
→ led = 1;

⇒ Bit value as voltage level.

⇒ Handled by the MC hardware.

→ Digital IO pin.
→ define its usage purpose

LED1 is available on the board.

DigitalOut led(LED1);
↳ used the LED1 as output
↳ name of out pin
↳ pin name (given beforehand)

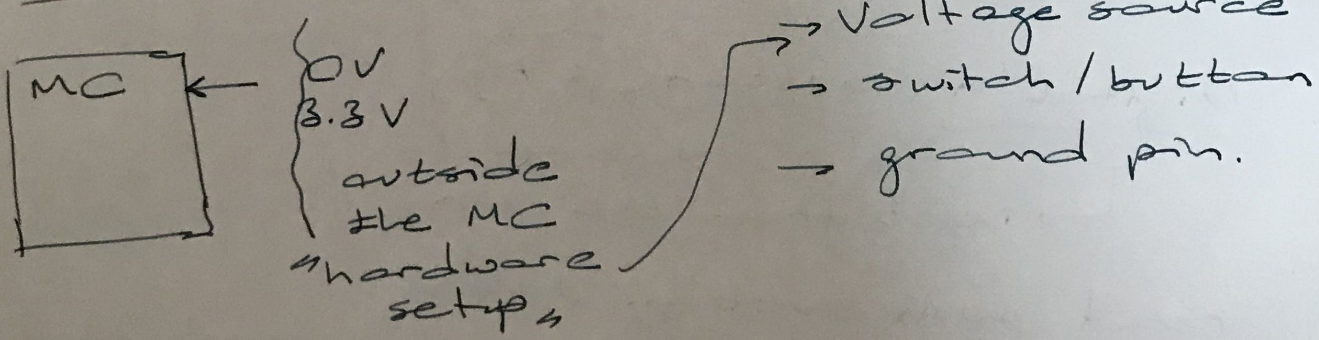
led = !led → toggle value
if led = 0 → led = 1 (3.3 V_{cc})
led = 1 → led = 0 (0V)

⇒ Till this time we fed data to the outside world.

⇒ How to get "digital data" from the outside world?

→ Two issues
→ hardware setup for this purpose.
→ reading the value in code.

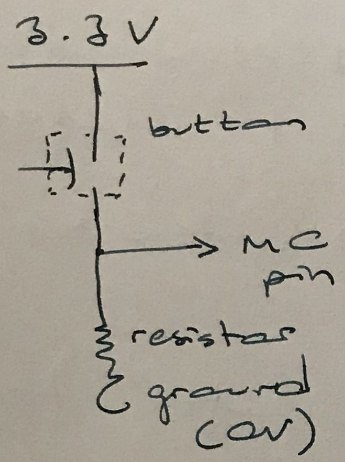
Digital Input



Active high setup

button
"not pressed" → 0V
"pressed" → 3.3V

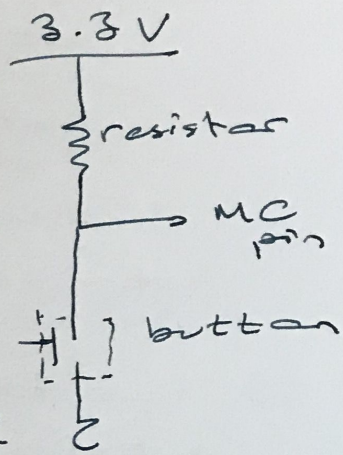
hardware



Active low setup

button
"not pressed" → 3.3V
"pressed" → 0V

hardware



Logic level

3.3 V → 1
0 V → 0

pin hardware

code

```
DigitalIn button(p7);
```

- DigitalIn: input from the pin
- button: name
- p7: pin

read push button value

```
if (button == 1)
    button.read() == 1
```

check the value on pin p7.