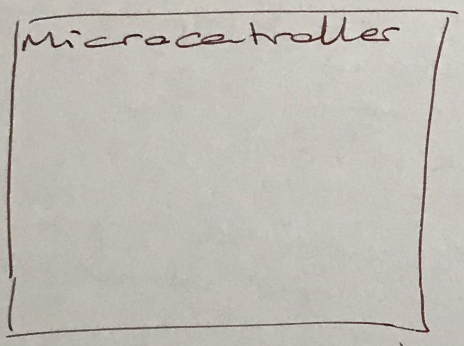
CSE 2037, Week 9

- About the Midterm
- Review of Digital I/O
- Introduction to "Interrupts" ***

Digital Input and Output



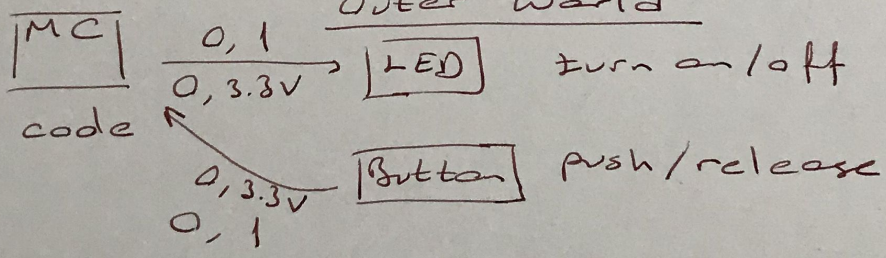
Outer World

Digital	Voltage
0	0V
1	3.3V

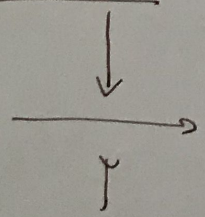
Analog (Later ADC/DAC)

Embedded application

Simple Applications

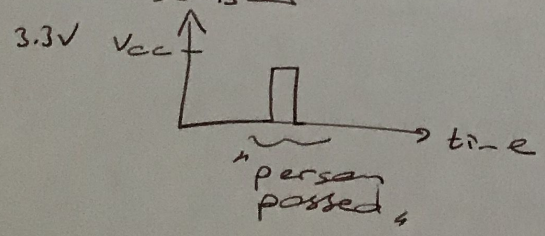


Gate



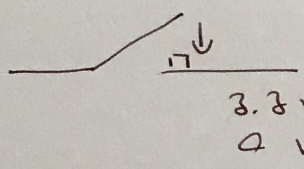
Digital

Logic Level	Voltage
0	0V
1	3.3V



In General

Sensor
feeds digital data



→ MC
code to take action

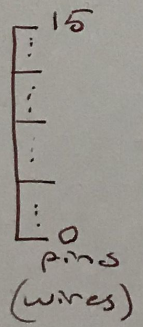
→ Actuator
solenoid
⇄
Automatic doors.
on/off
stepper Motor

Within the Microcontroller

CPU ↔ Peripheral Units
GPIO → General Purpose Input and output
"Digital I/O"

GPIO
↓
ports A, ..., M
↓
pins
↓
wires

Port A



Port A, pin 0

Under Mbed Simulator, one port with limited pins.

⇒ These representations were only related to hardware.

⇒ What about the Software?

→ We have to use "available functions" under Mbed to interract with GPIO pins.

→ class defn. ⇒ C form

HAL → hardware abstraction layer libraries.

→ Dedicated GPIO registers.

→ Assembly

→ C language

Mbed functions GPIO

→ How will I use the pin?
output, input

→ Get data from the outside world

→ Feed data to the outside world

Embedded Application

Digital I/O

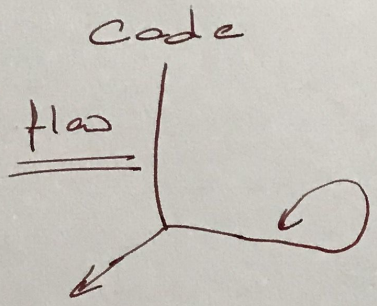
Hardware

Software

Interrupts

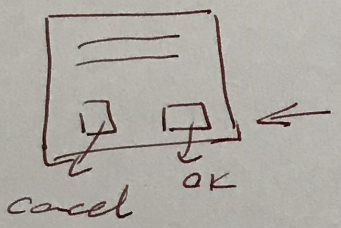
Interrupt ⇒ Event Driven Programming.

Codes were executed in sequential form till this time.



What if my microcontroller only responds to an input?
↳ hardware

It resembles Windows or Linux "panels".

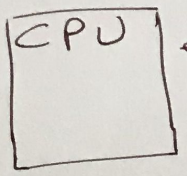


Interrupt (Kesme)

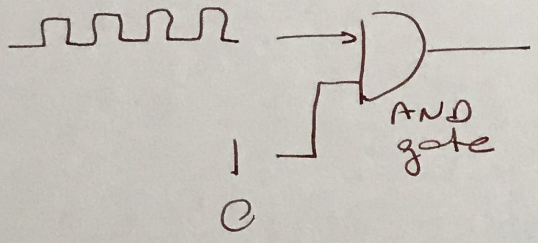
GPU performs its usual operation or it "sleeps."
↳ CPU is disabled. Does nothing.

When an outside signal comes
→ stops the sequential operation, goes to another node to act in accordance to the signal.
→ wakes up, performs the desired operation.

CPU in "sleep" mode.



CPU needs a clock signal to operate.



↳ no rising or falling edges.

⇒ CPU does not perform any operation.

⇒ CPU is "sleeping."

Let's add the interrupt concept here.

At same time, if I turn on the CPU clock it starts working again.

→ If I set a specific operation for this time, I can perform it just for that instant.

Simple Example for Interrupts

→ I wat to turn on the LED by a button press.

→ For all other times, ~~the~~ let the CPU sleep.