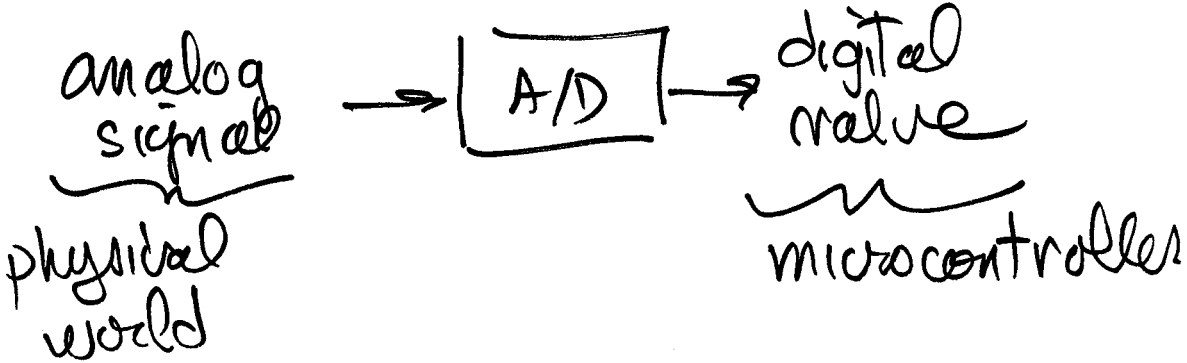
EE2361 - Lecture 28

11/14/16

A/D converter module

A/D converter module



A/D { resolution, range, precision

How to build an A/D ?

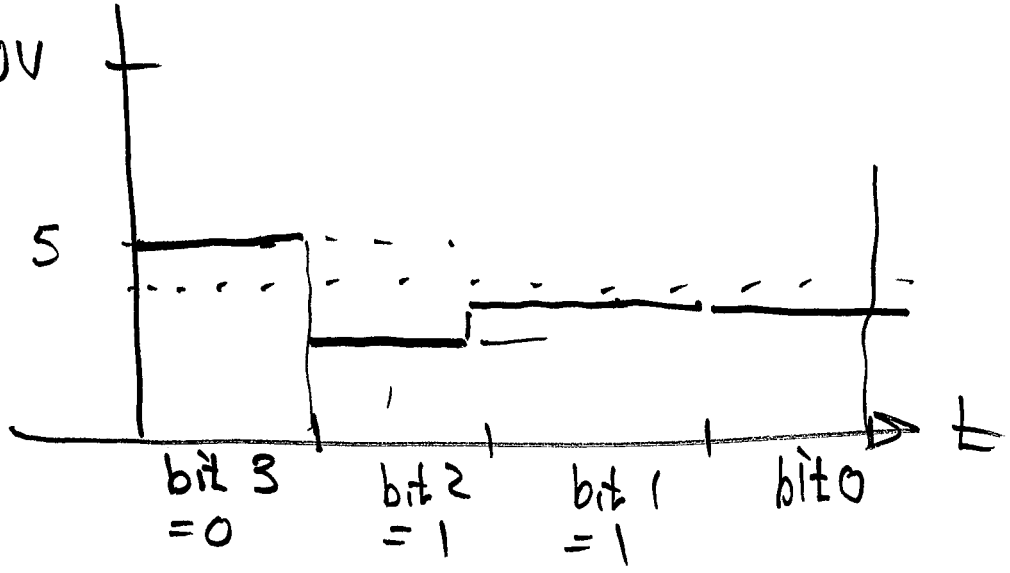
⇒ several technologies/methods can be used

- Flash or Parallel A/D
- Single and Dual Slope A/D
- Sigma-Delta A/D
- Successive Approximation (SAR) A/D

used in PIC24F family

Successive Approximation Register scheme

Example



For the PIC24F 10-bit A/D

2 steps

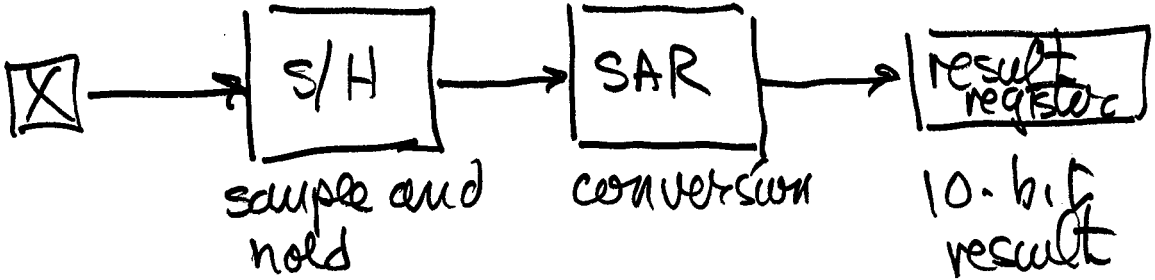
- Sample and Hold Step

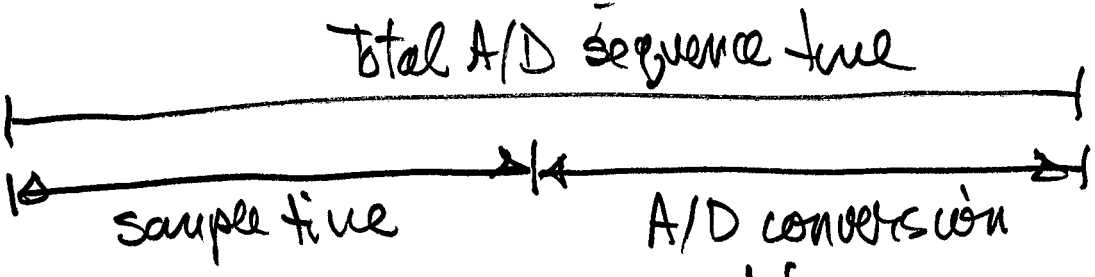
  sample the input signal and use it to charge a capacitor.

- Conversion

  Disconnect cap from input pin and connect it to the SAR A/D converter

We have





Conversion process is controlled by a number of registers

Fig 21-1 in PIC24FJ64GA002 datasheet

(PIC24F FRM Section 17)

10-bit

What Registers do you use

- 3 control registers
  ADICON1, ADICON2, ADICON3
- ADICHS (channel select register)
- ADIPCFG (port configuration)
- ADICSSL (scan select register)
- ADC1BUF0 (~~register~~ result buffer)

Details for configuring and using the A/D are in the FRM (sec. 17)

Configurations

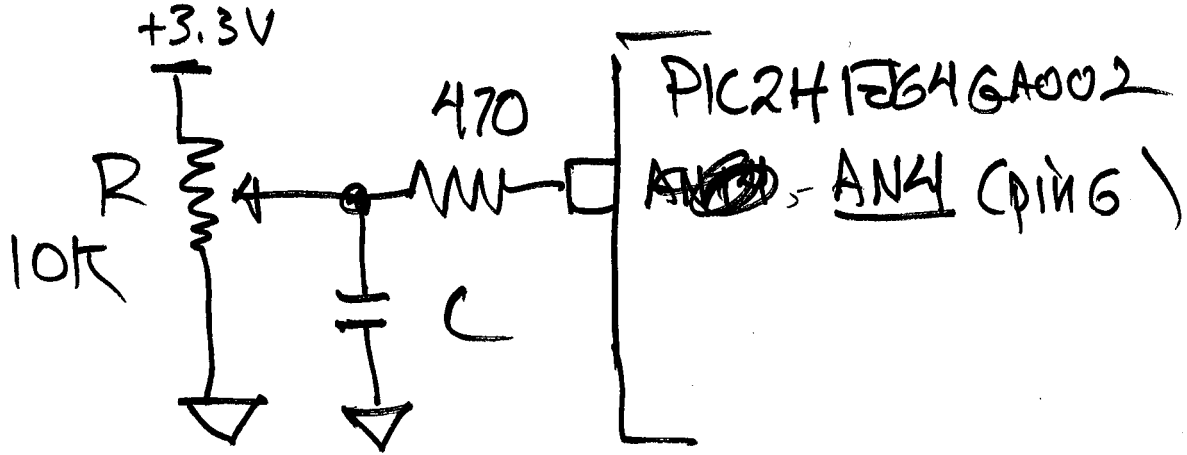
Example Codes

Datasheet also walks through the configuration bit settings

Do an example

Based on example in DiJasio

Sample a potentiometer



Digitize the voltage on the pot

Example

Resolution 10-bits or $2^{10} = 1024$ levels

Range is 0 to 3.3V

Precision $\frac{3.3V}{2^{10}} = 3.22mV$

Initialization

1111 1111 1110 1111 ← analog

```
ADIPCFG = 0xffef;  // AN4
ADICON1 = 0;
ADICSSL = 0;
ADICON2 = 0;
ADICON3 = 0x1F01;  // AD timing
ADICON1bits.ADON = 1;  // turn on
```

manually do 1 channel