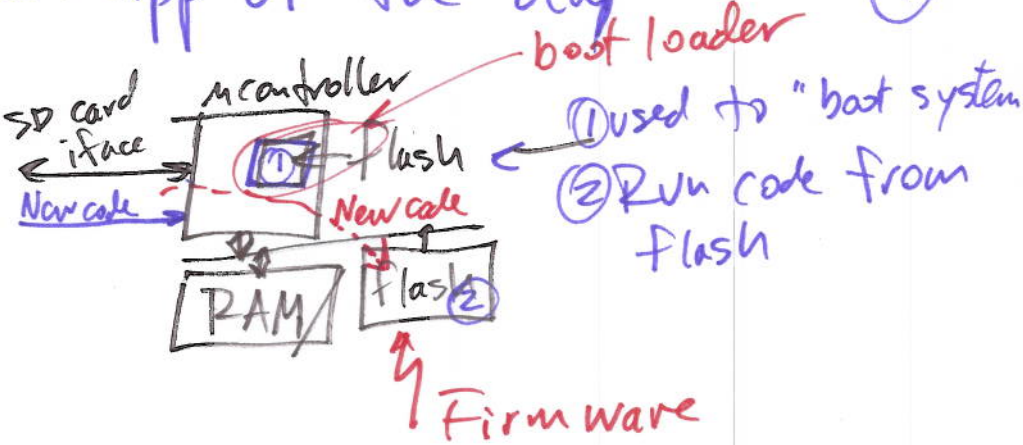
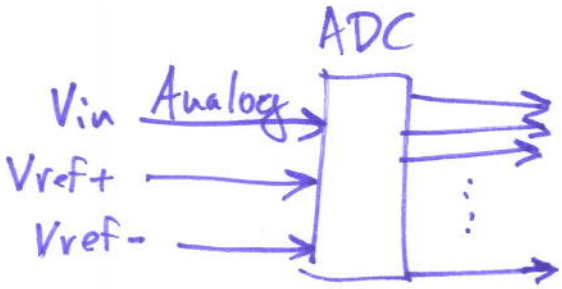
ECGR 4101/5101 - Lecture 11

Embedded system app of the day (1)



Chapter 6



Digital output
8 bits → 12 bits
Renesas

Specialty could be upto 18 bits

Setup (hardware)
- Vref+ & Vref- are set (wired)
- Identify port(s) for input (wire)
- Ensure signal floats (no-pull-up or pull-down Rs)

μcontroller provides:
1) FD port
2) Hold circuitry → takes snapshot
3) A/D Conversion → digital representation

Guessing Game

number between 0 & 100

Guess 1 = 50 L

2 = 25 L

3 = 12 L

4 = 6 L

5 = 3 L

6 = 1 H

7 = 2 !!!!!

How much time for our ~~Conversion~~ conversion?

tD = A/D Conv start delay time

tSPL = Sample

tSAM = Successive conversion ✓✓✓ most

tCONV = tD + tSPL + tSAM ←

$$n = \left[\frac{(V_{in} - V_{ref-})(2^N - 1)}{(V_{ref+} - V_{ref-})} + \frac{1}{2} \right]_{int}$$

$V_{+ref} = V_{ref+}$ (3)

N = bits in our ADC

V_{in} = input analog signal

V_{ref+} = highest voltage V_{in} could be

V_{ref-} = lowest voltage V_{in} could be

$V_{in} = 5V$

$V_{ref+} = 10V$

$V_{ref-} = -10V$

$N = 12$

what is n?

$n = 307_{10}$

max. n could be is $2^N - 1$
$= 4095$

min n could be is 0

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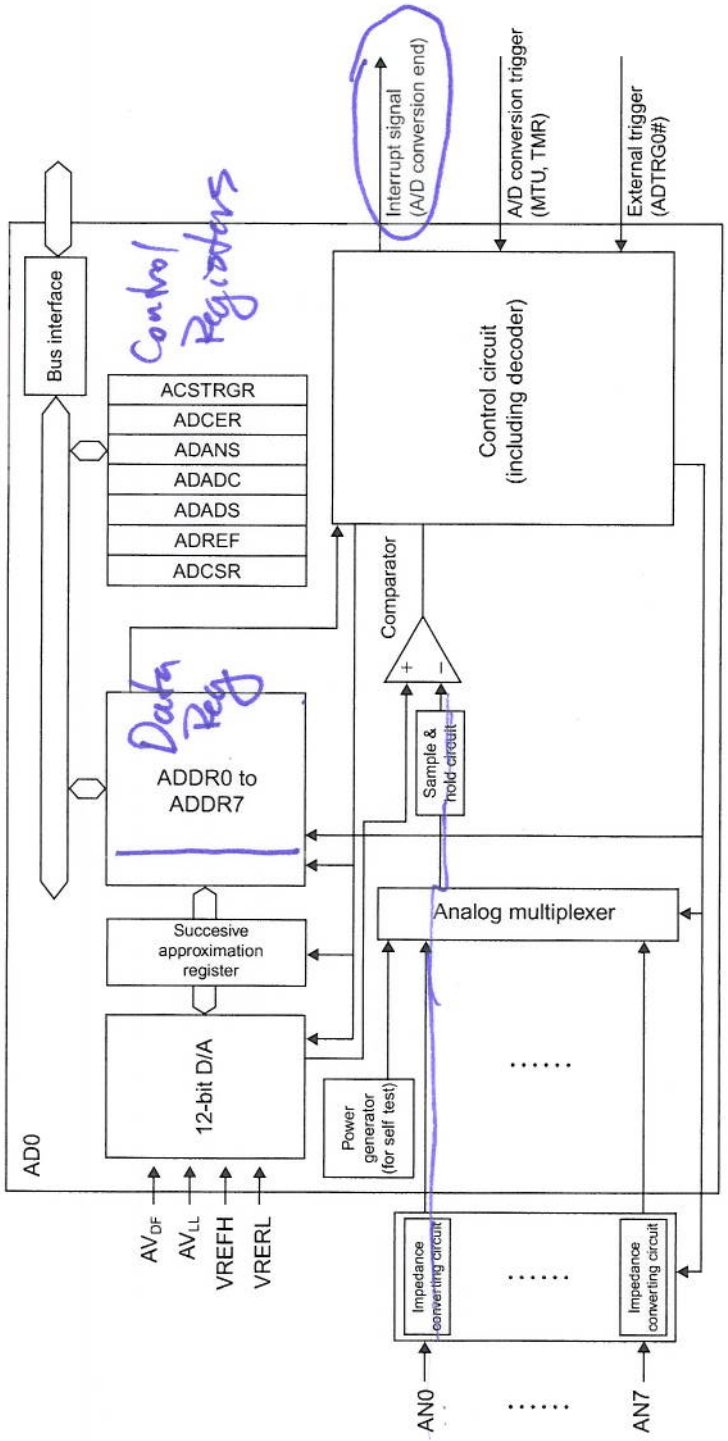

Figure 6.7 Block diagram of 12-bit ADC.