Embedded system app of the day:

1. Boot loader
2. Run code from flash

Chapter 6

ADC

Digital output
8 bits → 12 bits
Reversals

Specially could be up to 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)

Microcontroller provides:
1) Hold port circuitry → takes snapshot
2) A/D conversion → digital representation
ECGR 4101/5101 - Lecture 11

Guess my Game
number between 0 & 100

Guess 1 = 50
2 = 25
3 = 12
4 = 6
5 = 3
6 = 1
7 = 2

How much time for our Conversion?

\[ t_D = A/D \text{ Conv start delay time} \]

\[ t_{SPL} = \text{Sample} \]

\[ t_{SAM} = \text{Successive conversion} \]

\[ t_{\text{ConV}} = t_D + t_{SPL} + t_{SAM} \leq \]
\[ n = \left\lfloor \frac{(V_{\text{in}} - V_{\text{ref}})(2^N - 1)}{(V_{\text{ref}}^+ - V_{\text{ref}}^-)} + \frac{1}{2} \right\rfloor \text{ in}^+ \]

\[ V_{\text{ref}}^+ = \text{Vref}^+ \]

\[ N = \text{bits in out ADC} \]

\[ V_{\text{in}} = \text{input analog signal} \]

\[ V_{\text{ref}}^+ = \text{highest voltage} \quad V_{\text{in}} \text{ could be} \]

\[ V_{\text{ref}}^- = \text{lowest voltage} \quad V_{\text{in}} \text{ could be} \]

\[ V_{\text{ref}}^+ = 10 \text{V} \]

\[ V_{\text{ref}}^- = -10 \text{V} \]

\[ N = 12 \]

\[ \text{What is } n? \]

\[ n = 3071_{10} \]

\[ \text{max. } n \text{ could be is } 2^N - 1 \]

\[ = 4095 \]

\[ \text{min. } n \text{ could be is } 0 \]
Figure 6.7 Block diagram of 12-bit ADC.