ECE271: Microcomputer Architecture and Applications — University of Maine

Prelab for Lab #10: Analog to Digital Converter (ADC)

Week of 11 April 2022

Part A – Textbook Readings / Videos

1. Read Textbook `Chapter 20` to review Analog/Digital Conversion.

Part B – Prelab assignment

In this lab we will set up the Analog Digital Converter (ADC) and use it to measure analog inputs from a potentiometer and from an infrared receiver.

1. Setting up pin PA1 as an analog input (for ADC)

You will need to set the following fields. Record the values to mask/set. If no mask is needed you can leave it blank. You should use pre-defined names for the bits rather than raw hex values if at all possible.

- Set `GPIOA->MODER` for pin 1 to be "analog" (0b11).
  MASK MODER=__NA_____
  VALUE MODER=_____ GPIO_MODER_MODER0

- Set the `GPIOA->ASCR` bit for pin 1. This hooks up the Analog pin to the ADC.
  MASK ASCR=__NA_____
  VALUE ASCR=_____ GPIO_ASCR_EN_0

2. Setting up the ADC

In this lab we will set up ADC1. We will be implementing the flowchart in Figure 20-12 in the textbook.

Pg. 494

3. Questions (See chapter 20.8 in the textbook)

You have the ADC set up with a 3V reference voltage and 12-bit resolution. → 4096

1. How many volts is each bit increment in the value read from the ADC equal to?
2. If you want to check if the input voltage is greater than 2V, what value from the ADC would you compare against?

1) $\frac{3V}{4096} = 732\,\mu V$ per each bit increment

2) $\frac{2}{3} \times 4096 = 2730.667$ to binary → 1010 1010 1010