

Class Notes on the design of the EX4_Project_2

⇒ Objective: Design a counter similar to the standard chip 74HC4017 based on the Microchip PIC16F877A microcontroller.

1. Specifications

- a. Let's study the 74HC4017 datasheet to make adaptations and figure out the chip features.
- b. Draw the symbol. Name all the signals.
- c. Write a function table.
- d. Draw a timing diagram to show how the system will respond to inputs activity.
- e. Consider how many states does the system need.
- f. Can you draw a general state diagram or a specific state diagram for every mode of operation?

2. Plan

- 2A - Hardware
 - a. Draw the schematic in Proteus that will contain the chip. Chip_74HC4017.pdsprj
 - b. Connect and label all the inputs and outputs. Draw inside the subcircuit the PIC16F877A taking a previous example and adapting it.

c.- Use LED an switches or buttons to better simulate outputs and inputs.

2B. - Software - Do you know different ways to plan the counter architecture based in our FSM style? Draw the equivalent schematics.

Find, at least two ways, to be able to compare approaches.

- Can you do it in a similar way as in Chapter II?

- Can you enumerate states (Unit 2.3) or use the arithmetic functions like

$$\text{present_state} = \text{present_state} + 1 \quad (\text{Unit 2.5})$$

- How are you going to code the present_state variable? (binary, Gray, One-hot, Johnson, etc...)

- and so, how about the CC2 (out, ut, logic()) function?

- Can you specify the truth table of both, the CC1 and CC2 functions?

- How many variables will you use?

- How are you going to read (poll) control inputs?

- How are you going to detect clk edges \uparrow or \downarrow ? (interrupt)

- How does the software be organised?

- Do you plan several design phases?