NPTEL Workshop: Experiment 8

Wadhwani Electronics Lab, IIT Bombay

14 July, 2022

1 Problem statement

In this experiment, you will design a string detector using a Mealy type FSM which outputs '1' when input sequence of letters given thus far contains the following sub-sequences:
bomb
gun
in a string of letters.

For this experiment, letter 'a' is encoded as "00001", 'b' is encoded as "00010" and so on.

For example suppose the input string is: ***Bring UNO cards from my bag***
This string contains the subsequence "gun" and "bomb".
Thus, the input and output sequences when lined up will look like:

Bring UNO cards from my bag
000000010000000000000000100

Note: Consider characters in this problem as case insensitive.

2 Design Specification.

- Input: 5-bit input signal encodes blank-space and 26 lower-case characters (from a to z and where a = 1 to z = 26, and blank-space = 0) , Reset, Clock.
- In this problem Reset is synchronous.
- TRACEFILE format $< 5\ bit\ input >< Reset >< Clock >\quad < Output >\quad < Maskbit >$
- Output: 1-bit output

3 Lab Task

- Describe behavioral model of the string detector Mealy type FSM in VHDL.
- First draw the state diagram for the detection of both the desired words "bomb" and "gun". Take reference from the last string detector experiment(students) for drawing the state diagram and writing VHDL description.
- Perform RTL and Gate-level simulation using the provided testbench and tracefile.
- Demonstrate the simulations to your TA.
- Perform scan-chain and demonstrate to your TA.