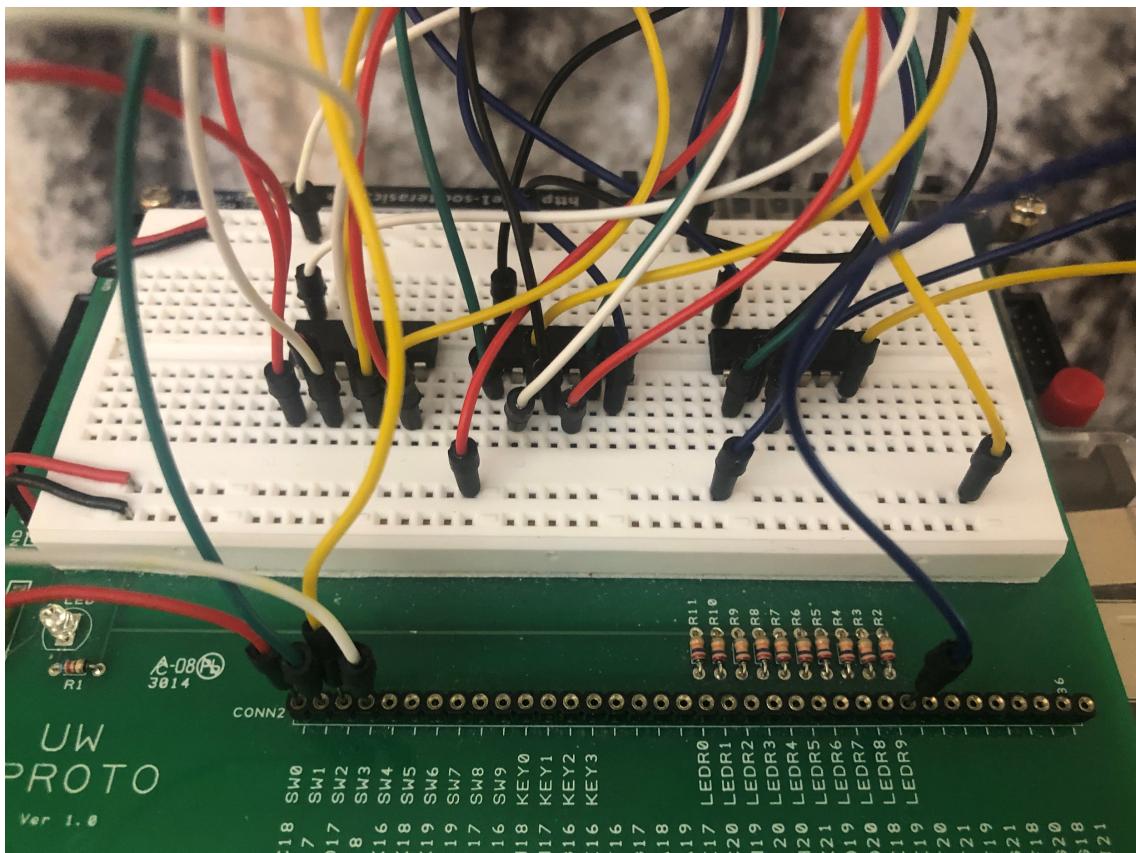
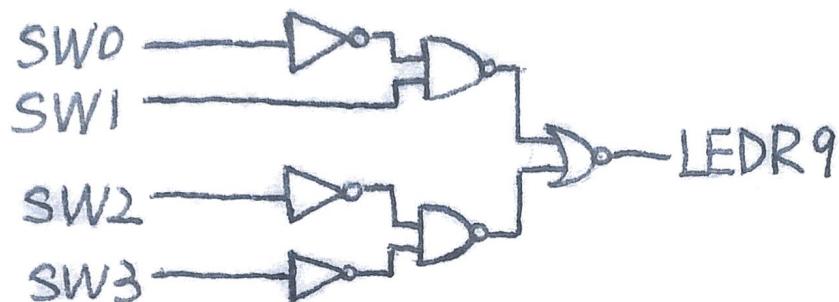


Lab 2 Report

1. Demo video:

<https://drive.google.com/file/d/1Ao4x-uQ21Phof08uToh5BhtrPqDRF9PD/view?usp=sharing>

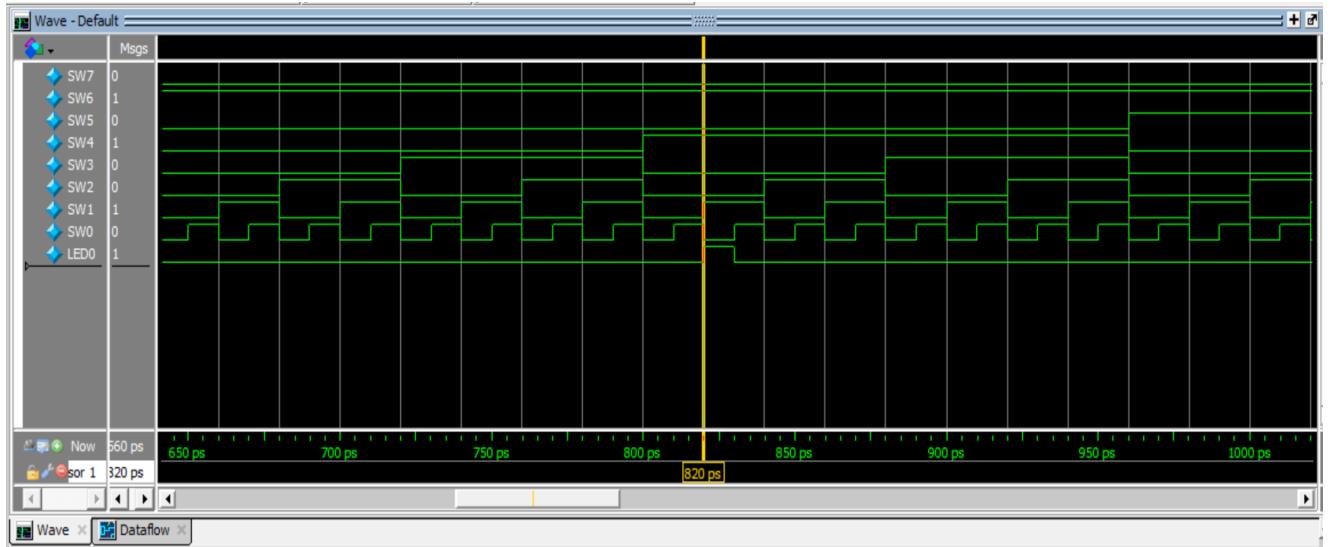
2. Include a circuit diagram of your 1-digit recognizer as was built on your breadboard (i.e., with 2-input inverter, NOR, NAND gates only).



I'm using 2 NAND gates, 1 NOR gate and 3 2-input inverters.

- 3. Include a screenshot of your 2-digit recognizer simulation in ModelSim showing a partial simulation waveform when the input is your recognized number and a span of about 10 numbers around it (e.g., if your circuit is supposed to recognize '74', show a screenshot of your simulation results from when the input is about 64-84.). We are not very picky about this screenshot - just show us something that clearly shows that your circuit is detecting properly.**

My two digits are 52, which is 0101 0010, corresponding to $81 * 10\text{ps} = 820\text{ps}$.



- 4. In the given testbench for the 2-digit recognizer, why is the for loop iterated 256 times?**

Though we are testing two digits, since 8 and 9 correspond to 1000 and 1001 in binary code, we need 4 switches (4 binary digits) to present each digit, in total 8 switches (8 binary digits) to include all combinations from 00 to 99. In the testbench, we chose to try every combination possible for the 8 binary digits, which would be $2^8 = 256$ combinations. This looks more than the combination of our input 2 digit, as our representation is different from transforming decimal to binary because we will not have combination 1010 to 1111 in the last for binary digits. However, for our convenience, trying every combination is fine, so we need to iterate 256 times to do that.

- 5. Approximately how much time did you spend on this lab (including reading, planning, design, coding, debugging etc.)?**

It took me about 7 hours to finish the lab. About 3.5 hours was because my '00' gate was not functioning properly for some reason, and it took me a long time to figure out why. The rest is fine.