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**EE 4550L**

**IC Hardware Security and Trust LAB**

**SPRING 2024**

**TA: Kanchan Vissamsetty**

**Lab section: 01**

**Name: Alex Yeoh**

**“I have neither given nor received aid on this assignment, nor have I observed any violation of the Honor code”**

**Signature: Alex Yeoh Date: 29th March 2024**

**Report due date: 29th March 2024**

1. **OBJECTIVE**

To learn how to use a HaHa board.

1. **PROCEDURE**

Measure the voltage of two pins on the HaHa board and learn what the buttons do to the voltages. Load test.pof that tests the FPGA and the Peripherals into the HaHa board and ensure the HaHa board performs as expected. Load U\_ACC.elf that tests the microcontroller and accelerometer and ensure the HaHa board performs as expected. Read data from the HaHa board to test the Temperature Sensor, RAM Module, and PLL Module to ensure the HaHa board performs as expected. Load U\_EEPROM.elf that tests the EEPROM and ensure the HaHa board performs as expected.

1. **RESULT**

Part 1

1a) the board while it is on with LED D9 lighting up  
A black circuit board with red lights

Description automatically generated

2a) picture showing the voltage of the input pin

A blue and red digital multimeter

Description automatically generated

2b) picture showing the voltage of the output pin

A blue and black digital multimeter

Description automatically generated

3a) approximately 1.30V to 3.23V

3b) minimum voltage of the 3.3A test point

A digital multimeter on a desk

Description automatically generated

3c) maximum voltage of the 3.3A test point

A blue and black digital multimeter

Description automatically generated

Part II

1a) screenshot of the Programmer Window showing Quartus detecting two chips in the

JTAG chain

A computer screen with a computer screen

Description automatically generated

2a) It alternates between blinking and sweeping. Odd switches flipped on causes the sweeping pattern while even switches flipped on causes the alternating pattern.

2b) Each button press increments the counter until it overflows where it becomes 0 again.

2c) screenshot of the programmer window showing that it’s been fully programmed.

A screenshot of a computer

Description automatically generated

2d) picture of the board with one of the LED patterns and a hexadecimal digit

displayed in 7-segment display.

A black circuit board with red lights

Description automatically generated

Part III

2a) photo of the board showing the acceleration value on the LEDs

A person holding a black circuit board

Description automatically generated

Part IV

1a) screenshot of the In-System Memory Content Editor window showing that 3 types of

data.

A computer screen with a computer screen

Description automatically generated with medium confidence

Part V

1a) photo of the board showing the value 0x29 on the LEDs.

A black circuit board with red lights

Description automatically generated

1b) screenshot of the In-System Memory Content Editor window, showing 0x29

for the 2nd byte of data.

A screenshot of a computer

Description automatically generated

1. **CONCLUSION**

My results satisfy the requirements. It is not possible to improve my design with better results as nothing was designed. I have learned how to test a HaHa board.