

CSEE 4280: Lab 5:

Designing the Toy Processor Datapath

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Contributions: Please list contributions (in estimated percentages) of each member in the following categories.

• Pre-lab design and analysis:

Habilou - 50% Kingsley - 50%

• In-lab module and testbench design

Habilou - 50% Kingsley - 50%

• In-lab testbench simulation and analysis

Habilou - 50% Kingsley - 50%

• In-lab FPGA synthesis and analysis

Habilou - 50% Kingsley - 50%

• Lab report writing

Habilou - 50% Kingsley - 50%

# **ABSTRACT**

Now we have built all the necessary components for the Toy Processor. We will connect the Datapath and the controller to finish the implementation. You will then validate our design by simulating the behavior of your Toy Processor for a simple program.

1. **INTRODUCTION**
   1. **Prelab**

|  |  |  |
| --- | --- | --- |
| Instruction | Input | Memory Address |
| RESET | 0000 0000 | 0000 0000 |
| ADD | 0000 0001 | 0000 0001 |
| 170 | 1010 1010 | 0000 0010 |
| CLR | 0000 0100 | 0000 0011 |
| ADD | 0000 0001 | 0000 0100 |
| 254 | 1111 1110 | 0000 0101 |
| SUB | 0000 0010 | 0000 0110 |
| 1 | 0000 0001 | 0000 0111 |
| STORE | 0001 0000 | 0000 1000 |
| 255 | 1111 1111 | 0000 1001 |
| CLR | 0000 0100 | 0000 1010 |
| BNZ | 0000 1000 | 0000 1011 |
| 254 | 1111 1110 | 0000 1100 |

1. **IMPLEMENTATION DETAILS**
   1. **A close up of text on a white background

      Description automatically generated Controller Schematic**

* 1. **A screenshot of a social media post

     Description automatically generated Controller Testbench**

**A screenshot of a cell phone

Description automatically generated**

1. **Analysis Error**
   1. **A picture containing monitor, wall, indoor, screen

      Description automatically generated Waveform**

**The Waveform obtained confirms the correctness of our module because we were able to replicate the waveform given in the lab instruction.**

1. **CONCLUSION**

We were able to create a controller and confirmed its functionality by creating a testbench and obtaining a waveform identical to the one given in the lab instruction.