ISTANBUL TECHNICAL UNIVERSITY
COMPUTER ENGINEERING DEPARTMENT

BLG 222E

Computer Organization
Project 1

PROJECT DATE : 24.05.2023

GROUP MEMBERS:

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SPRING 2023

Contents

1 INTRODUCTION

In this project our purpose was to design a hardwired control unit. To achive this we firstly implemented small components of this system. Yusuf did the fetch and decode parts, Hakan did the instructions without memory reference and Emre did the instructions with memory reference. Yusuf also wrote the test bench and tested the system with Hakan.

At first, Yusuf has designed the fetch cycle. Then Hakan and Emre designed the execute part. Hakan and Yusuf then tested the project and corrected the errors.

2 IMPLEMENTATIONS AND EXPLANATIONS

2.1 Fetch Cycle

2.2 Instructions With Address Reference

2.3 Instructions Without Address Reference

2.4 Memory Implementation

3 DESIGN PHOTOS

3.1 Part 1

Figure 1: Register Design

3.2 Part 2

3.2.1 Part 2.a

Figure 2: IR Design

3.2.2 Part 2.b

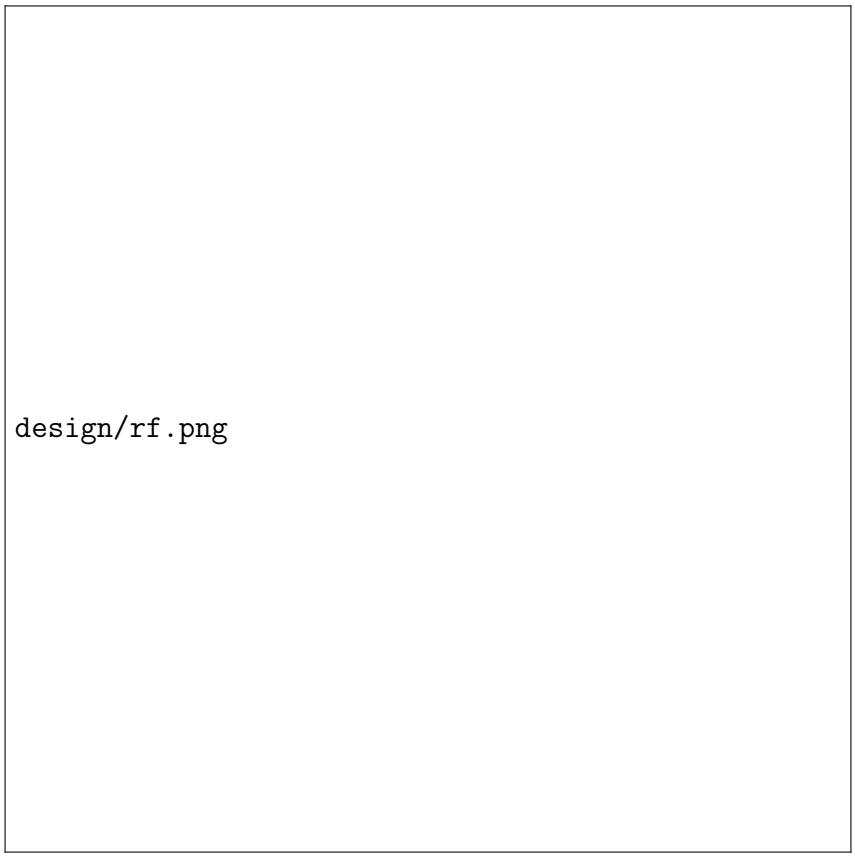

Figure 3: RF Design

3.2.3 Part 2.c

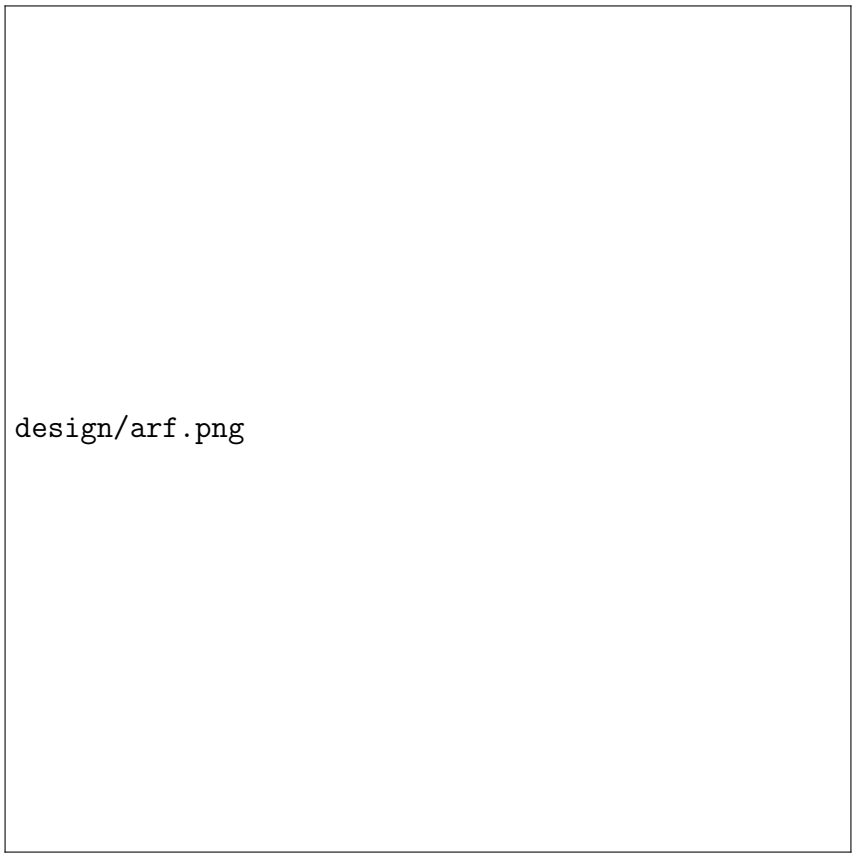

Figure 4: ARF Design

3.3 Part 3

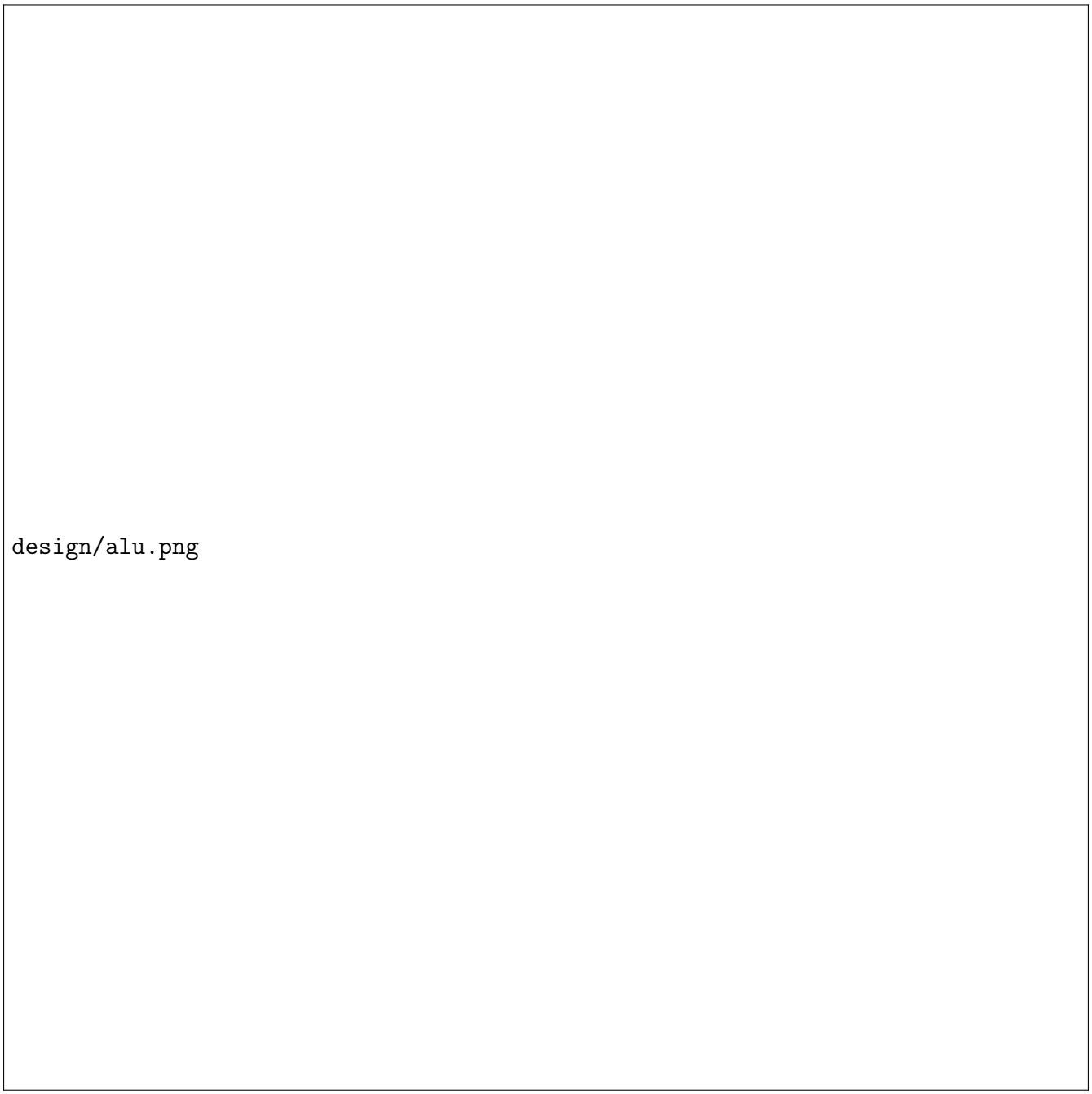

Figure 5: ALU Design

3.4 Part 4

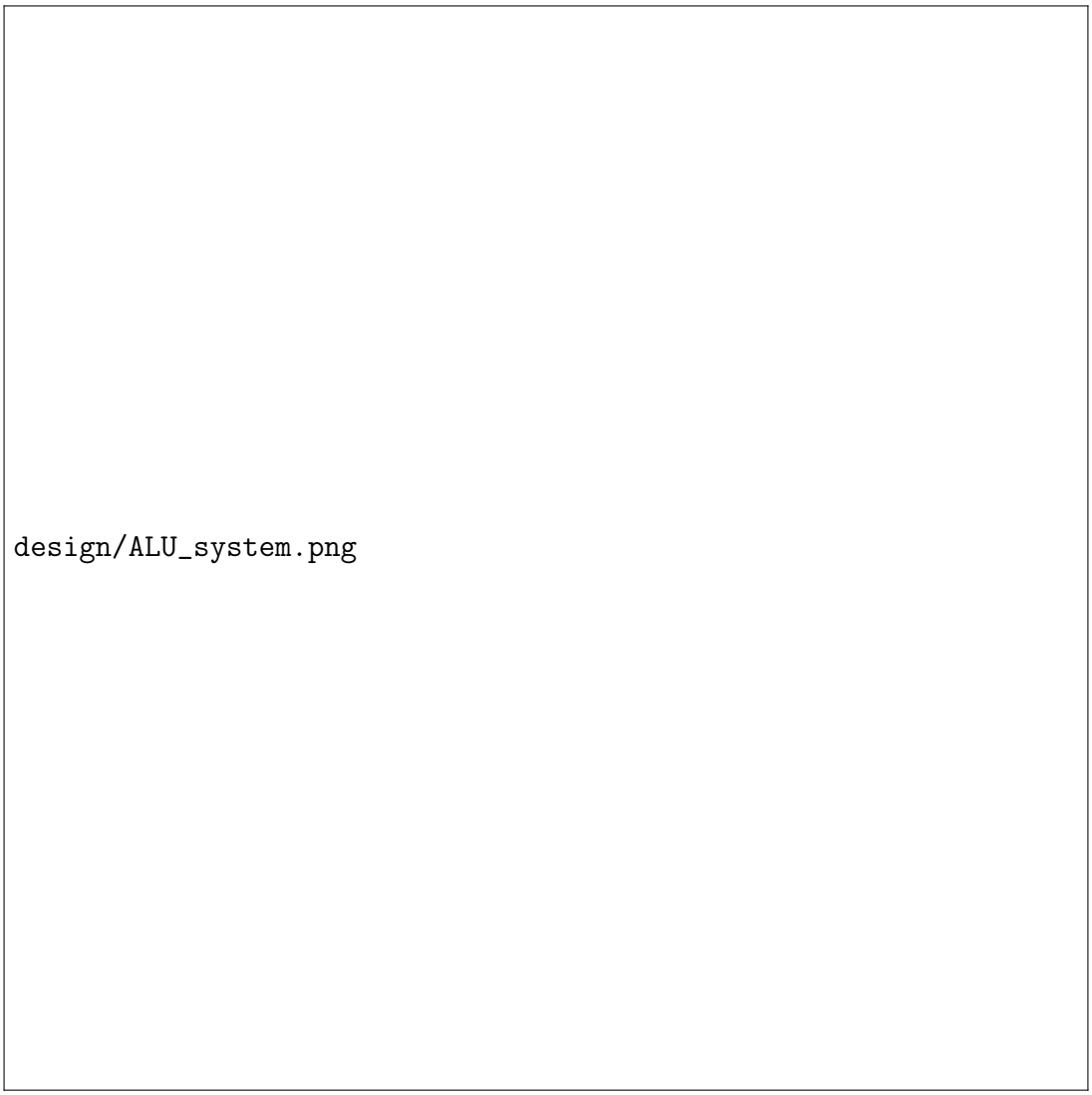

Figure 6: ALU System Design

4 RESULTS

4.1 Part 1

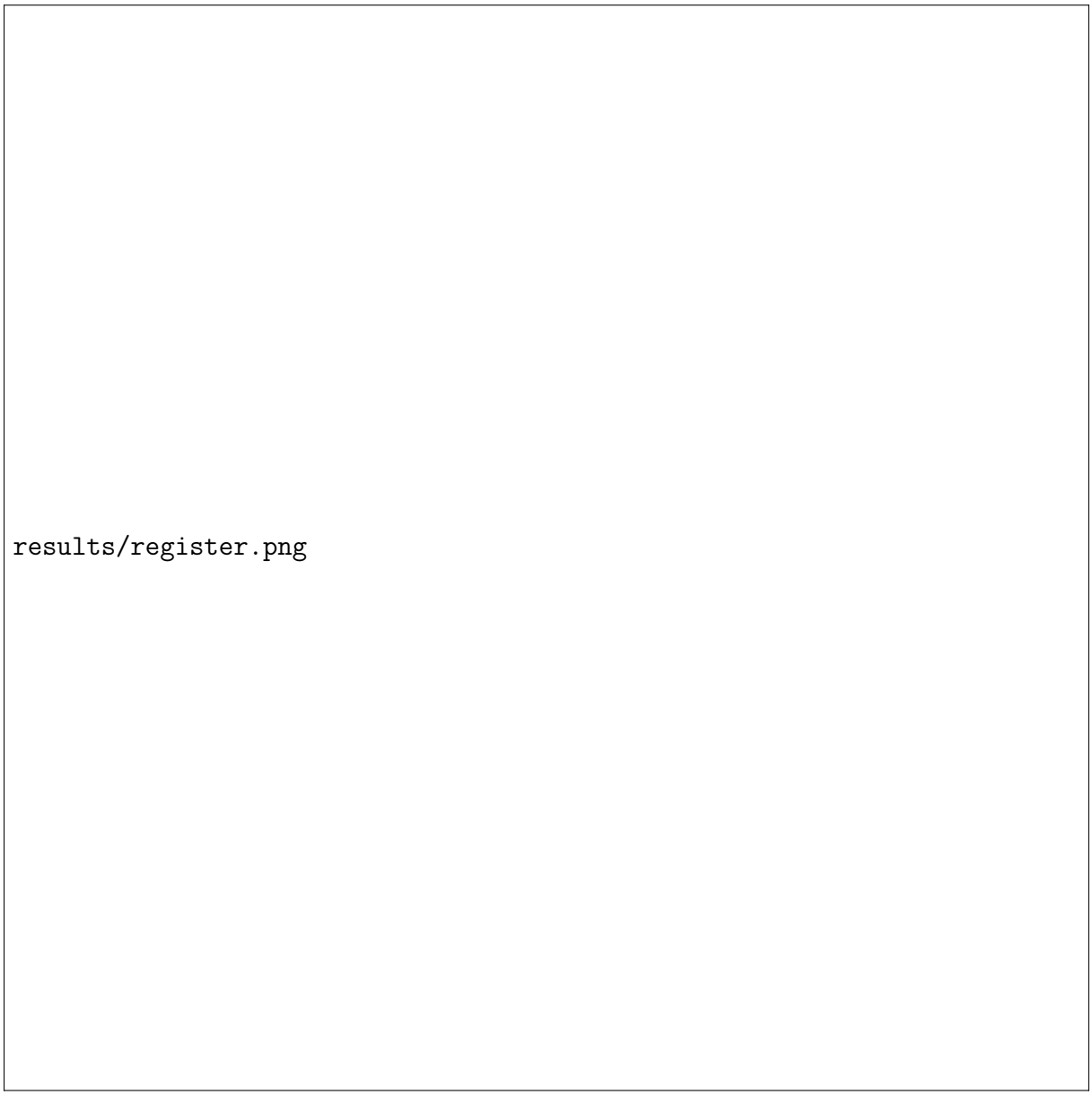

Figure 7: Register Simulation

4.2 Part 2

4.2.1 Part 2.a

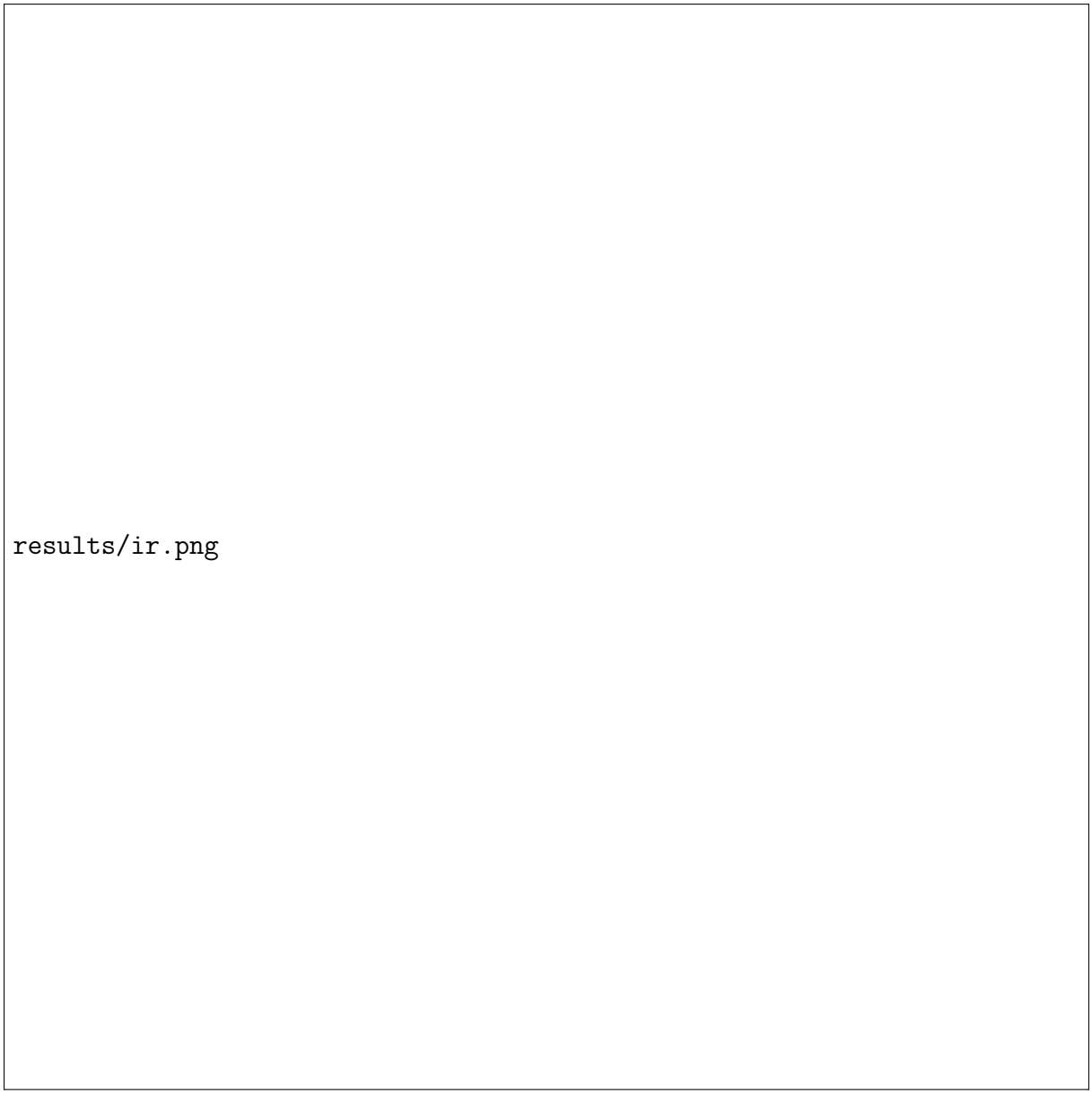

Figure 8: IR Simulation

4.2.2 Part 2.b

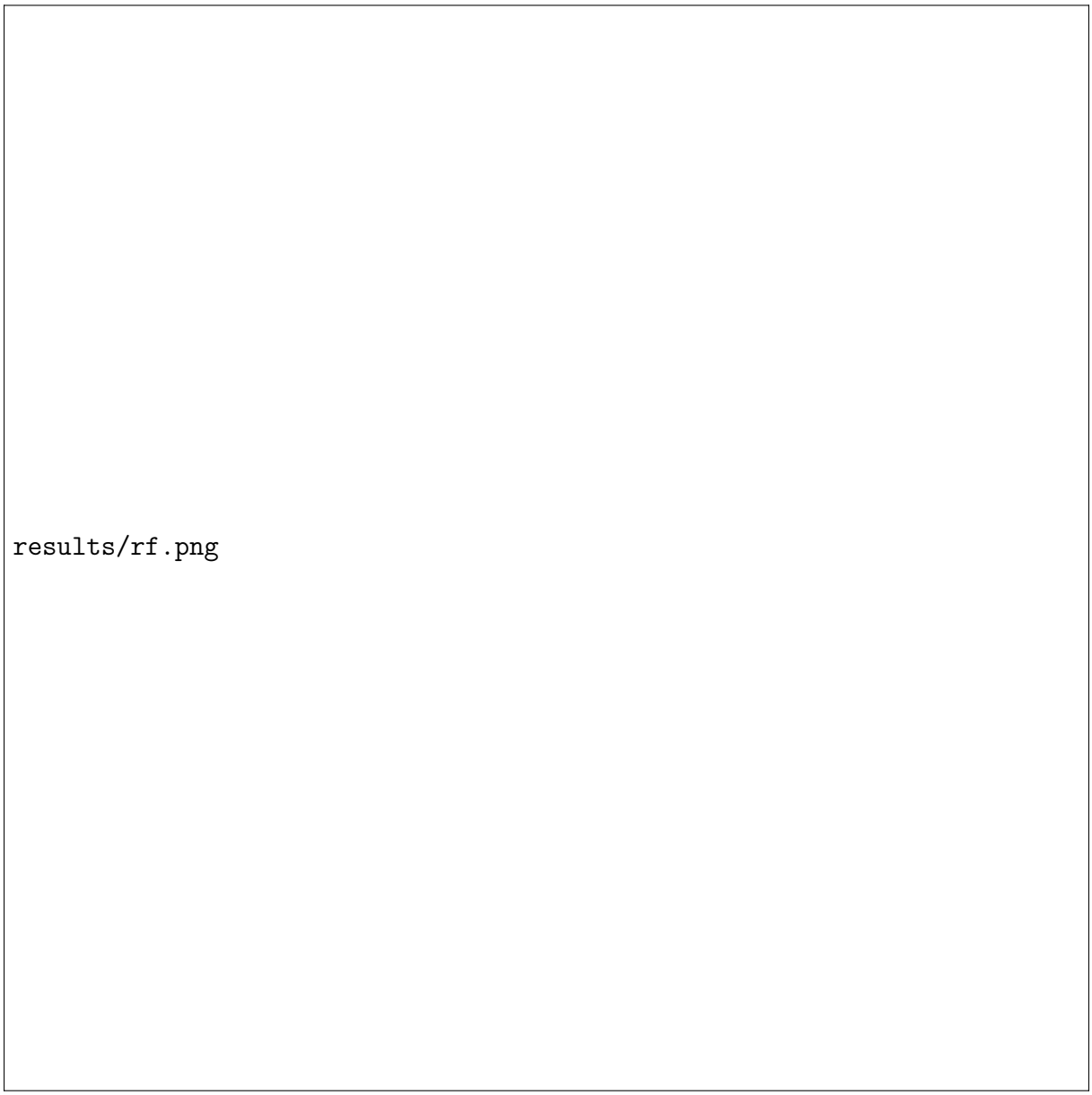

Figure 9: RF Simulation

4.2.3 Part 2.c

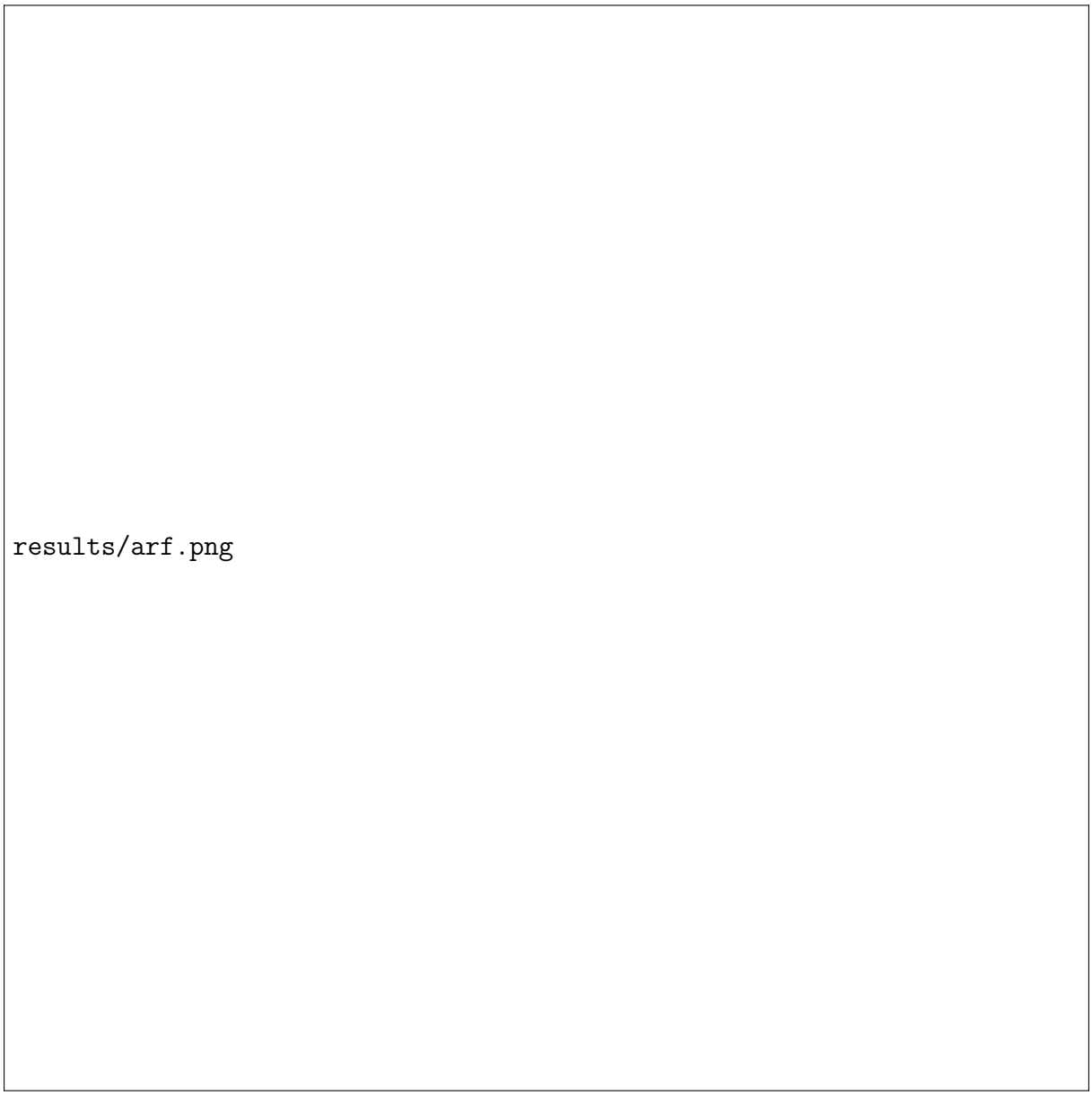

Figure 10: ARF Simulation

4.3 Part 3

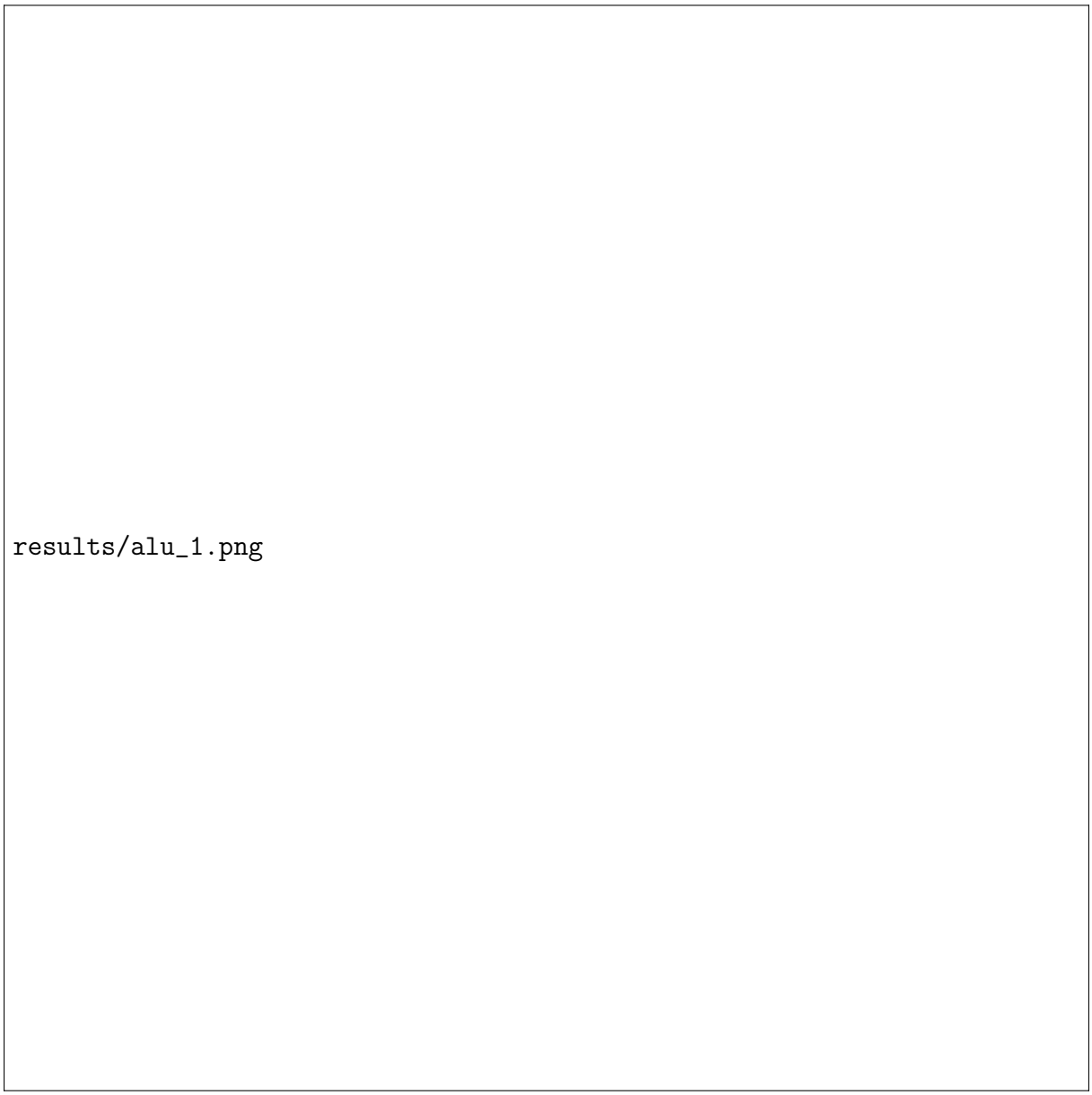

Figure 11: ALu Simulation, First Image

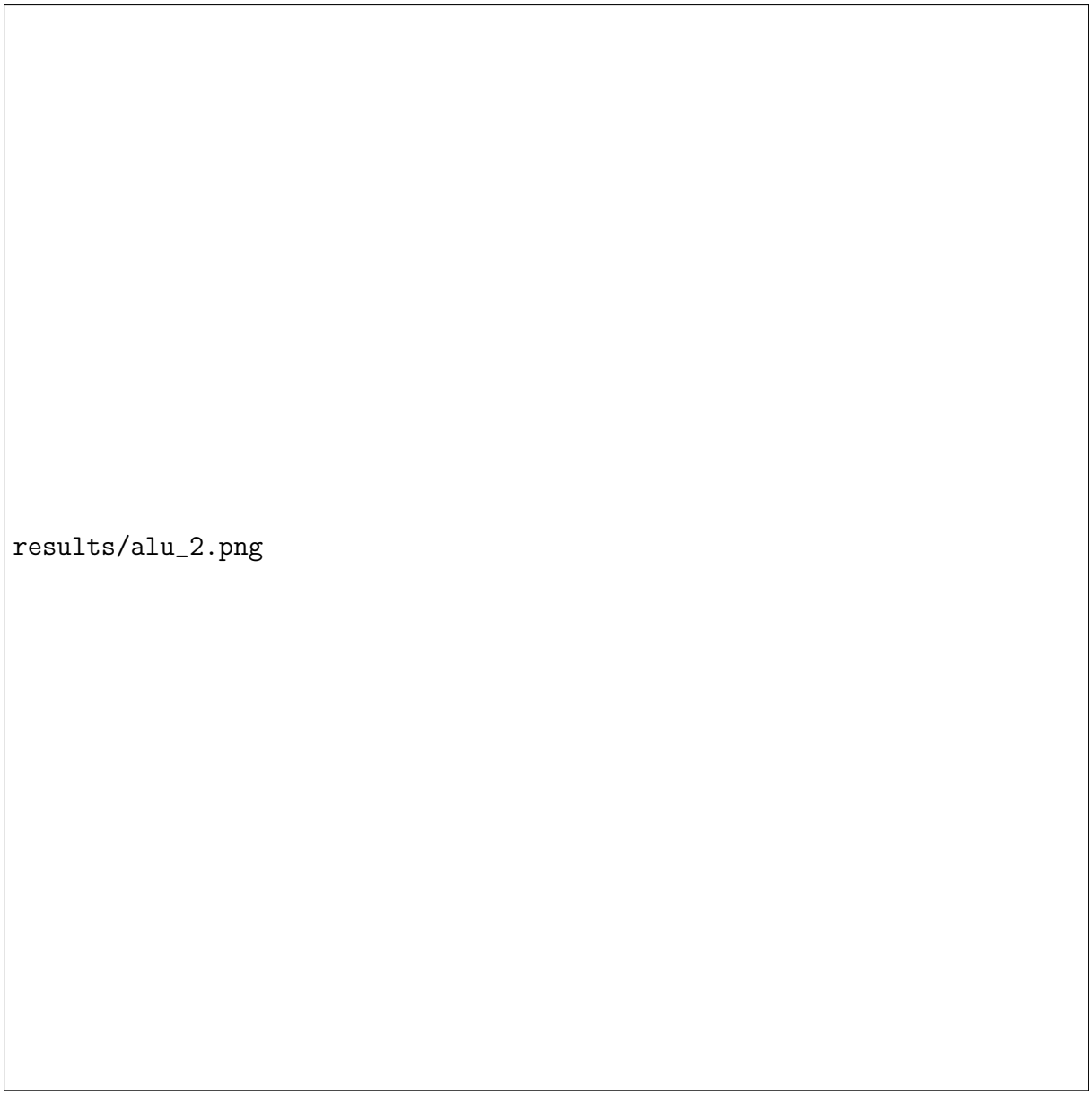

Figure 12: ALu Simulation, Second Image

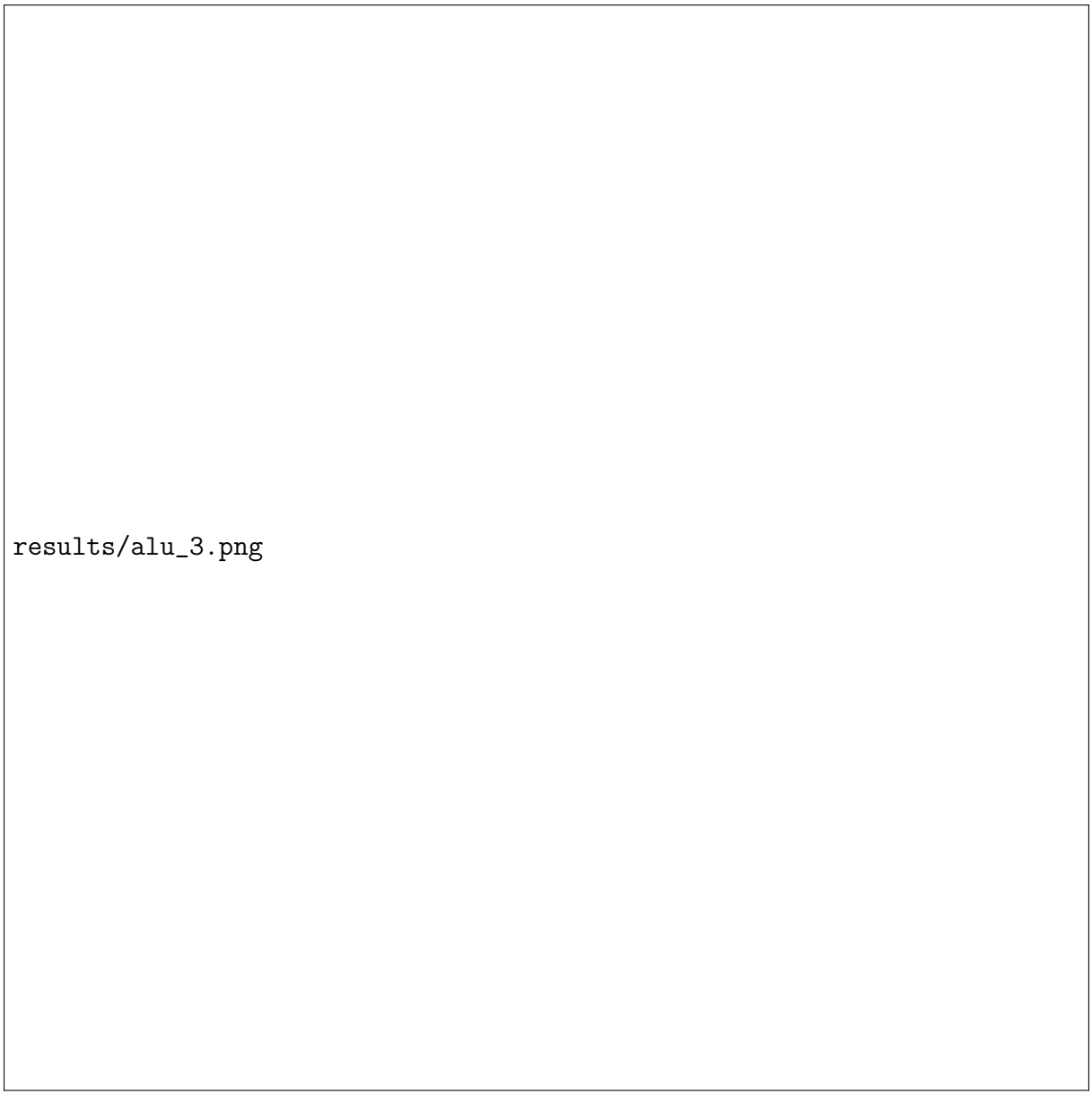

Figure 13: ALu Simulation, Third Image

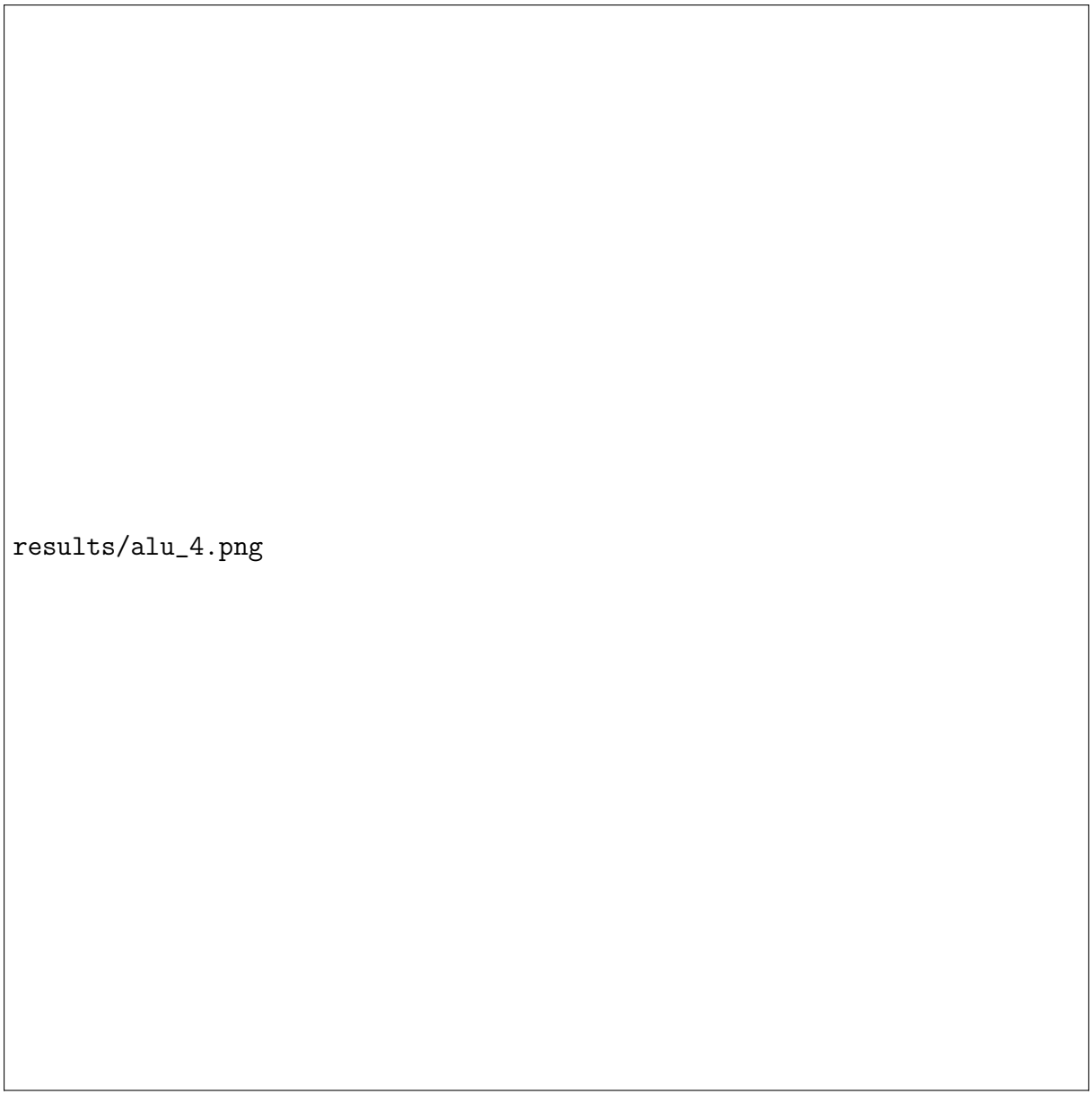

Figure 14: ALu Simulation, Fourth Image

4.4 Part 4

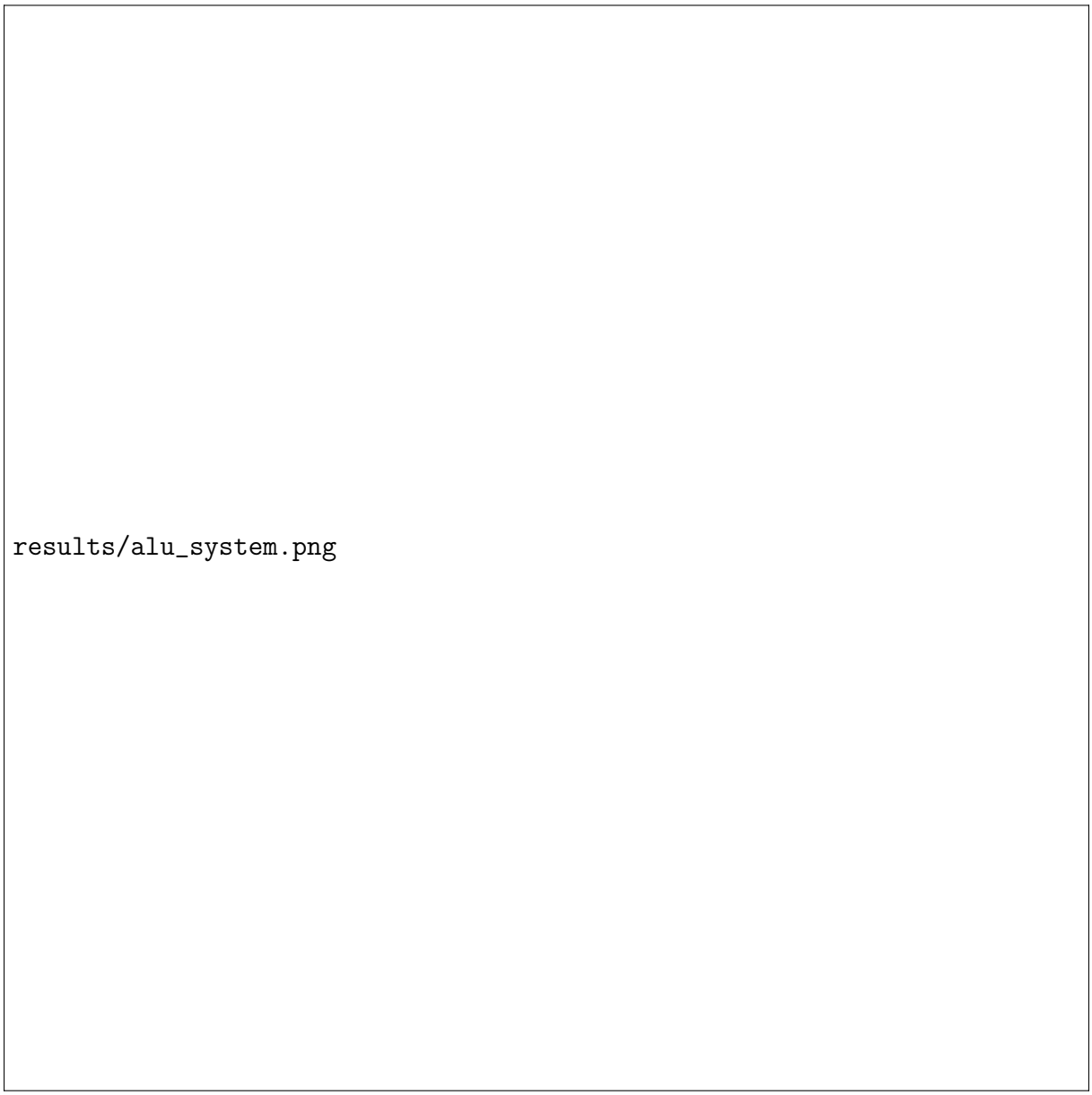

Figure 15: ALU System Simulation

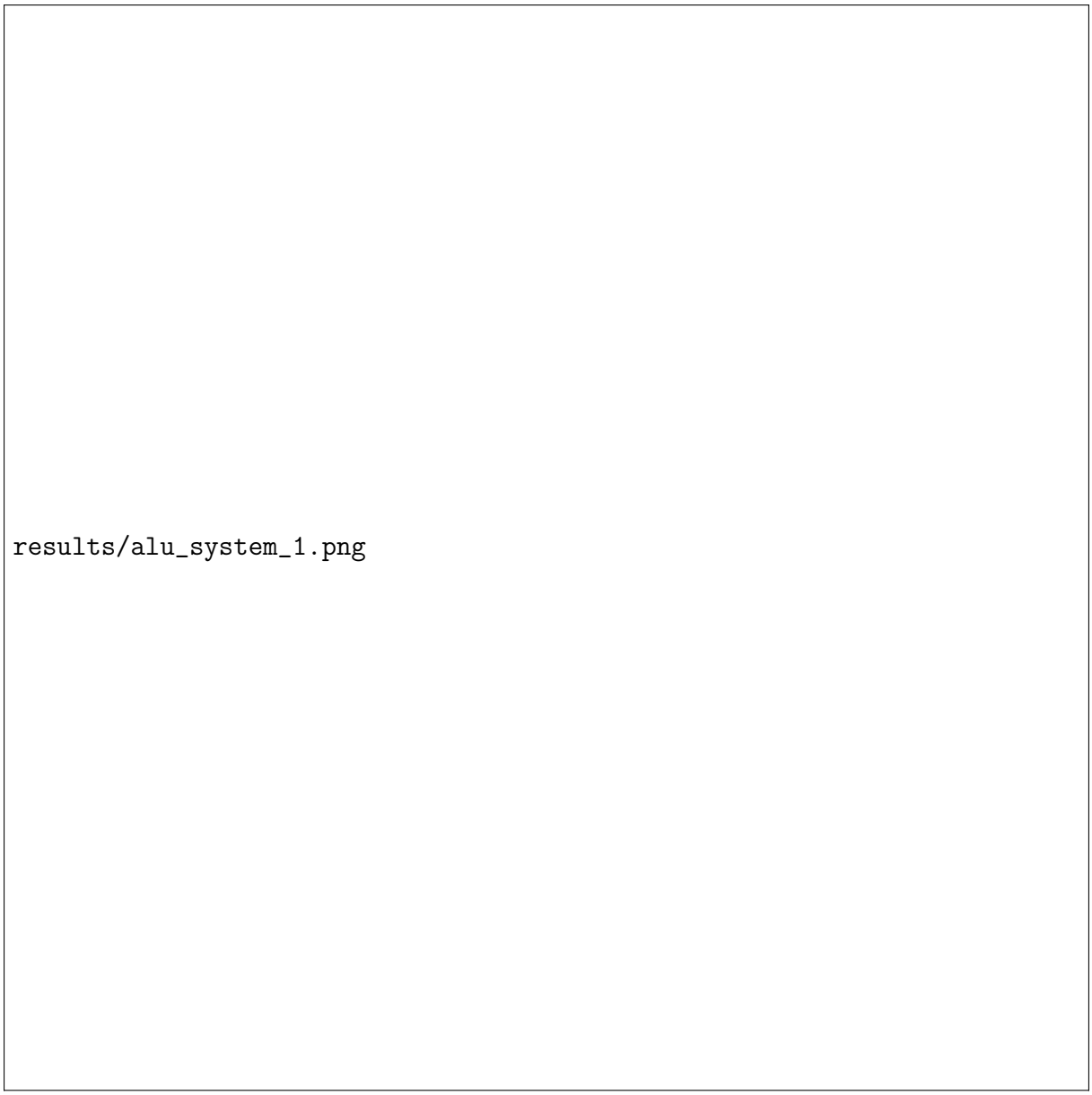

Figure 16: TCL Console for First Inputs

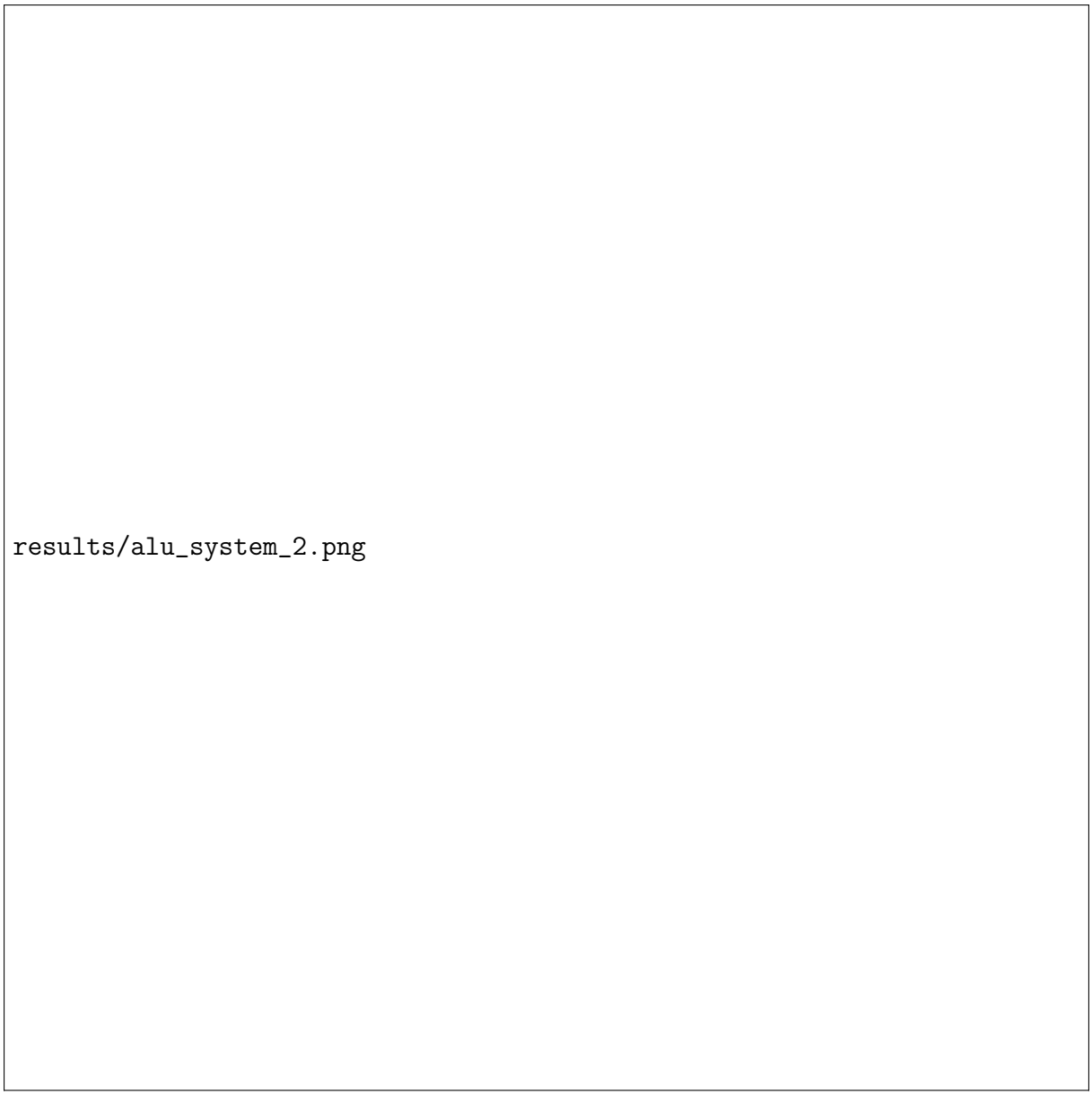

Figure 17: TCL Console for Second Inputs

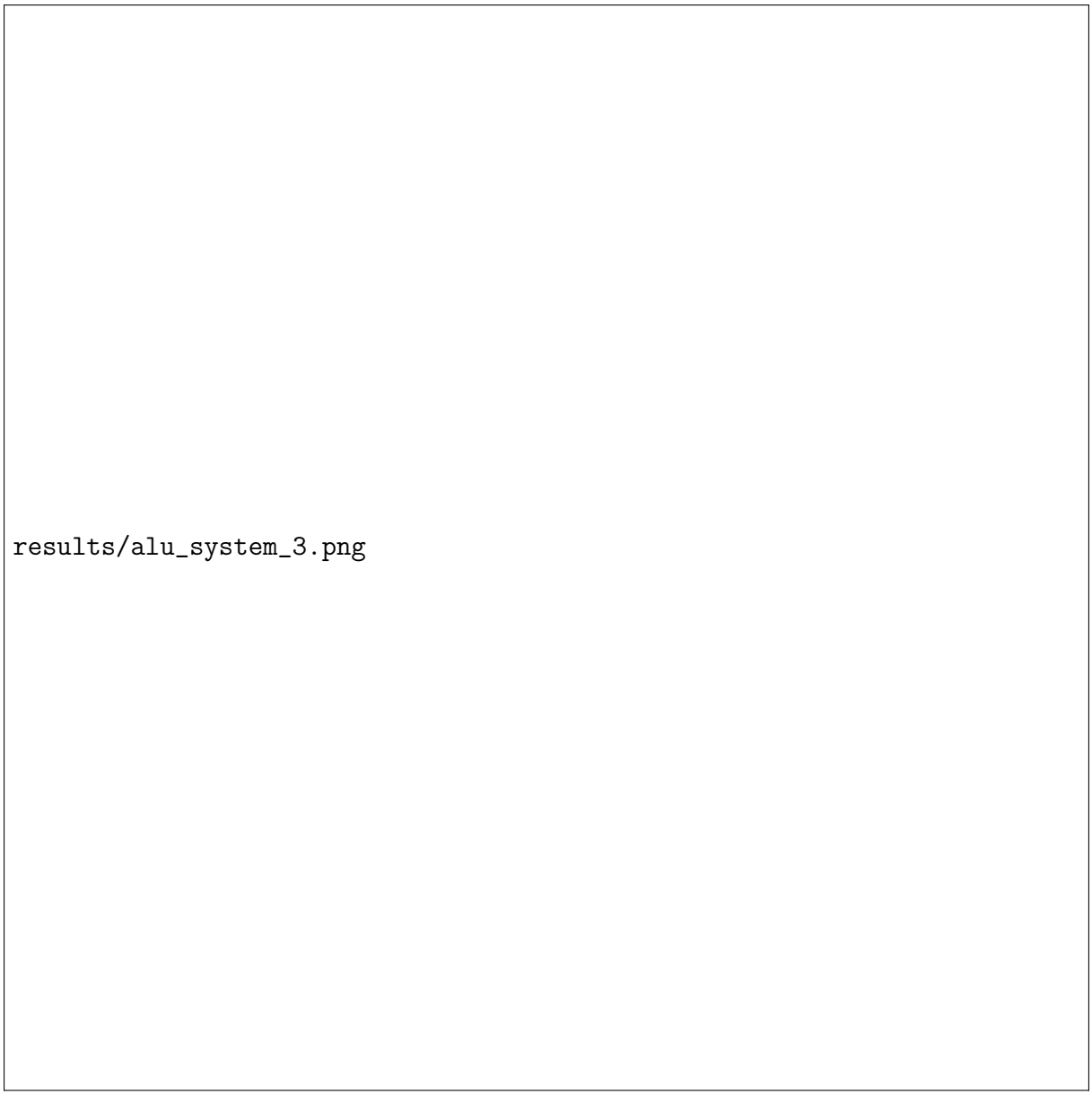

Figure 18: TCL Console for Third Inputs

5 DISCUSSION

5.1 Memory

6 CONCLUSION

In this project we designed a hardwired control unit with the help of the ones we created in the first project.