sdmay25-31

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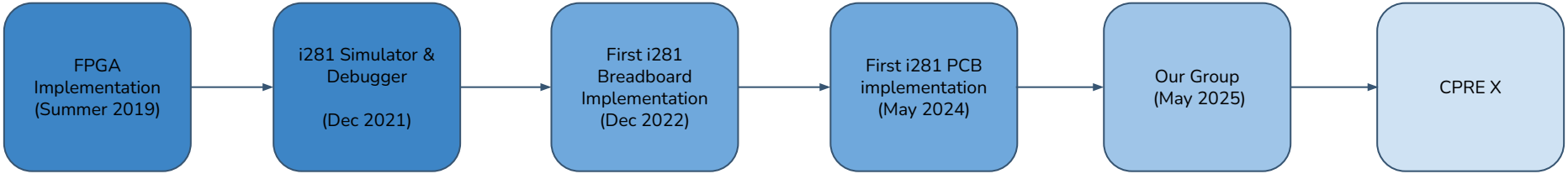
Professor Alexander Stoytchev

i281e Timeline

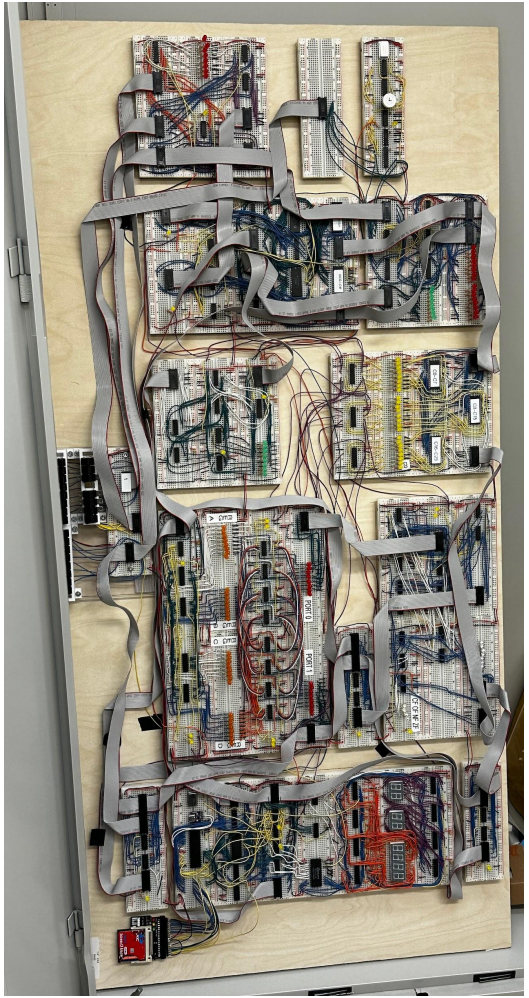


Project Overview

- Utilize the existing i281e CPU designed by previous senior design teams
- Design, test, and document 10 lab activities for a new class

Stretch Goals:

- Create and implement outreach activities
- Assemble another i281e CPU on PCB and document the process



Users

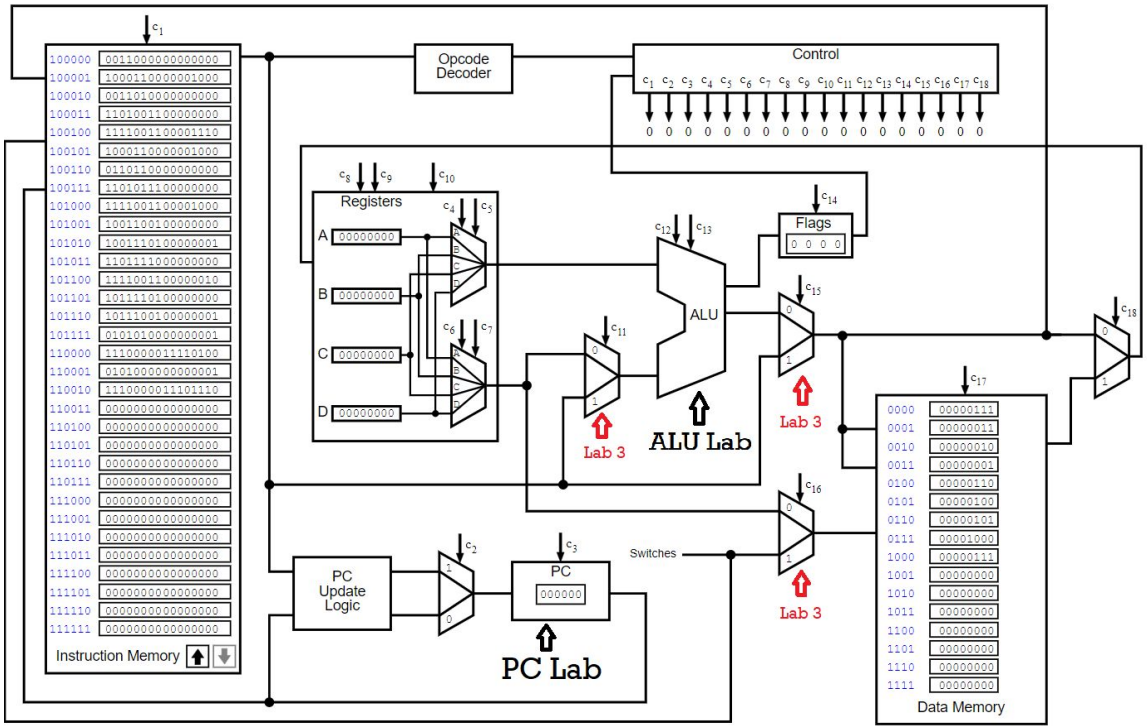
Primary

- Prof. Stoytchev (Client)
  - Curriculum
  - Past i281 CPU Work
- Undergraduate Students
  - Previous knowledge
  - Time constraints
  - Lab room and time constraints

Secondary

- Teaching Assistants
- Outreach Coordinators (WiSE)
- Middle and High School students

Detailed Design and Visuals



Hardware Labs:

- Lab 1: Implementing Digital Logic
- Lab 3: Multiplexer
- Lab 4: Program Counter
- Lab 8: Registers
- Lab 9: ALU Modification

Software Labs:

- Lab 2: Clock
- Lab 5: Program EEPROM
- Lab 6: 7-Segment Decoder
- Lab 7: Rock, Paper, Scissors
- Lab 10: Final Project + Device Drivers

Lab X: Outline

Prelab: This will Include any information needed to be researched ahead of time.

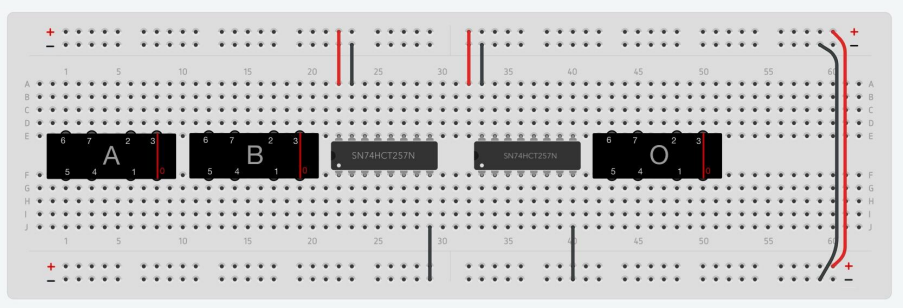
Objectives: This will Highlight the purpose of the lab and correlate it to the learning objectives of the course.

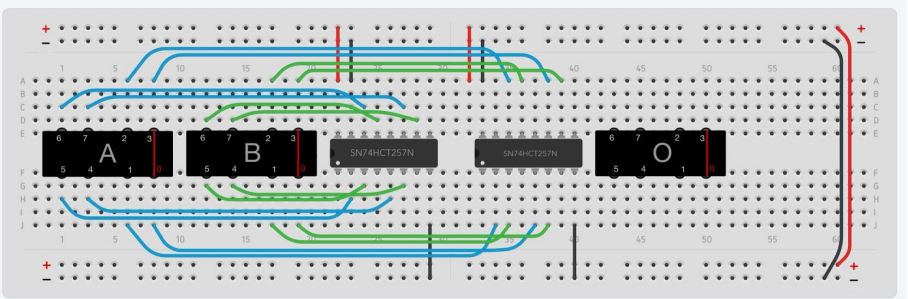
Background: This will include any figures or supplementary information to the lab activity.

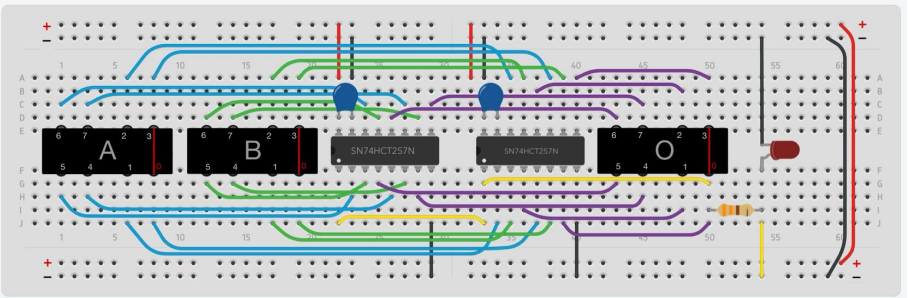
Activity: Steps to complete the lab some step by step others more general asking the students to come up with their own solutions to the problem.

Testing: This will outline how a student can test whether or not the activity was successful and the steps to do that.

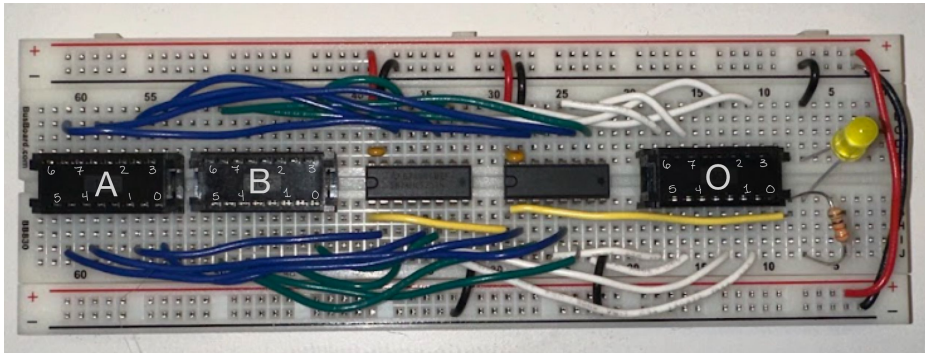
Parts List: This will include a list of all materials used during the lab for easy reference and reproduction.

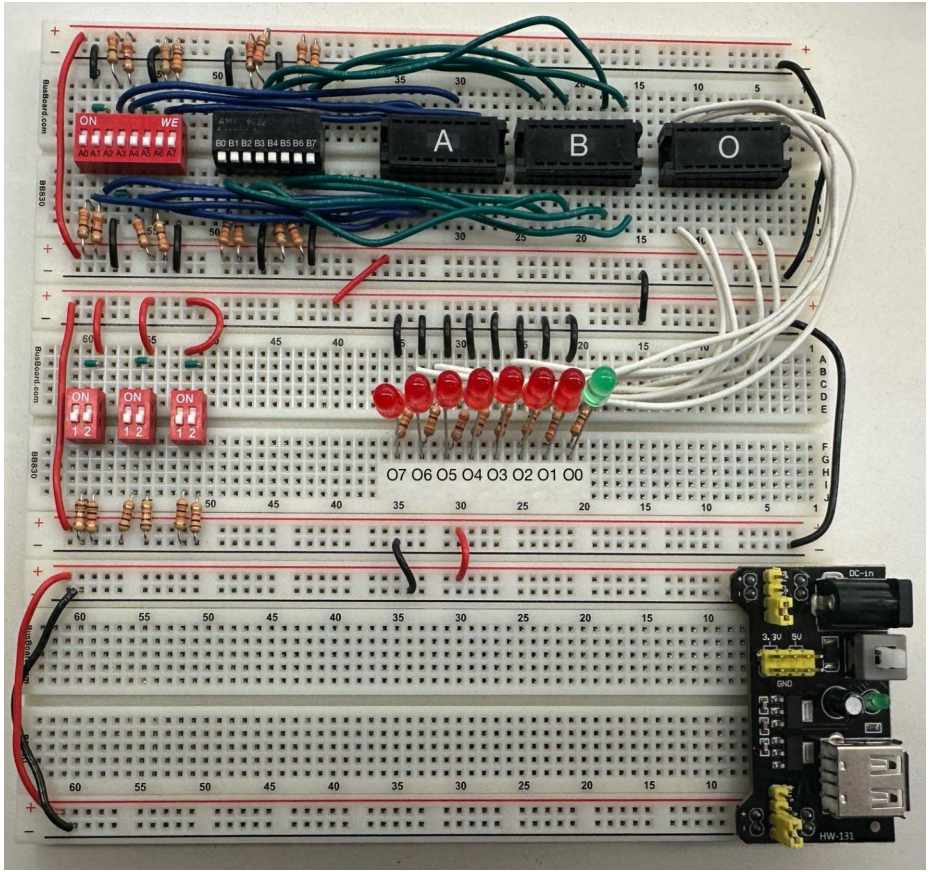






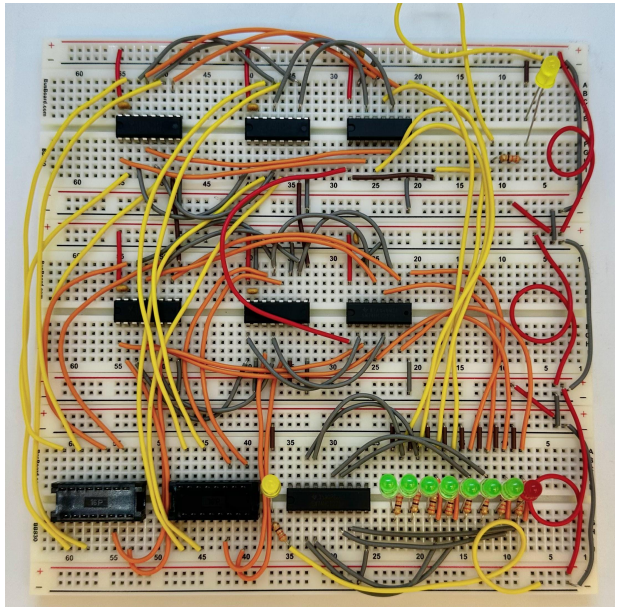
Testing





Future Labs

Program Counter Lab

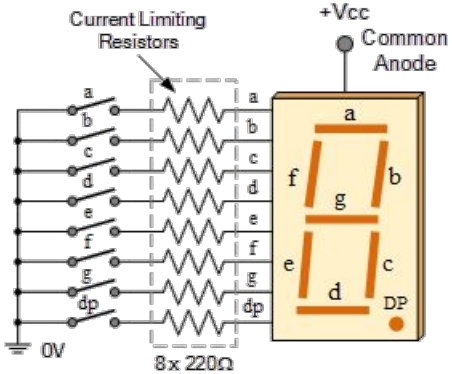


Rock, Paper, Scissors

- Implement a video game in assembly
- Inputs with push buttons
- Score and timing visualized by 7-segment display
- Modify program to be appropriate difficulty

EEPROM Labs

- Program an EEPROM
- Implement 7-segment decoder using EEPROM and 7-segment display



Technology Considerations

Hardware

Chips:

- Some chips used in existing design are no longer produced so we needed to find a comparable solution
- The chip we decided on the AT28C256

Wiring:

- The lab room for the class does not allow for cutting wires
- Wire kits have limited lengths and colors

Software

- Need visual representations of for the labs with either photos or a simulator
- Needed to keep in mind cost, component availability, and ease of use

Currently using TinkerCAD since it’s free, has a wide range of components and neatly depicts breadboards.

Conclusion

- Timeline for each lab and plan to complete 4 by the end of the semester
- If possible will also design a set of outreach activities to be administered my other programs at ISU
- Consist of a mix of digital logic and hardware focused labs
- Some constraints may be due to measuring lab success rate, which is how many students are able to finish the labs

Questions?