# i281 CPU

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# **Project Overview**

- Utilize the existing i281 CPU designed by previous senior design teams
- Assemble another microprocessor and document the process
- Design, test, and document 10 lab activities for a new class
- Create and implement several outreach activities
- Problem Statement - Design and implement a set of labs and activities based around the i281e CPU
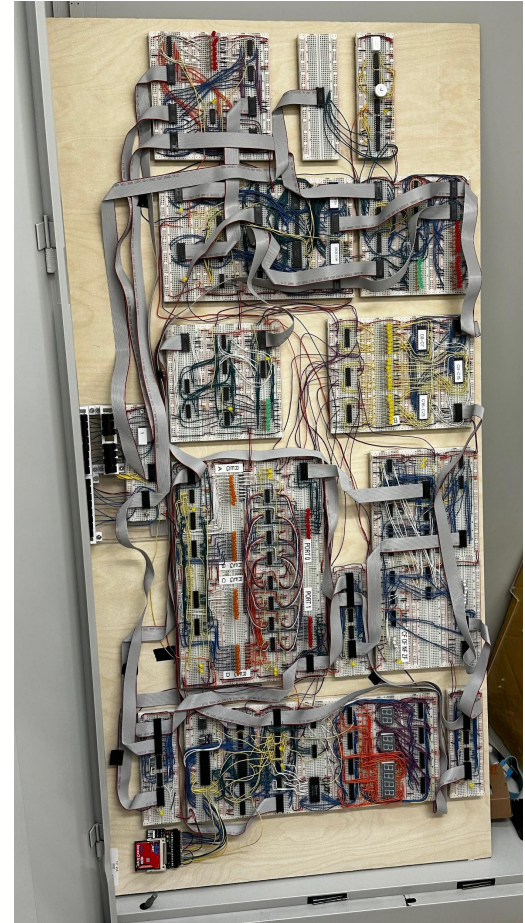
# Project Statement

Use open source hardware and software designs for the existing CPU, OS, and simulator to implement a set of lab and outreach activities. Each activity needs to be of appropriate complexity such that it can be completed by an average student in a reasonable amount of time. Each must be tested by the team and documented with a detailed step-by-step documentation.

# User 1 - Students

- Students will have to complete the labs we come up with as a part of their class.
- Students might have trouble understanding the material.
- Students hear questions their classmates ask and material the professor covers.
- Students see lab materials and other student's approaches.
- Students could be overwhelmed by their workload and have trouble understanding course material.

# User 2 - TA's

- TAs will administer the labs and will need a deep understanding of the material
- Hear from students common questions
- See their and other TAs solutions
- Interact with the professor and relay their and students concerns back and forth

# User 3 - Professor

- Will have a set curriculum to teach each semester which the labs will follow
- Work with TAs to address student concerns
- See students in class and office hours
- Teach other classes and also conduct research, as such have a lot of other priorities and are quite busy

# User Needs

- Students need (a way) to learn about the i281e processor because they need to be able to build, comprehend and work with computers.
- TA needs (a way) to supplement learning for the student because they need to assist in the student's learning and comprehension while supporting their knowledge.
- Professor needs (a way) to teach about the i281e processor because they need to make their students understand the importance of the i281e processor so the students can grow their interest in engineering and perform better in future classes

# Requirements

### Functional Requirements

- Must include 10 Labs/Activities around the i281e Processor and its components.
- Must be comprehensible to the average student.
- Each lab must be able to be completed by students in a reasonable time, namely a 2-3 hour lab period.
- Labs must introduce students to both the hardware and software components of the processor and embedded programming.

### Non-Functional Requirements

- Must be professional in presentation.
- Must be comprehensible to the average student.
- Must be adaptable/reusable for future use by professors/TAs.

# IEEE Standards

- IEEE Standard Glossary of Computer Hardware Terminology
  - [IEEE 610.10-1994](#)
  - Definitions are provided for terminology that is not common knowledge with in the lab documentation
- IEEE Standard Definitions of Terms for Electronic Digital Computers
  - [IEEE 162-1963](#)
  - Includes standard definitions that will be used throughout our lab documentation to make sure we use the most accurate terminology
- IEEE Standard Glossary of Mathematics of Computing Terminology
  - [IEEE 1084-1986](#)
  - Definitions are provided for terminology in the field of mathematical computing that include boolean algebra and computer arithmetics

# Conclusion

- There are three distinct user groups which all have their own needs and expectations
- Ultimately are designing this to meet the curriculum requirements provided by the professor
- Must also keep in mind our own experiences as TAs and students when documenting the activities
- There are standards and requirements that must be met and kept in mind during the design process

# Questions?