i281 CPU

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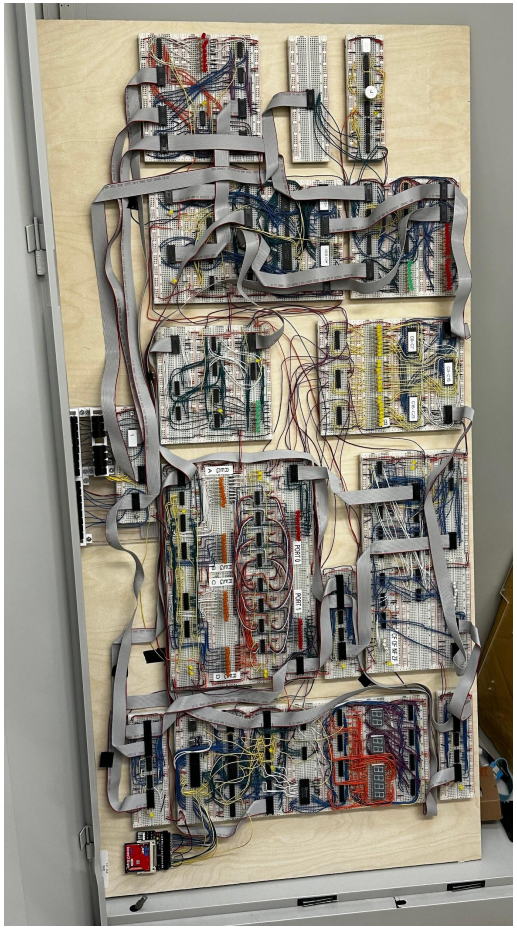
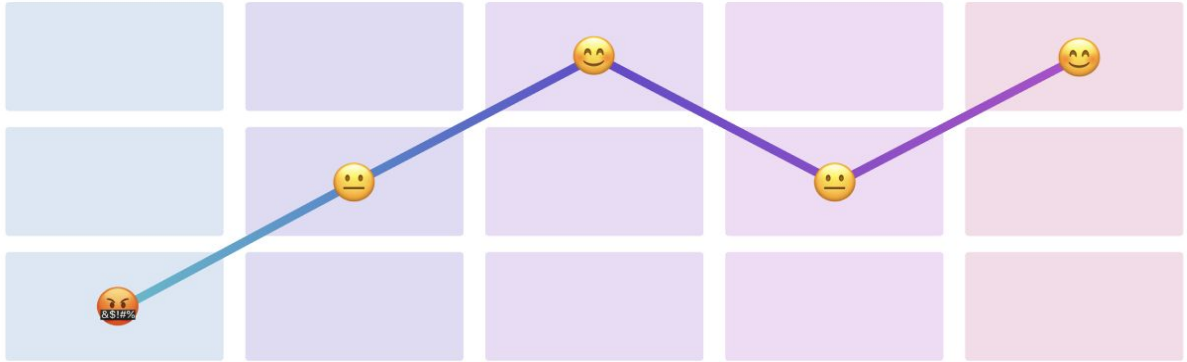
Ariana Dirksen, Gigi Harrabi, Tessa Morgan, Ethan Uhrich
Professor Alexander Stoytchev

Project Overview

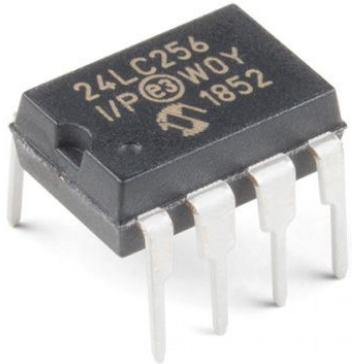
- Utilize the existing i281e CPU designed by previous senior design teams.
- Assemble parts for another microprocessor and document the process.
- Design, test, and document 10 lab activities for a new class.
- Create and implement several outreach activities.
- Problem Statement - Design and implement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



	Labs 1 and 2	Labs 3 and 4	Labs 5 and 6	Labs 7 and 8	Final Project
Knowledge of CPU and Embedded Programming					
User tasks	• Build basic circuit on breadboards • Learn about standardization and basic breadboard info	• Build the i281 CPU MUX • Build the i281 PC • Test both circuits	• Program EPROM • Use EPROM with seven segment display	• Use assembly to program with the clock • Build a basic game in assembly on the i281 CPU	• Students will develop, build and test their own projects putting together everything they've learned
Painpoints	• May have no prior experience with breadboards or building circuits • First lab is following instructions • First and second labs are not working with the CPU	• Students are building components which are already designed • Not designing or developing their own problems • Will use a lot of wires and be messy	• Can be quite complex • Doesn't directly work with i281 CPU	• The assembly language for the i281 is custom and very limited • May have very little experience programming in assembly	• Developing your own project can be very overwhelming • This is a busy time for students already and they may feel rushed
Opportunities	• This will build students background with breadboards • Teaches them the fundamentals for future labs	• Will familiarize students with the CPU components • Will experience building circuits across multiple breadboards	• Teaches about EPROMS which is an area the department currently does not teach CprE students	• Students will need to learn assembly and use it in other classes, this will give a good intro • The game may be very rewarding to see	• Being able to work on a project of your choosing can be very fun and rewarding
Touchpoint	• Meet lab partners • Gain experience with breadboards	• Multiple Breadboards • Begin work with i281 CPU	• EPROM • 7-segment display	• i281 CPU assembly language • Clocks/timing	• i281 CPU • Final Project • Lab partners • Work with TAs to approve ideas

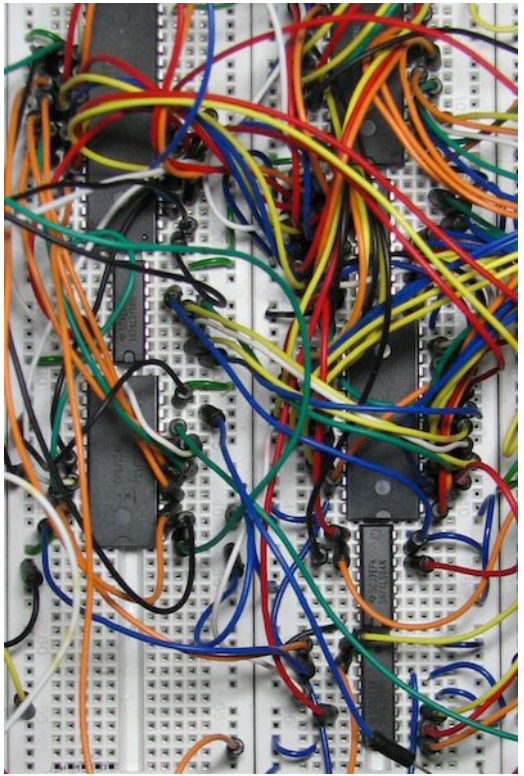
Human

- If implemented, the labs for this class will bridge the gap between CprE 2810 and CprE 3810
- Includes introducing students to programming in assembly and exploring basic computer architecture
- Will also fill other gaps in the department such as programming and using EEPROMS

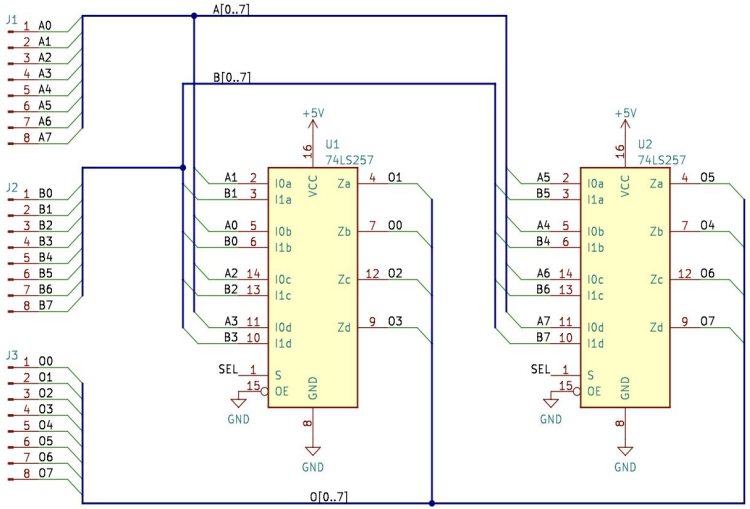


Economic

- Fairly comparable to existing courses in terms of cost for students and will need to including wire kits, breadboards, and various chips
- Plan to use a pre-built test circuit to help cut down on the amount of materials each student will need



Technical



- Building various components of the i281 CPU on breadboards with various layouts
- Ideally, will complete another i281 machine on a custom motherboard
- CPU is already designed but this requires reading and re-creating some schematics
- Programming in the i281 custom assembly language with heavily limited memory and inputs
- Researching and working with EEPROMs which none of us have experience with.

Questions?