***EE/CprE/SE 492 BIWEEKLY REPORT 03***

**Date:** September 28, 2022 – October 11, 2022

**Group number:**  Dec2022-20

**Project title:** i281 CPU Hardware Implementation

**Client &/Advisor:** Dr. Alexander Stoytchev

**Team Members/Role:**

Alex Kiefer (Hardware Team)

David Vachlon (Software Team)

Joseph De Jong (Hardware Team)

Saffron Edwards (Software Team)

Patrick O’Brien (Hardware Team)

**Summary**

Our team is currently working to finalize the breadboard implementation of the i281 CPU. The team started by gathering a list of missing components to purchase. Additionally, we finished the control module and programmed the EEPROMs. Programming the EEPROMs consisted of completing the hard drive, bios setup, and instruction memory.

While waiting for parts, the team will largely be moving onto implementing the i281 CPU on PCBs. This process includes design, implementation, checking, and purchasing. The register file, clock, ALU, and control module have begun to be implemented onto printed circuit boards.

**Past Week Accomplishments**

* **Alex Kiefer:** Completed the first iteration of the register file PCB. Worked with professor Stoytchev and Patrick to develop standards for input and output bus connections.
* **David Vachlon:** Finished programming the EEPROMs and wrote new software to help program them via the arduino. These EEPROMS were not programmable via previous methods we had used (previously it was a combination of custom written software and 3rd party devices/software). Also wired the last of the EEPROMs onto the breadboard.
* **Joseph De Jong:** Joe worked with the software team to finish programming the EEPROMs. The EEPROMs were implemented on breadboards as they were programmed. This made the BIOS, instruction memory, and hard drive.
* **Saffron Edwards:** Updated the website and helped work on the control board with David.
* **Patrick O’Brien:** Worked on creating the PCB for the ALU and control switches. He also worked with David to source parts for the remaining components of the breadboard.

**Pending Issues**

* **David Vachlon:** Want to discuss possible software interfaces to streamline the programming of new software onto the CPU harddrive in the future.
* **Alex Kiefer:** Has to redesign the register file to meet client specifications. Has begun work on the program counter PCB .
* **Joseph De Jong:** A limit on 2-1 muxes and ribbon cables has slowed progress on the final implementation of the i281 CPU on breadboards. Orders have been made, but ETA is unknown.
* **Patrick O’Brien:** Waiting on parts to arrive to complete the breadboard. Trying to redesign the ALU so that it fits the desired form factor on the PCB, while also being easy to wire.
* **Saffron Edwards:** Waiting to start on interface with David.

**Individual Contributions**

| **NAME** | **Individual Contributions** | **Hours this**  **week** | **HOURS**  **cumulative** |
| --- | --- | --- | --- |
| Alex Kiefer | Designed register file PCB | 5 | 34 |
| David Vachlon | EEPROM programming, wiring to board, wrote EEPROM programming software. | 5 | 34 |
| Joseph De Jong | Implement EEPROM, work on Control Unit | 5 | 34 |
| Saffron Edwards | Helped wire EEPROMs and updated the website with new reports. | 3 | 23 |
| Patrick O’Brien | Designed ALU PCB, worked on controls PCB. Helped order parts. | 5 | 34 |

**Plans for the Coming Week**

* **Hardware:** Alex and Patrick are continuing on implementation of the i281 CPU onto PCBs. They will complete the ALU and control box. Additionally, Alex and Patrick have agreed to host a meeting to discuss the KiCAD software and get others onto the task.
* **Software:** Discuss possible software interface with the client to make EEPROMS reprogrammable in the future if desired. Additionally, the website continues to be maintained as needed.

**Summary of Weekly Advisor Meeting**

Our advisor meeting this week focused on making progress on the project. A brief summary of the project was discussed. Dr. Stoytchev discussed a new BIOS design along with PCB goals. Each member got guidance and suggestions on their current technical issues. At the end of the meeting, a list of future tasks was created. Instructions were then given regarding who needs to learn what and who will assist on the different parts of the development of the PCB. We also discussed different standard practices that need to be followed when designing the PCBs so that the final product is consistent.