**Project Goal:** Demonstrate how computer technology evolved by illustrating how computing systems work at a fundamental level with integrated circuits and microprocessors, and how those concepts are still integral for practical purposes today.

This project will consist of three parts that will all illustrate essential factors of computing.

## Part 1: Integrated Circuits

**Goal**: Show how computers work at a fundamental level by building circuits using concepts of logic gates and decoders

**Subgoals:**

* Build experience with circuit design
* Demonstrate designs visually and mathematically

**Plans / Ideas:**

* Explain a series of logic gates through a variety of circuits
* 4-bit adder
* 7-segment display decoder

Complete by 1/1/2024

## Part 2: Microprocessors & EEPROMS

**Goal:** Illustrate how microprocessors and interface adapters utilize fundamental computing concepts at a much more compressed and efficient form factor through programmability.

**Subgoals:**

* Gain more experience with assembly language
* Demonstrate how programming can be implemented and how it became widely more efficient
* Explain how the systems outlined in Part 1 are becoming a lot more conceptual
* Display interactions between both hardware and software
* Show how ease of implementation is on the rise

**Plans / Ideas:**

* Explain how the 65C02 Microprocessor is efficient at managing the complexity of a design
* Show through programming how rewritable EEPROMS replace the need for combinational logic by implementing the same designs from Part 1
* Use the concepts outlined in Part 1 to build more complex programs

Complete by 1/1/2024

## Part 3: Modern Microcontrollers

**Goal:** Demonstrate how today’s microcontrollers utilize these computing concepts for a variety of practical purposes through programmability and ease of use and implementation.

**Subgoals:**

* Gain experience with programming microcontrollers (C++)
* Show how microcontrollers (like the Arduino) are designed to serve numerous purposes and are made easier to use and implement due to object-oriented programming
* Build a device to serve a practical purpose

**Plans / Ideas:**

* Custom PCB Shield for arduino (KiCAD)
* <https://jlcpcb.com/>
* Mail detector

Mail Detector

Overall Goal: Utilize an ESP32 microcontroller with light/motion sensor to detect when mailbox is opened. The project will be solar-powered and transmit data to Node.js server running from a raspberry pi.

