CSEE4840 Embedded Systems Fall 2023 Project Proposal

Nintendo Entertainment System (NES) Emulator

Tyler Manrique(tm3147); Jason Lam(jjl2247); Otito Darl-Uzu(ood2103)

Proposal

The Nintendo Entertainment System (NES), is an 8-bit video game console released in Japan in 1983. It was groundbreaking in its ability to play popular arcade games on a home television set and support for features such as pixel-level scrolling. The goal of this project is to successfully emulate the NES core functionality to play a ROM on a 256 x 240 screen.

The scope of our emulation is as follows:

1. CPU (8-bit 6502)
2. Addressable memory space (16-bit)
3. Picture Processing Unit (PPU): Our emulation will render on a 256x240 screen with support for as pixel-level scrolling
4. Controllers: Keyboard inputs will be primary mode of control with possible support for NES controllers
5. Cartridge boards: We will limit our emulation to ROMS that dynamically map ROM/RAM into CPU and PPU memory space. We will not support cartridges that have their own battery-backed RAM, or audio processing unit.

Our team will not be emulating the Audio Processing Unit for the NES as the above will provide sufficient complexity for the project.

Milestones

1. Successful CPU Emulation
2. Functional Memory space
3. Successfully load ROM into memory space
4. Ability to render pixels to 256x240 screen
5. Render ROM on to 256x240 screen
6. Input handling
7. Test and Demo

Further reading

The NES emulation project has been replicated several times, we will leverage the learnings of other attempts to guide or build: https://yizhang82.dev/nes-emu-overview

NES Dev Wiki: https://www.nesdev.org/wiki/Nesdev

System Documentation: Nintendo Entertainment System Documentation