

Network Arcade Platform

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Problem Statement:

The arcade machines in the TLA are not in working conditions, whether it be due to age or tampering. As a result, the machines sit unused and no longer serve the public.

Solution:

Design a system with an expected lifespan of 5+ years and also intends to account and prepare for the shortcomings of previous arcade systems developed at Iowa State University.

Functional Requirements:

Controls: Able to switch from arcade controls to Gamecube controls at ease.

Structurally Sound: Cabinet is strong enough to handle stress of users and avoid tipping.

Integration of Networking: Able to network between the set of cabinets and play games together or separately.

Non-Functional Requirements:

Maintainability: Lasting at least 5 years with minimum repairs.

Availability: 24/7 accessibility for the user.

Portability: Able to be moved from place to place for events at ease.

Operation Environment:

Work in TLA or any indoor building for events, and able to use for short and long periods of time.

Intended Users and Uses:

Users: The intended users are high schoolers and older and the machine can support up to 4 players at a time.

Uses: Provide stress relief, entertainment, and promote a friendly environment. Also, use as a showcase piece for events and show capabilities of Senior Design and ECprE department.

Standards:

IEEE 802.3-2018 - IEEE Standard for Ethernet

IEEE 10.1109/ACOUSTICS.2018.8502289 - Sound Level Control Based on Grey System Theory for Protection Against Hearing Damage Risk in Music Entertainment Venues

Project Resources:

Boyd Laboratory
ECprE Machine Shop
ETG Shop

Software:

Linux, specifically Ubuntu
C language
RetroPie
MAME, Dolphin, Daphne

Testing Environment:

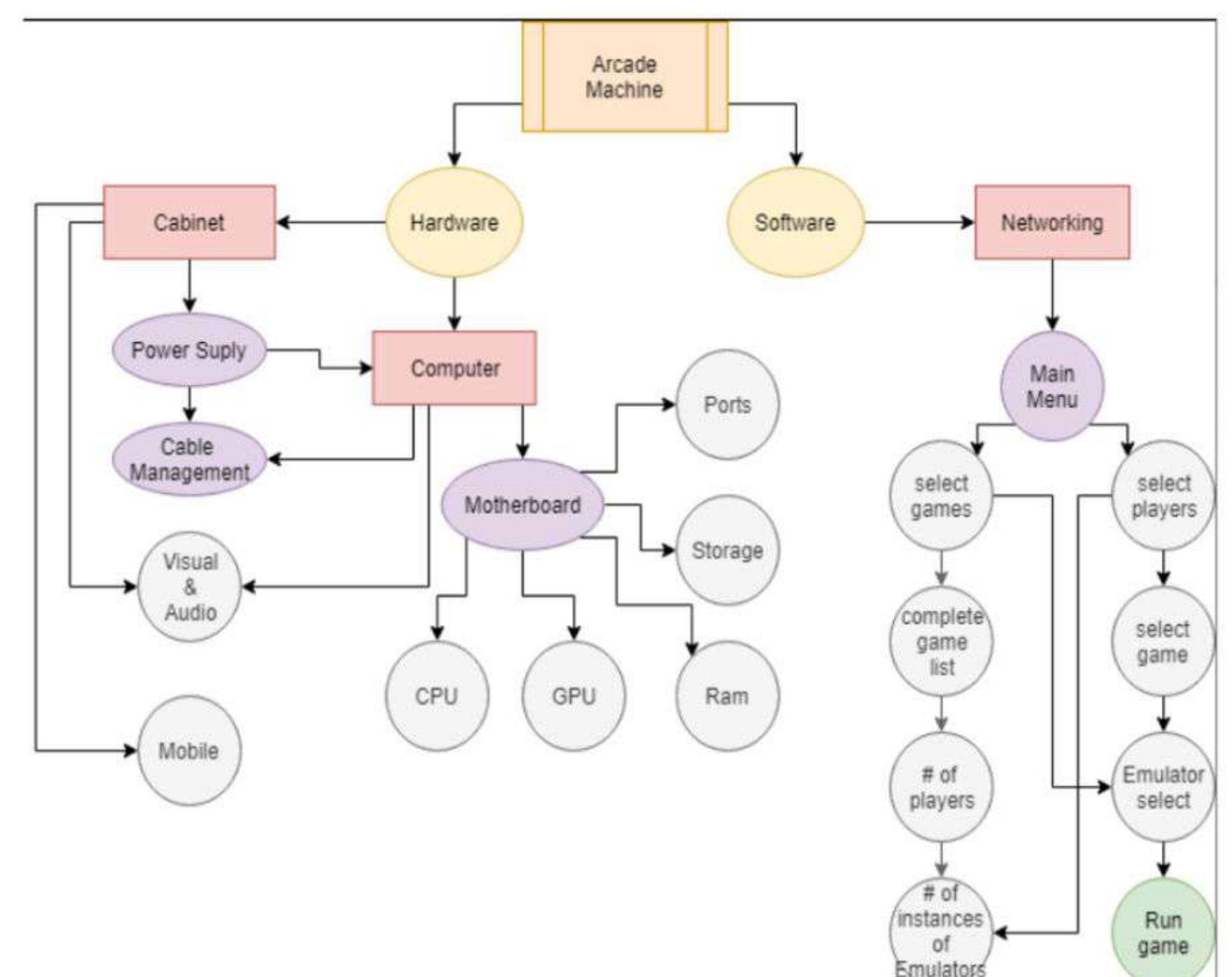
Worked in Coover Hall for portability testing,
Senior Design Lab for all other testings

Design Approach:

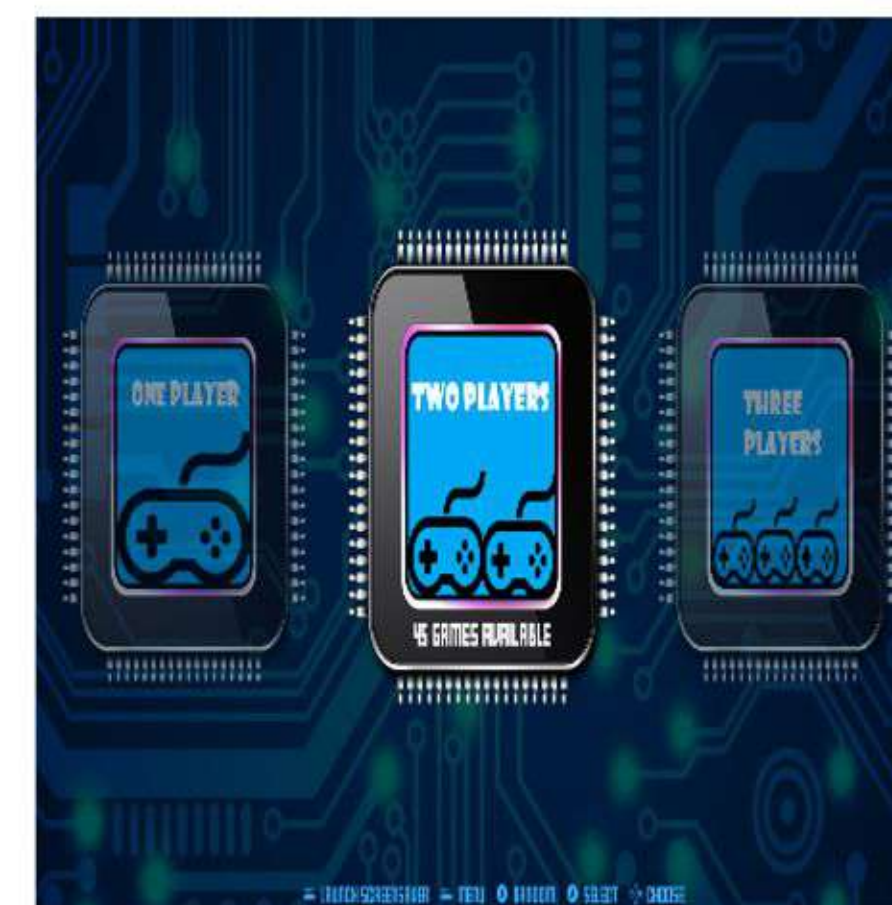
Concept Sketch



Block diagram



Main Menu - Main hub to access game collections and set-up. Operated by Joystick or Gamecube controls on our cabinet



Controller Holster - Able to switch from Arcade to GameCube at ease



Hardware:

Computer Specs:

- MSI Computer Video Graphic Cards GeForce GTX 1050 TI Gaming X 4G
- HX 850W Power Supply
- 1 TB Hard drive
- Motherboard

2 sets of Suzo Happ 8-way Joystick and Push Buttons
2 Insignia 32" TV
4 USB MUX

2 Kinter Stereo Audio Amplifier
4 4" Dual Cone Round Speaker
4 4.5" Black Speaker Grill
2 Speaker Wiring Kit
2 RCA Audio Cable
2 12v 3a Power Supply
40 Black 1/2" Screws
750VA Power Surge Protector
2 Addressable LED strips
Plywood
Acrylic Glass

Testing Strategy:

Structurally Sound: Having two individuals on each machine for stress test for wears.

NetPlay: Having the two machines communicate with each other and able to play the same game simultaneously.

Quick Game Loading: System running at an efficient time with no long wait between games.