The Retro Arcade Game System is a portable wooden box with a clear acrylic top, meticulously designed for retro gaming on-the-go. This system is powered by a Raspberry Pi single-board computer running the RetroPi operating system, which allows players to enjoy classic games like Mario, Pokemon, and Atari classics. The system features two player controllers, each with a joystick, eight game buttons (red for player 1, blue for player 2), a coin/start button, and an exit button. Additionally, all 20 buttons feature LEDs, providing an exciting and unique gaming experience. An LCD screen is also included for displaying game info and button mappings, which is controlled by an Arduino Mega, providing customizable lighting patterns and message displays.

In our senior project, we utilized both Fusion 360 and ShopBot software to create and machine the components required for our project. Fusion 360 is a computer-aided design (CAD) software developed by Autodesk, which is widely used in industries such as engineering, architecture, and product design to develop and prototype new products. The other hand, ShopBot is a brand of computer numerical control (CNC) routers used to machine various materials such as wood, plastic, and aluminum. ShopBot routers are controlled using ShopBot software, which allows users to design and control the cutting path of the machine. Using Fusion 360 software, in design mode we sketched and extruded each individual side face of the respective components using .686 inch plywood for the box sides and .25 inch acrylic for the box faces. In manufacturing mode, we used a combination of 2D and 3D milling operations, specifically adaptive clearing and contouring, to create toolpaths for the ShopBot to produce our specific design. After design creation is finalized we ensure there are no errors in the process that inhibit process completion or sacrifice design integrity by 3D simulation of the cut process within the Fusion360 software. After simulation is complete and no errors were listed we exported the design setup which is essentially a list of all operations needed from start to finish categorized into respective operations by the type of bit that will be used for each operation. To cut out the components, we utilized three distinct types of bits on the ShopBot, which included: 1/4” single flute acrylic flat end bit (acrylic) 1/8” dual flute ball end bit (wood) 1/8” dual flute flat end bit (wood). It is worth noting that the 1/4” bit was used exclusively for the acrylic material, and it was the smallest bit size available for the material at the school's fab lab, which made it impossible to create smallest .12 inch diameter holes with it. The 1/8” flat bit, on the other hand, was used for all cuts and holes in the plywood sides and bottom pieces, while the 1/8” ball drillbit was used for the diagonal 54-degree edges of the pentagon sides. Additionally, the 1/8” ball drill bit used to fabricate the pentagon’s edges utilized in combination with the 3D adaptive clearing, was the most time-consuming and complex operation of both materials, plywood or acrylic.

Overall, the Retro Arcade Game System offers a fun and competitive way to enjoy retro gaming with friends and family. Its portable design, customizable lighting patterns, and compatibility with classic games make it a must-have for gaming enthusiasts.