

Arduino Arcade Controller

Final Report

By Fenway Powers and Griffin Mandelbaum

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Abstract:

The project is an ATmega32u4 microcontroller based arcade style controller. The microcontroller has 12 buttons hooked up to it, allowing it to play not only retro games, but also more modern games. The system is designed to be recognized as a Generic Input Controller, which allows it to be used on modern computers, including systems like Windows 10 machines, Raspberry Pis, Macs, as well as Linux machines. A raspberry pi was used in conjunction with the controller during the science symposium showcase. The material cost was \$69.96+tax, which was funded by the Millbrook School Engineering Department. Final testing of the controller was conducted during the spring semester of the 2020-2021 academic year.

Introduction:

There are a variety of arcade games that cannot be properly enjoyed on current gaming hardware. Games like pacman, space invaders, and other games lack the essential feel of arcade buttons on modern hardware. Retro games can be accessed and played on the raspberry pi for example, but there is no way to retain the original arcade feel without a bigger arcade-style controller.

In addition to retaining the feel of an arcade, the controller was aimed to be good at playing 2D games in general.

Goals & Accomplishments:

The Goals for this project are outlined here:

- The ability to play video games with the controller.
- Create code to allow for 12 buttons to be initialized on one arduino board.
- Create a prototype 12 button enclosure of the controller with access to the USB port on the back.
- Create a 3D-printed enclosure for the final product.

The first three goals were accomplished, while the last one was not. Thanks to an existing library of code, the process of coding the arduino went smoothly. At first, each button was initialized one by one, and activation of all the buttons was done using separate "if" statements. In the final version of the code, each button is initialized using a "for" loop, and activation is also done using a "for" loop.

Griffin had an excellent cardboard box for making the prototype, and it was able to house all 12 buttons. He also reinforced the box to make sure that it did not break while in use.

The ability to play video games with this controller was also accomplished, thanks to the code and the prototype enclosure. It performed especially well when playing 2D platforming games and puzzle games such as Tetris.

Remaining Work:

Many of our goals were reached, but there is still much to be accomplished in the areas of the hardware and the coding.

One of the main goals was to 3D print a case to house the buttons in. However, this was not completed. The remaining work that would have to be done is as follows:

- Make a demo case that would only house one button to make sure the full case would be able to fit the buttons.
- Render the case into 2 separate halves to accommodate the size of the 3d printer.
- Attach the buttons to the case and attach the wires to the buttons.

There would also be an optional process of work which would be the visual designing of the box itself. This would have designs of the groups' choosing to make the case feel less dull. The process would have involved stenciling the case of the sketches, most likely with designs from games like tetris, doom, mario and more. Afterwards, it would get painted with a thin brush over the stencil and the interior of the sketches would be filled in with paint, these would be detailed with colors respective to the games that are drawn. The final product would be a fancy looking case with designs of the games played with the controller.

The coding was complete, but not in the way the team would have liked it the best. The controller works perfectly with the current scheme of initializing every button as a button. However, the team would have liked to initialize the 4 directional buttons as a HAT-Switch. This was accomplished, but the HAT-Switch setup did not allow for diagonal movement like the regular button scheme did. Due to this, the team settled on the all-button scheme as the final version of the code. Both versions of the code can be found [here](#).

Final Budget:

Throughout the process of building the Arduino Arcade controller, the price itself did not fluctuate from the prices of the objects that were bought in the initial expenditure. Nothing purchased was damaged. The full price of all items purchased was a bit over \$70.

Cost of All Parts:

Item	Quantity	Unit Cost	Item Subtotal
Arduino Leonardo	1	9.99	9.99+tax
7X Arcade Buttons 30mm (For Initial Testing Purposes)	1	11.99	11.99+tax
Sanwa 6 pcs OBSF- 30 30mm Buttons	2	15.75	31.50+tax
Solderless Flexible Breadboard Jumper Wires	1	6.49	6.49+tax
20 pcs USB Encoder Wire Harness	1	9.99	9.99+tax
		Total:	69.96+tax

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Dr. Jeff LaCosse: Dr. LaCosse provided help with 3D printing by exposing the software and providing the hardware to 3D print a case for the controller.

Mr. Thomas Powell: Tom is acknowledged for his willingness to help with the design of the case and for designing the demo case.

References:

<https://www.instructables.com/Create-a-Joystick-Using-the-Arduino-Joystick-Libra/>