

BreadBoy

Sc.B. Computer Science Capstone Project

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Abstract

Our goal was to build a modular device which outlined a standard set of Inputs and Outputs and could run arbitrary software. The idea is that you would write your program, save it to an SDCard, and then run the program on our device. We chose this project because it tied together many of the topics we are interested in: visualization, graphics and game development.

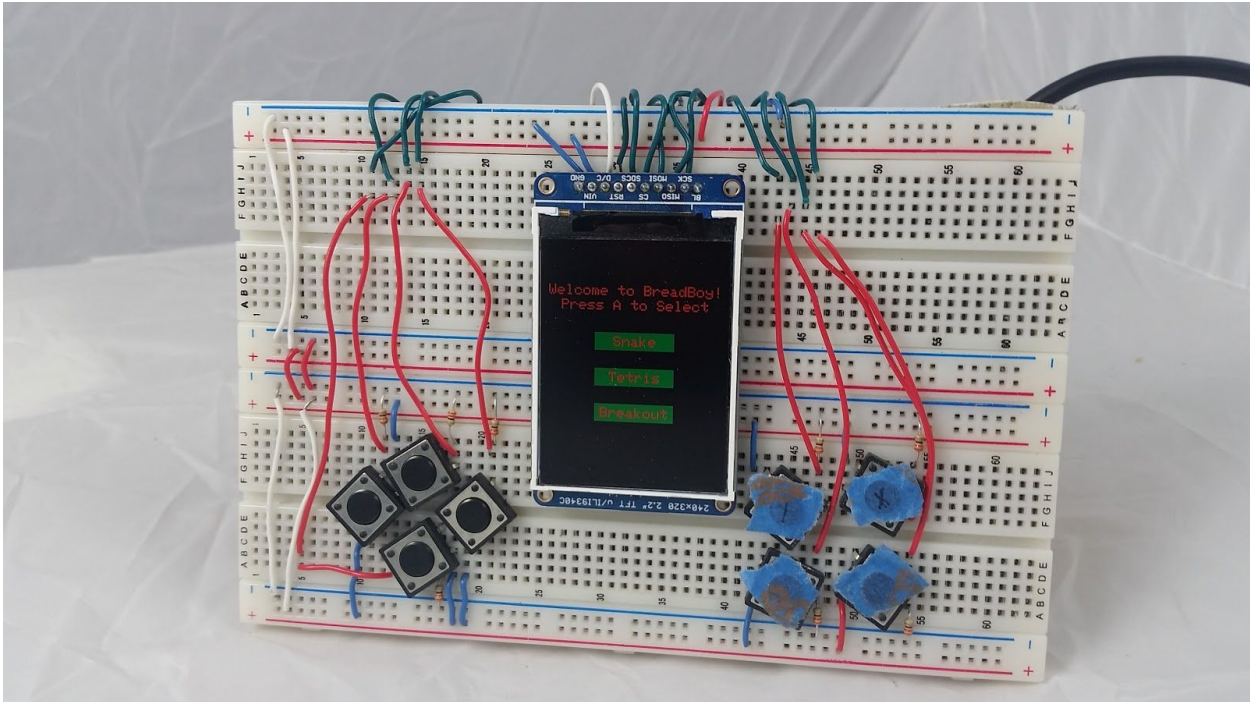
The final iteration of our project is an arcade style handheld game device with 3 playable games and a persistent high score system. The system has 8 buttons: a directional pad and four action buttons in a diamond formation. Upon turning on the BreadBoy, a main menu appears with the options to play Tetris, Breakout, or Snake. Using the directional pad the user moves to the game they want to play and selects that game with the action buttons. At the end of the game the user is brought to the Hall of Fame for that game and shown how they fared against the current top 5 high scorers. If the user broke a high score record, they are prompted to choose a 3 letter abbreviation for their name, and that name is entered in the Hall of Fame. These high scores are kept persistent even after the system is turned off using an SD card.

Our system is slightly different from most embedded systems. Instead of having a very defined set of states, it has the main tick loop. On every run of this loop we gather all of the button presses and pass them to whatever program is currently running. The programs themselves keep track of the current state and update themselves accordingly. The available programs (each of which can be thought of as a state in a state machine) are the menu, the three screens, the "hall of fame" game over screen, and the "enter name for highscore" game over screen. Just as in a finite state machine, one can pass from state to state along a defined set of state transitions, and cannot occupy more than one state at once.

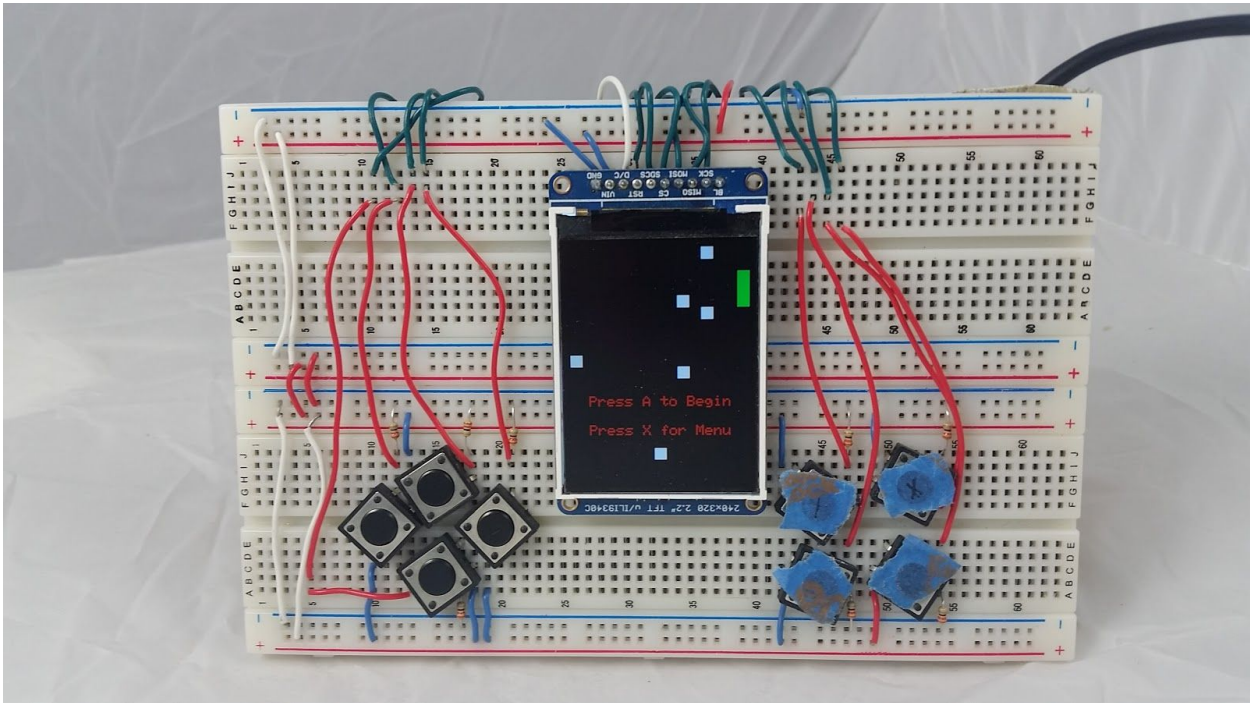
We had two main pieces of hardware: the Arduino Due, and the Adafruit LCD Screen. We used the Due as the master controller. It handles all inputs, passes all outputs, and interfaces with the sd card. The LCD screen is used to display game state and anything else that we would like to show to the user.

Our main focus for the future would be to increase the modularity of the system and add sound.

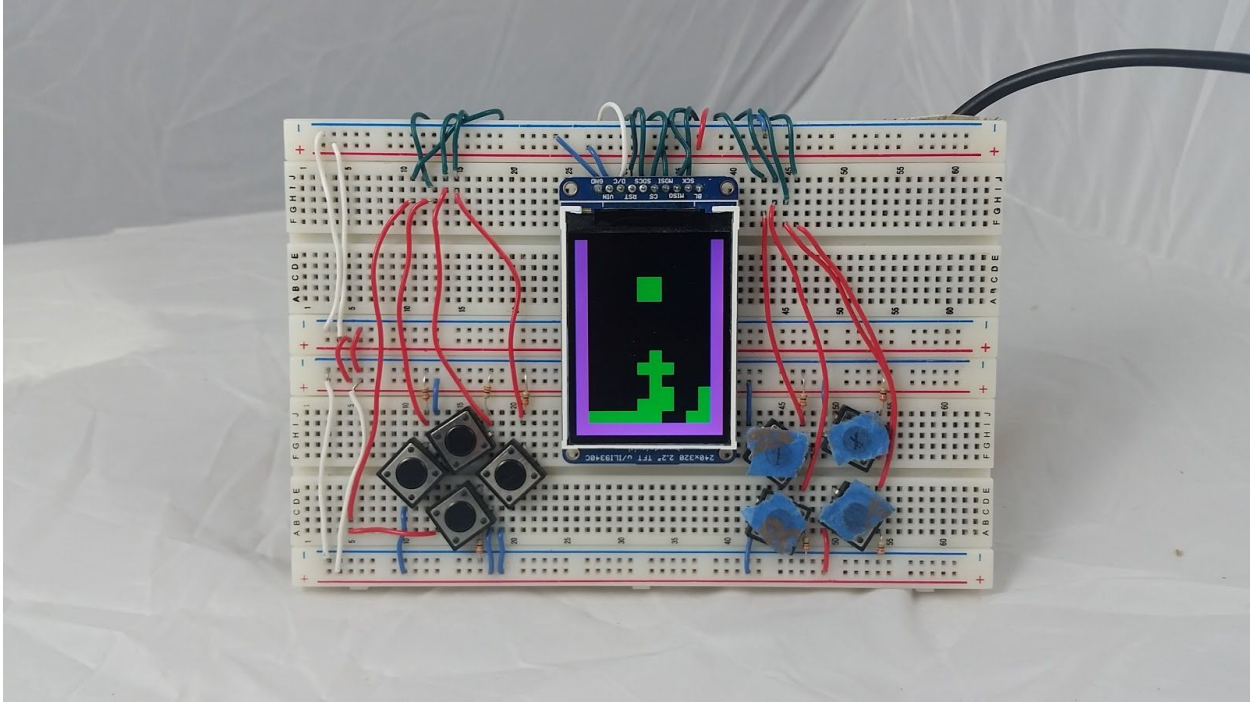
Main Menu:



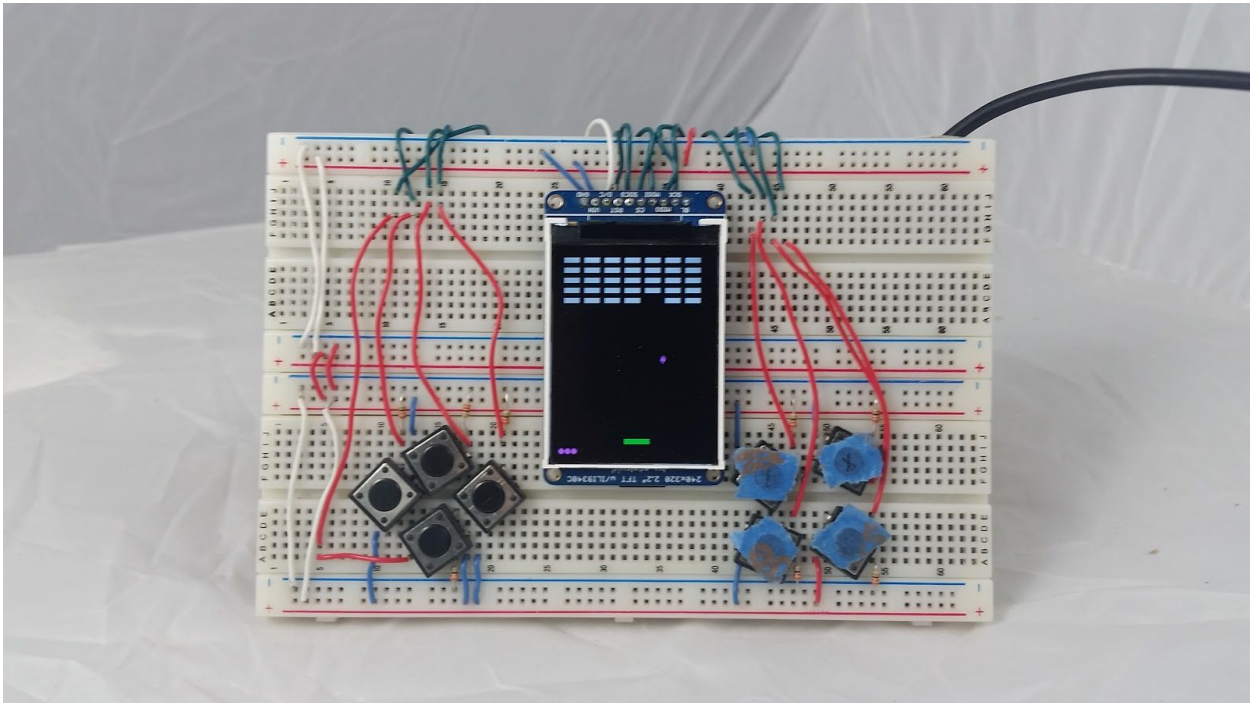
Snake:



Tetris:



Breakout:



High Score Screen:

