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ATHENS Week November 2018

**Physical Computing Based on Open Software and Hardware Platforms**

Project - MINI ARCADE

During the ATHENS week of November 2018 we built a mini arcade game. We used an Arduino nano in combination with the Arduino IDE (version 1.7.7). We started by connecting a 1.3 inch OLED V2.0 display to the breadboard. It was somewhat challenging to find the documentation and to correctly connect the pins to the Arduino. To program the display we used the u8g library. The last two columns of pixels were faulty - however this did not change with a different display, so we assume it is a compatibility problem between the display and the library. The first game was meant to be a single player side-scrolling game, so we wired an FSR 400 pressure sensor to the board. Later we added another to allow for shooting and multiplayer games.

The objective of the first game ("Space Invader") is to avoid hitting enemy spaceships and/or to shoot them for as long as possible. Using the left pressure sensor, the user controls a spaceship; more pressure makes it move upwards faster, letting go makes it move downwards. The right pressure sensor is for shooting at the enemies. The figures were designed using an online pixel art tool. We then translated them to bitmaps to be able to use u8glib functions. The enemy flight sequence is randomized using noise from an unused analog port on the Arduino as the seed. The game is designed to move faster as time passes to make it more challenging. Shooting enemy spaceships also adds to the player's score, which is displayed at the top of the screen, as well as on the end screen when the player loses.

Later, we added a multiplayer game similar to Pong. In this game, each pressure sensor controls a bar on either edge of the screen. The objective is to keep a virtual ball in between the bars. To switch between the games, we designed an interface that appears whenever the program is started.
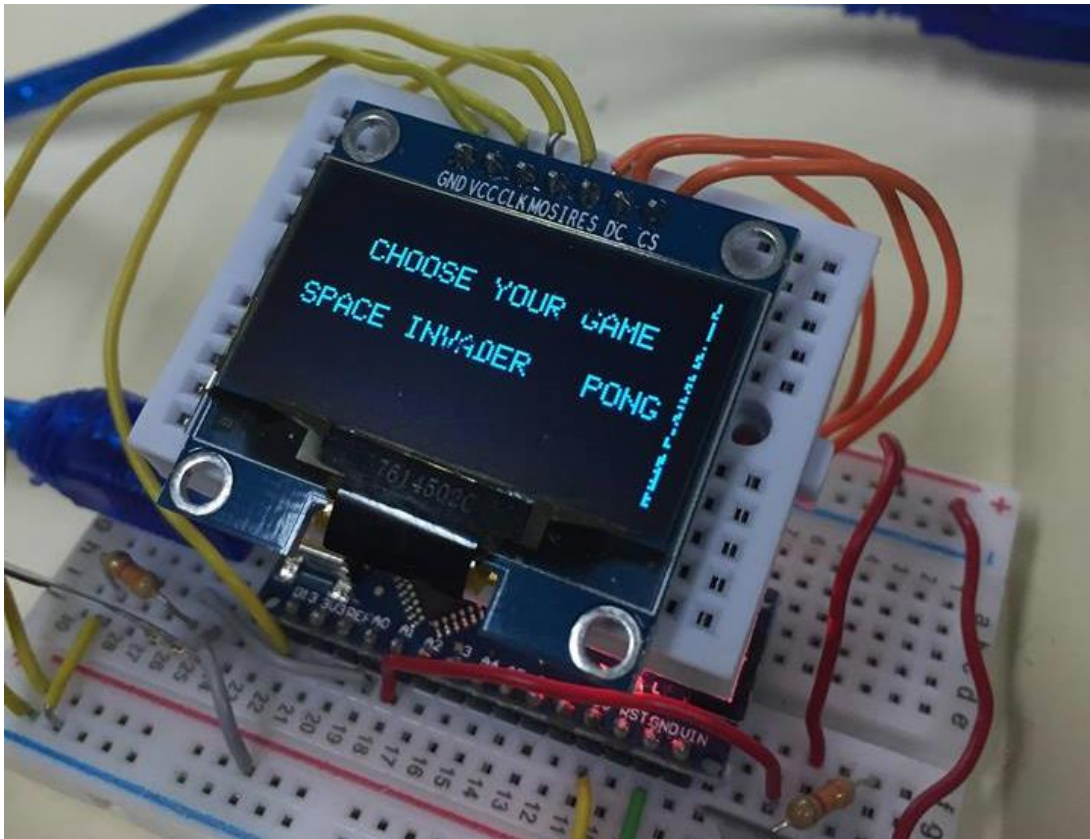
For aesthetics and practicality, we rewired the mini arcade to fit on a smaller board. Using an online tool, we designed the plans for a wooden (5 mm) laser cut box to make the system more stable and to hide the wiring.
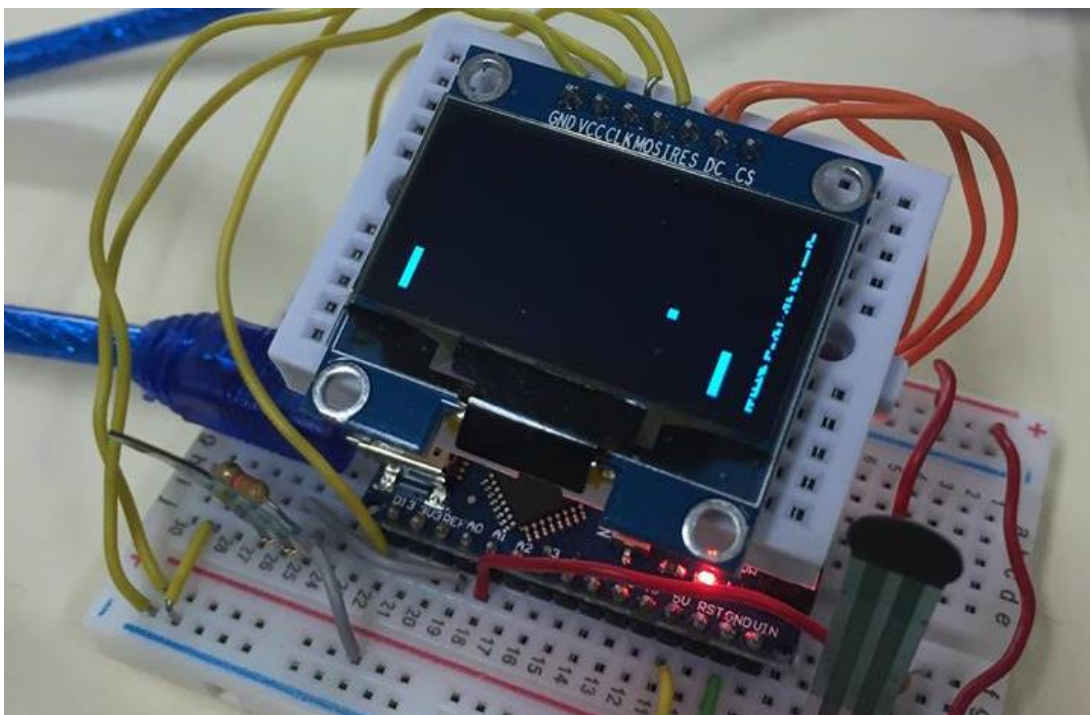
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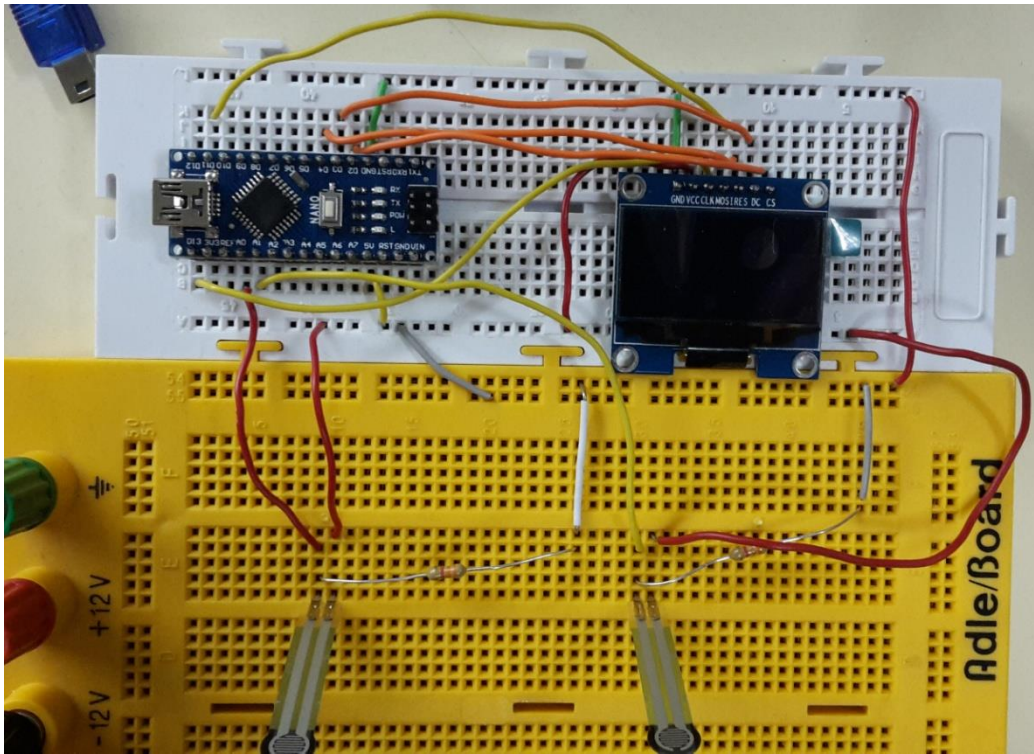
Picture 1 - First prototype with two pressure sensors
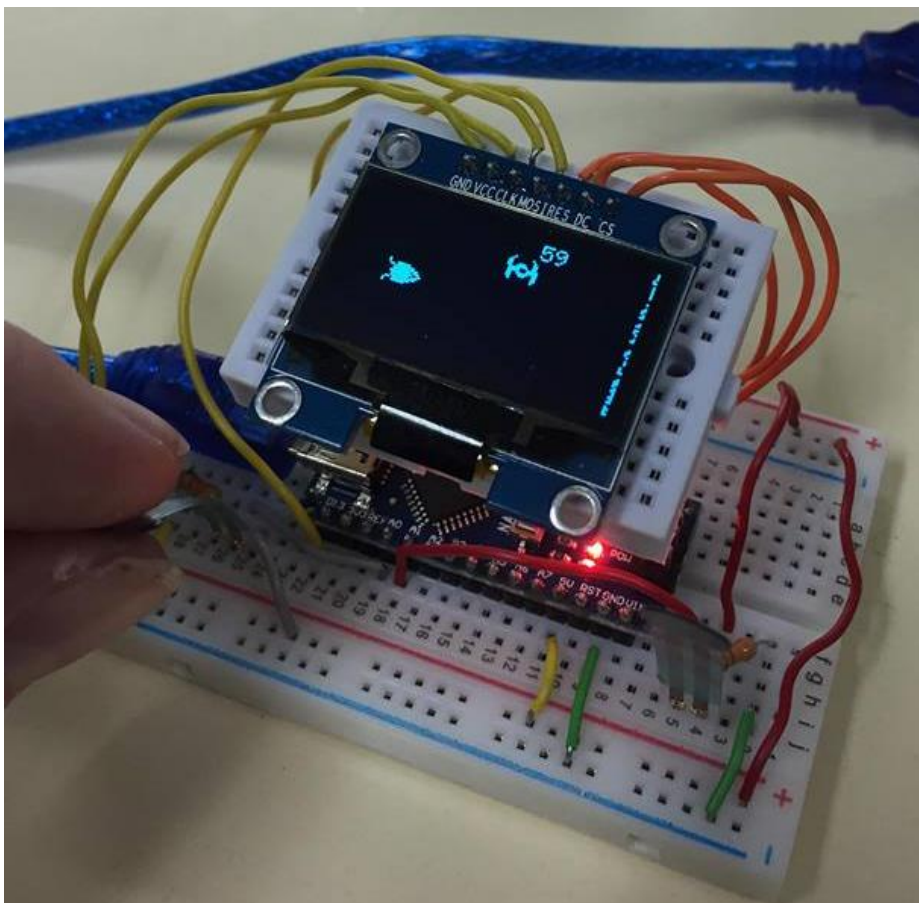
Picture 2 - First game: Space Invader

Picture 3 - UI for choosing the game

Picture 4 - Second game: "Pong"

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Picture 5 - Finished case

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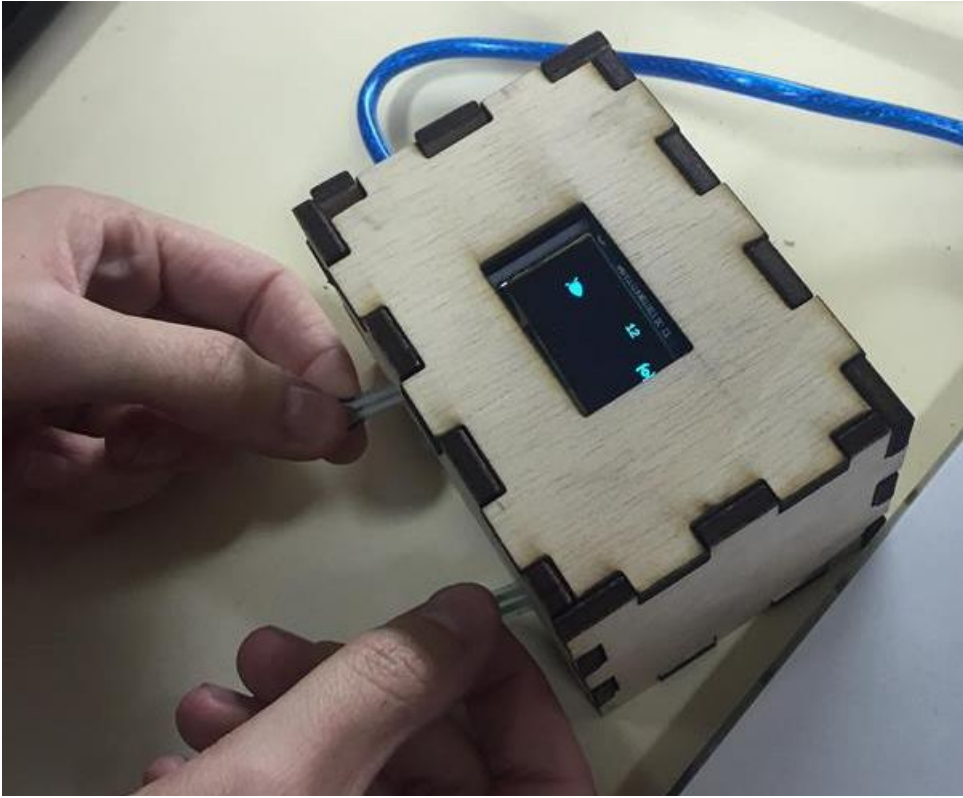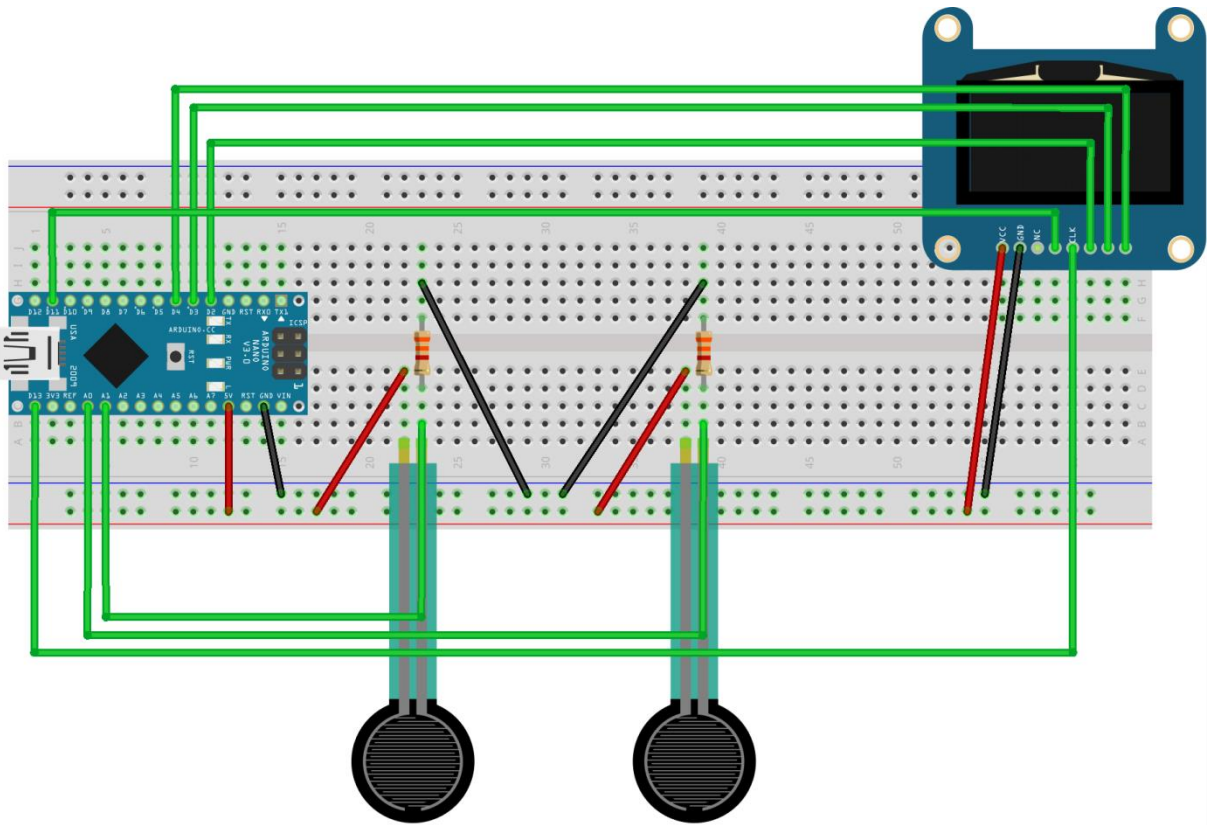
Picture 6 - Fritzing (Final design)