Mechanical Overview

Year: 2024 **Semester:** Spring **Team:** 1 **Project:** Dungeon Crawler Board
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Assignment Evaluation: See Rubric on Brightspace Assignment

1.1 Commercial Product Packaging

1.2 Product #1

The Infinity Game Board is an electronic touchscreen game board that is used as a portable tabletop gaming device [1]. It looks very similar to an iPad or other tablet device, simply expanded in size, either to its 18.5” screen or its 32” table counterpart [1]. It is very thin, and requires its own table to work, though it does not need an outlet to power [1]. Because it is lightweight and does not require an outlet, it is incredibly portable, which offers diversity of use, as it can be used more casually, but also in a group setting. The touchscreen allows it to be used for many kinds of games [1]. However, because the board strives to be very portable and used for many games, it requires all the electronics to be small and very efficient, which substantially increases the price. The 18.5” board is $500 [2], and the 32” table is $1000 [3].

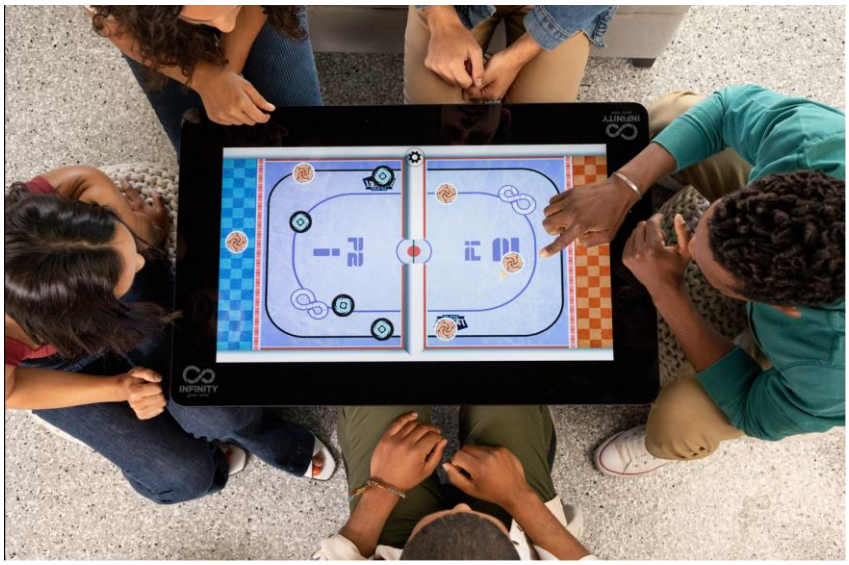

Figure 1. Infinity Game Table [1]

Our project will roughly be the same area as the game board, being around 16” in width and 20” in length. Other than that, our board will differentiate a lot from the Infinity Game Board. Rather than an expensive touchscreen, our board will use magnets and a keypad as inputs, and LEDs and an LCD as outputs. Because it is not touchscreen, the top of our board will essentially be separated into two sections: the plastic hex board and the hardware (keypad, LCD, USB port, and charging port). Our prototype will likely be thicker than the Infinity Game Board, due to the inclusion of the keypad and the LCD. Also, the plastic top and the hex dividers underneath will add space. It is expected that the thickness will be a few inches.

1.3 Product #2

Teburu is an electronic gaming system made by Xplored that combines physical and digital systems in one board game experience [4]. The board is built with embedded RFID antennas, a main PCB board, and a layer of sensors [4]. The game pieces each have a built-in magnet, an RFID tag, and a smart board with LEDs [4]. Because the LEDs are built into the figurines, that means the board top can be made of cardboard rather than an opaque material. However, this means that maps are harder to customize, since separate maps must be purchased or custom-made. Also, the board requires a separate electronic device to view the game information, whether this comes from a tablet or a phone. The board is also incredibly thin, making it highly portable, but due to the carboard top, it is easier to damage.

Figure 2. Teburu Board

Like the Teburu, our board will require a third-party device, but this is only to input the map and character information. After that, a laptop or other device will not be needed for the rest of the game. This increases the usability of the game, as only the DM needs an electronic device. Like Teburu, our board will implement magnets to keep track of tokens and use LEDs to keep track of status. However, because our LEDs are ingrained into the board rather than the tokens, our tokens will only require having a magnet attached to the bottom, rather than needing any sort of electronics and charging stations. Our board will not be using any cardboard, since that is an easily destructible material, which greatly benefits the customizability of our board, as only changing the lights is needed to change maps. This does mean that there are not any advanced graphics on board to see any sort of animation.

2.0 Project Packaging Description

As seen from the picture in Appendix 1, the packaging of the game board will be a simple box. The top of the playing area will be made of 3 mm acrylic, and the rest of the top, as well as the

sides and bottom, will be made of 3/8” (measured as 9.5mm in metric units) wood. The hex patterns will not be ingrained into the acrylic top. That is shown only for symbolic purposes. The hex patterns will be created with a hex grid divider beneath. The keypad and LCD will be attached to the PCB board below such that both components are raised (i.e., they will not be flush). The USB and power input will be located on the side of the box to the right of the hardware, as seen in the picture in Appendix 3. The microcontroller will be located next to the LED and Hall Effect Sensor strips, as well as the other hardware components. The top right corner of the box is empty, and most likely will feature either a logo or basic instruction set.

3.0 Sources Cited

[1] “The Infinity Game Table and Infinity Game Board,” Infinity Game Table, https://infinitygametable.com/#slide1 (accessed Feb. 7, 2024).

[2] “Arcade1Up Infinity Game Board,” Best Buy, https://www.bestbuy.com/site/arcade1up-infinity-game-board-black/6538280.p?skuId=6538280 (accessed Feb. 7, 2024).

[3] “Arcade1up 32" Infinity game table,” Best Buy, https://www.bestbuy.com/site/arcade1up-32-infinity-game-table/6470412.p?skuId=6470412 (accessed Feb. 7, 2024).

[4] Teburu, https://teburu.net/#develop2 (accessed Feb. 7, 2024).

[5] H. Flütsch, “Numeric Keypad,” Free CAD Designs, Files & 3D Models | The GrabCAD Community Library, https://grabcad.com/library/numeric-keypad-1 (accessed Feb. 9, 2024).

[6] A. Minaev, “2.2" TFT display,” Free CAD Designs, Files & 3D Models | The GrabCAD Community Library, https://grabcad.com/library/2-2-tft-display-1 (accessed Feb. 10, 2024).

Appendix 1: CAD Model Illustrations

The below dimensions are in millimeters. The keypad and LCD CADs were acquired online.

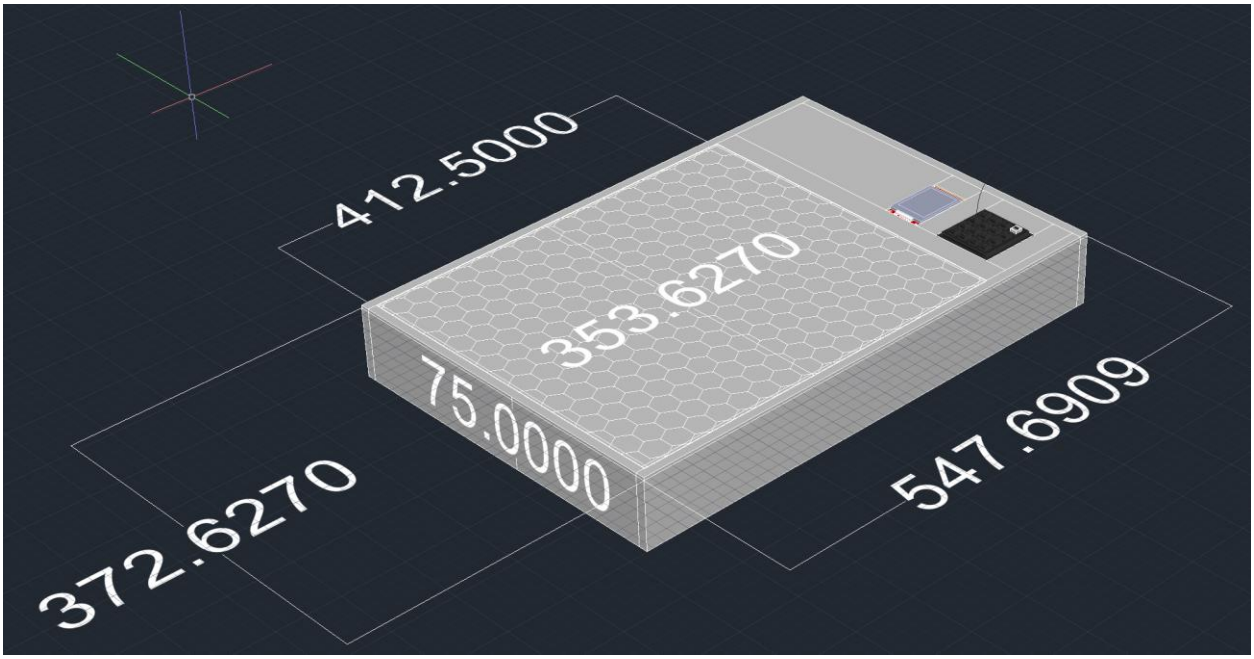

Figure 3. Dungeon Crawler Board CAD [5][6]

Appendix 2: Project Packaging Specifications

Material	Tools Required	Weight	Cost
Opaque Acrylic	Table saw, drill, drill press	1.06 lb	$14.40
3/8” Birch Plywood	Table saw, drill, screwdriver, sander	2.7864 lb	$24.96
Screws	Screwdriver	0.44 lb	$7.49
Standoffs	Screwdriver	0.40 lb	$22.50

Table 1. Materials, tools, weight, and cost of packaging

Appendix 3: PCB Footprint Layout

The below dimensions are in millimeters.

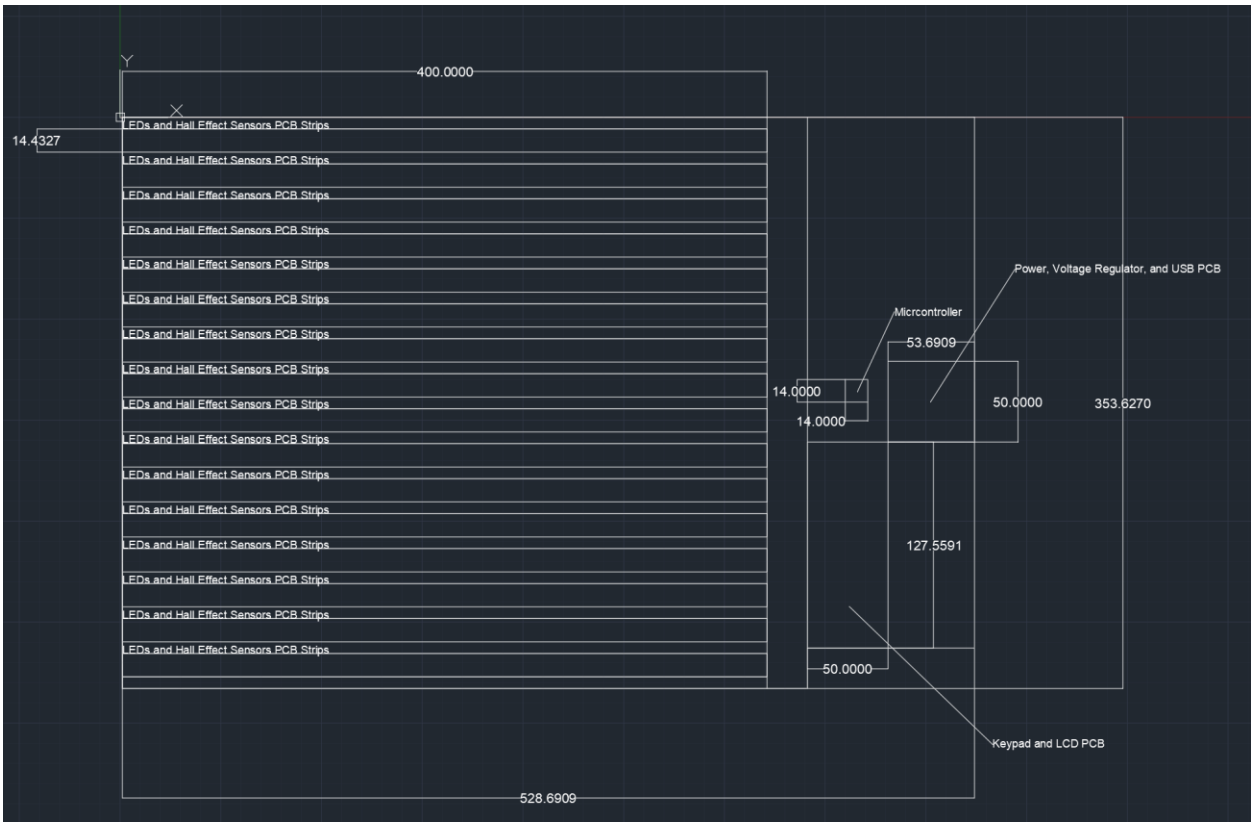

Figure 4. Dungeon Crawler Board PCB Layout