MAGIC DRAWING

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MOTIVATION

Figure 1. Coca Cola Time Square Display creating a 3D effect via actuators and LEDs.

We discovered the Coca Cola display in Time Square while searching for projects. It is a visual display that combines mechanical and computer engineering. The display itself is used for marketing purposes but shows that the combination of engineering and art can be used to make very expressive designs. As seen in Fig. 1, the Coca Cola display creates a 3D effect using blocks of LEDs (similar to a 64x64 LED block) with actuators attached behind them. The actuators move the blocks in and out of the display at different sequences to showcase a visual art show.

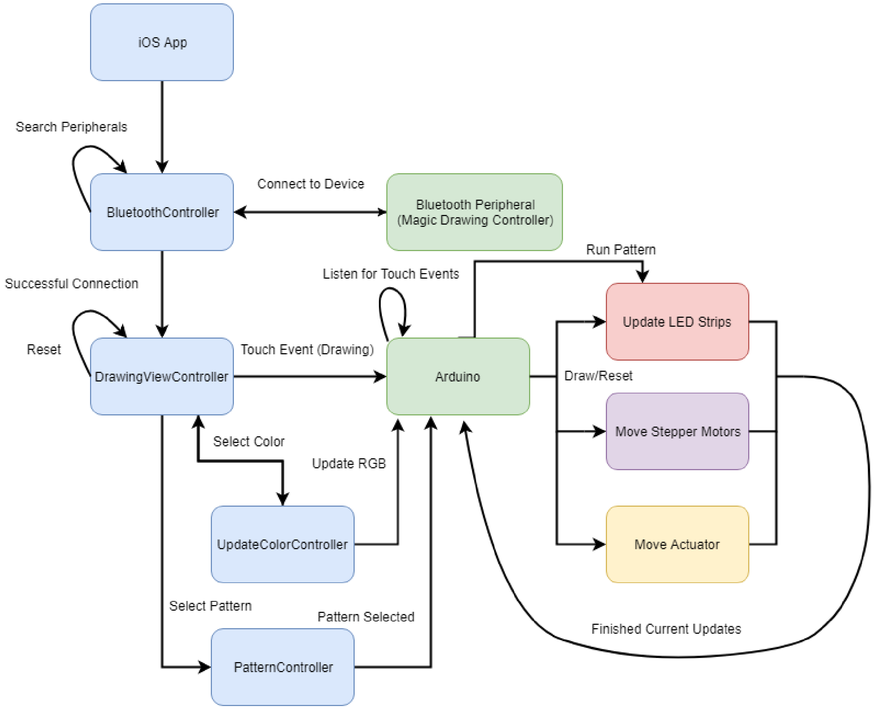

Figure 5. Magic Drawing Flow chart.

FRAME

Figure 2. Frame made out of wood housing all of the components.

Originally, our plan was to hang our project on a wall. However, as we progressed, the project became heavier than expected. Thus, we dicided to make a frame with legs to house all of our components.

MICROCONTROLLER

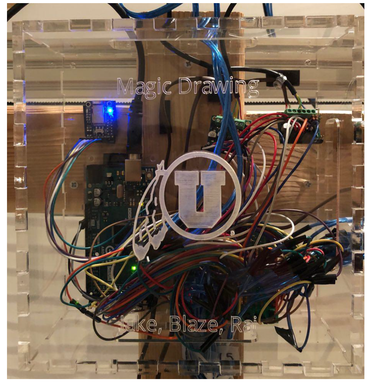

Figure 3. Acrylic housing consisting of Arduino, Bluetooth chip, two motor drivers, and our custom PCB.

- Arduino Mega for controlling the LEDs, motors, and actuator
- Adafruit Bluefruit LE Chip for Bluetooth communication
- AMIS-30543 Stepper Motor Drivers
- Custom PCB for LED data lines & actuator driver

DESIGN

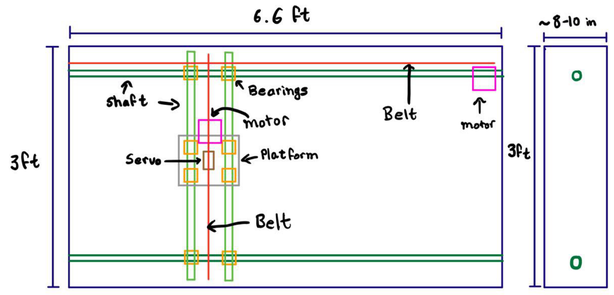

Figure 6. Design of 3D canvas with its components in place.

We wanted our display to be meaningful so we decided to build a 1m x 2m canvas.

- 2 Stepper motors for movement in X and Y plane
- Aluminum V-Slot linear tracks
- Actuator for 3D effect in Z direction
- 18 Neopixel LED strips (60 LED/1 m)

LEDs

Figure 8. Canvas made out of 18 LED strips.

- 60 x 18 resolution
- Each stip requires 4A to run all LEDs at full brightness
- Each LED is individually indexable
- Full RGB spectrum

iOS APP

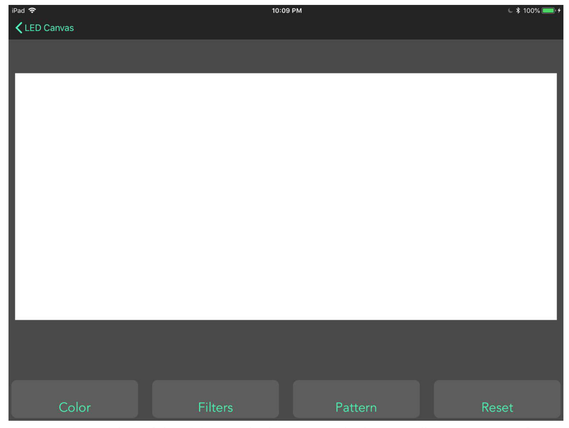

Figure 4. Screenshot of the iOS app. The buttons on the bottom allow users to configure the canvas.

- Provides communication to microcontroller via CoreBluetooth framework
- Provides user interface for interacting with Magic Drawing Canvas
- CoreGraphics framework allows user to visualize what they are drawing in the app
- Sends data to microcontroller via CSV format

POWER

Figure 7. Wiring of power and data lines of the LED strips and the motors.

- 5V/60A LED power supply
- 12V/14.6A Motor power supply
- 12V/6A Actuator power supply
- 6 x 600V/25A Dual row 8 position bus bar