LUMIRAIL

Jake Greenbaum | Chris Fisher | Jack Shoemaker | Sam Ng | Zachary Richards

Overview

Our project aims to create a captivating LEGO art piece depicting the Massachusetts Bay Transportation Authority (MBTA) map in the downtown Boston area, with added features to provide real-time information of the subway system. Through several LEDs spread throughout the map, this project visually represents the precise locations of trains within the MBTA network based on their most recent stop, offering commuters and enthusiasts an interactive and informative experience.

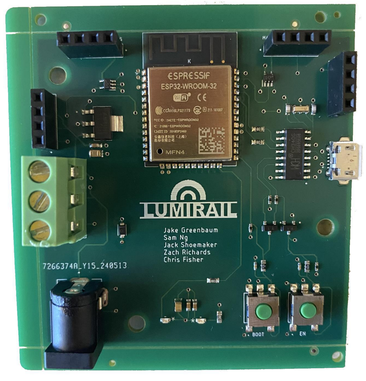
Key Components

Microcontroller - ESP-WROOM-32-N4
Core of the system that supports both Wi-Fi and Bluetooth connectivity.

LEDs – PL9823 RGB
Provides multi-color display of each train station and individually addressable.

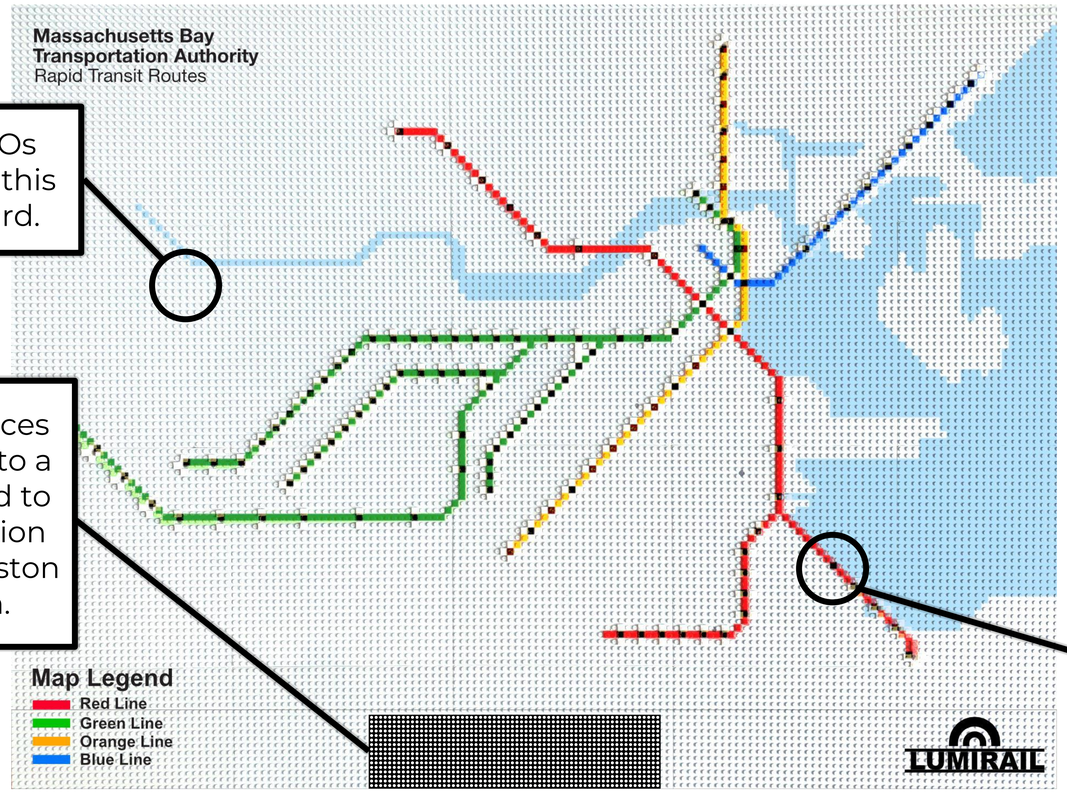
Android Application
Acts as the primary interface for users, facilitating essential interactions with the art piece.

Custom PCB



Our custom PCB incorporates an ESP-WROOM-32-N4 microcontroller enabling Wi-Fi & Bluetooth connectivity, ensuring seamless interaction with the Android application and internet. It enables control of the individually addressable PL9283 LEDs and the MAX7219 LED dot matrix, and other electronic components to complete our final product.

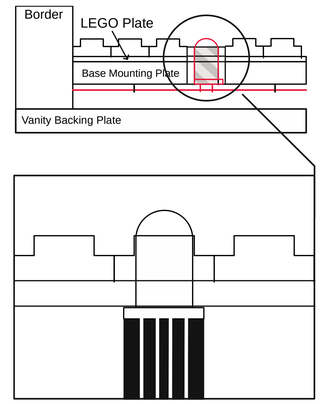
Final Product



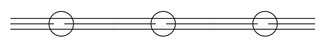
Over 1000 LEGOs hand placed on this 48in x 36in board.

16, 8x8 Dot Matrices daisy-chained into a long display used to display information related to the Boston transit system.

Over 150 LEDs drilled, mounted, and individually wired on the board.

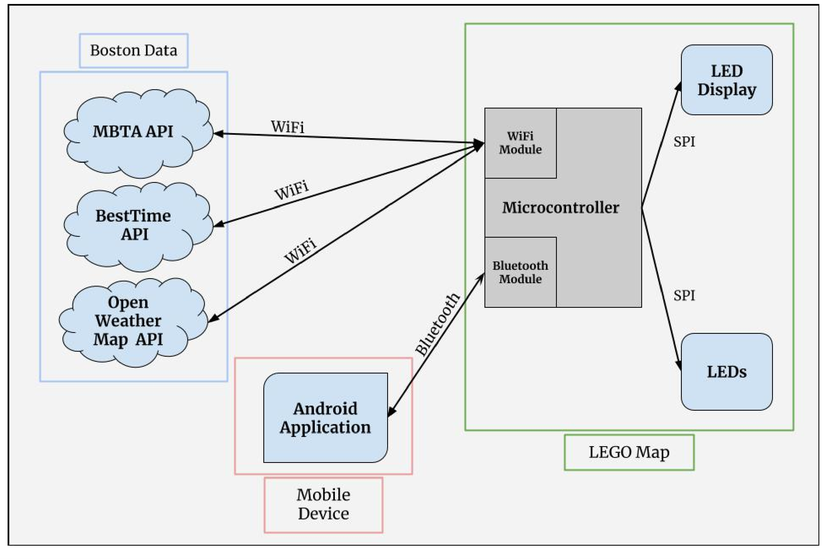


Blown up LED Mounting Side View

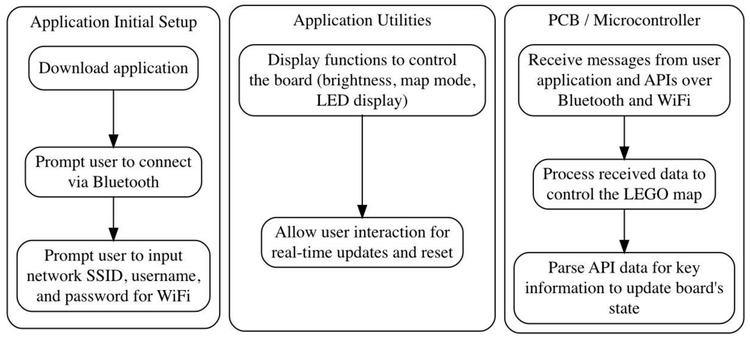


Bottom View of LED Series

Hardware Block Diagram



System Flow



The user downloads the app, connects to the board via Bluetooth, inputs Wi-Fi credentials, and controls the various map functionality including changing the brightness, map mode, or LED display information.

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College of Engineering