



ZenPad

Find your vibe.

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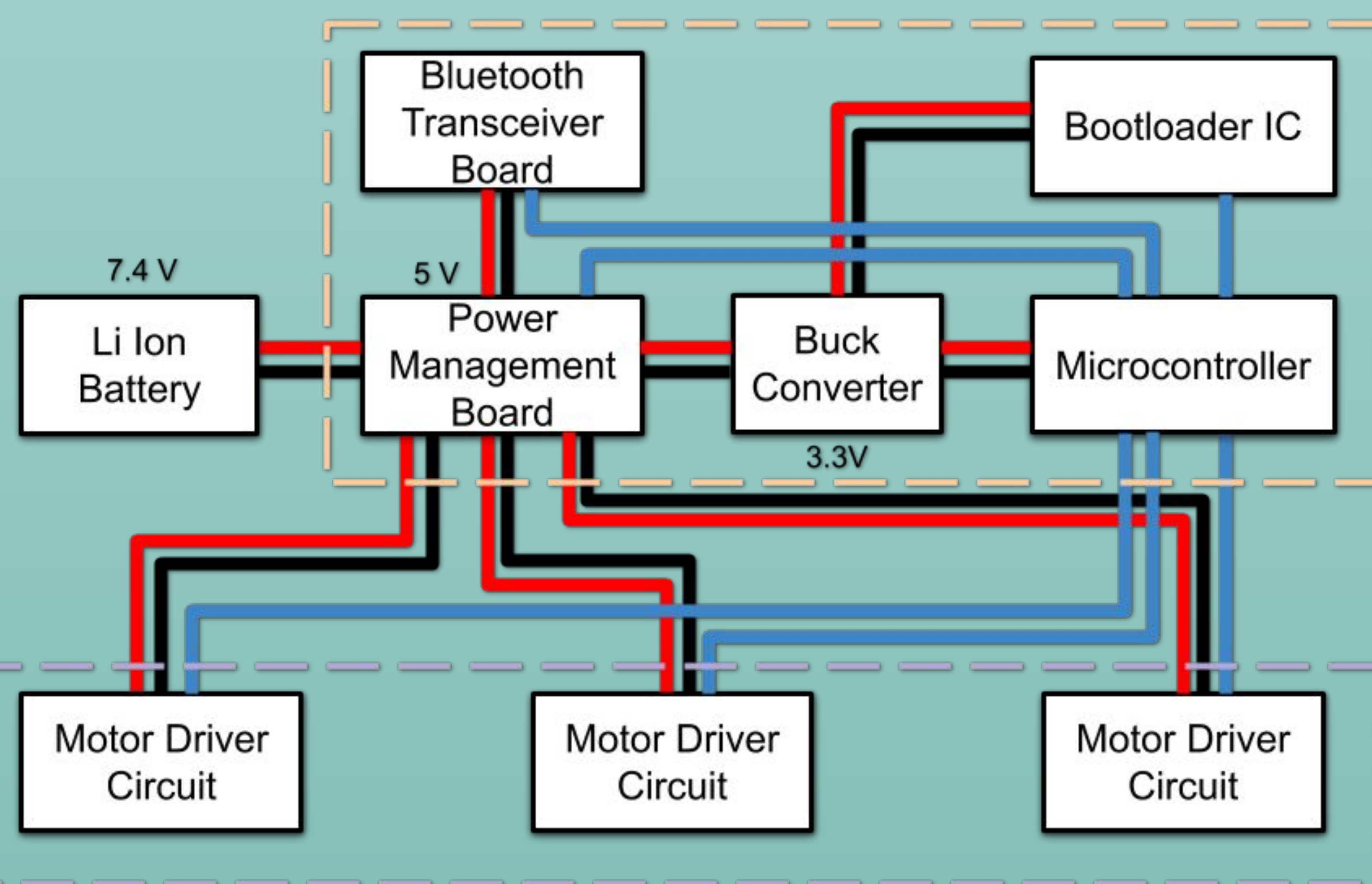
Background

Vibrational massage devices have proven to be a helpful tool in a variety of medical applications. They have also been well received in the consumer market as home relaxation appliances. However, the current technology does not allow the user to personalize their massage to meet their exact needs. Our product is an innovative, fully customizable, and portable massage mat called the ZenPad that offers users the flexibility and control.

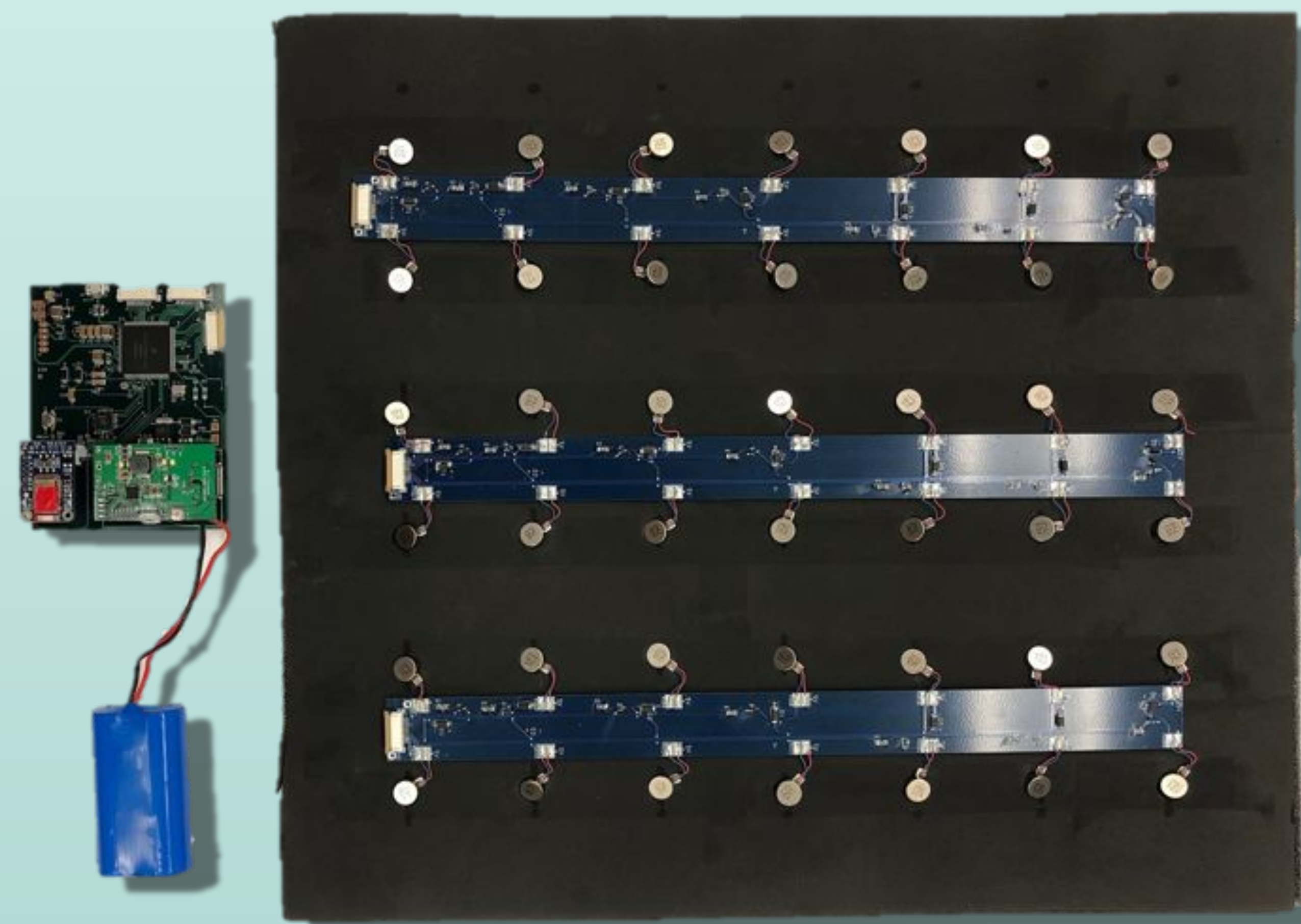
Overview / Design Specs

The ZenPad is a fully customizable, rechargeable, and portable massage pad that allows the user to take a personal massage wherever they desire. The user can choose from a library of many different pre-programmed massages. They also can control the 6x7 array of motors themselves in real time by using our mobile application to select blocks of motors to activate. The motors have over 100 different levels of intensity so that the user can create a specific experience catered to their needs. Similar products do not offer the customization and portability that the ZenPad provides.

Block Diagram



Final Design



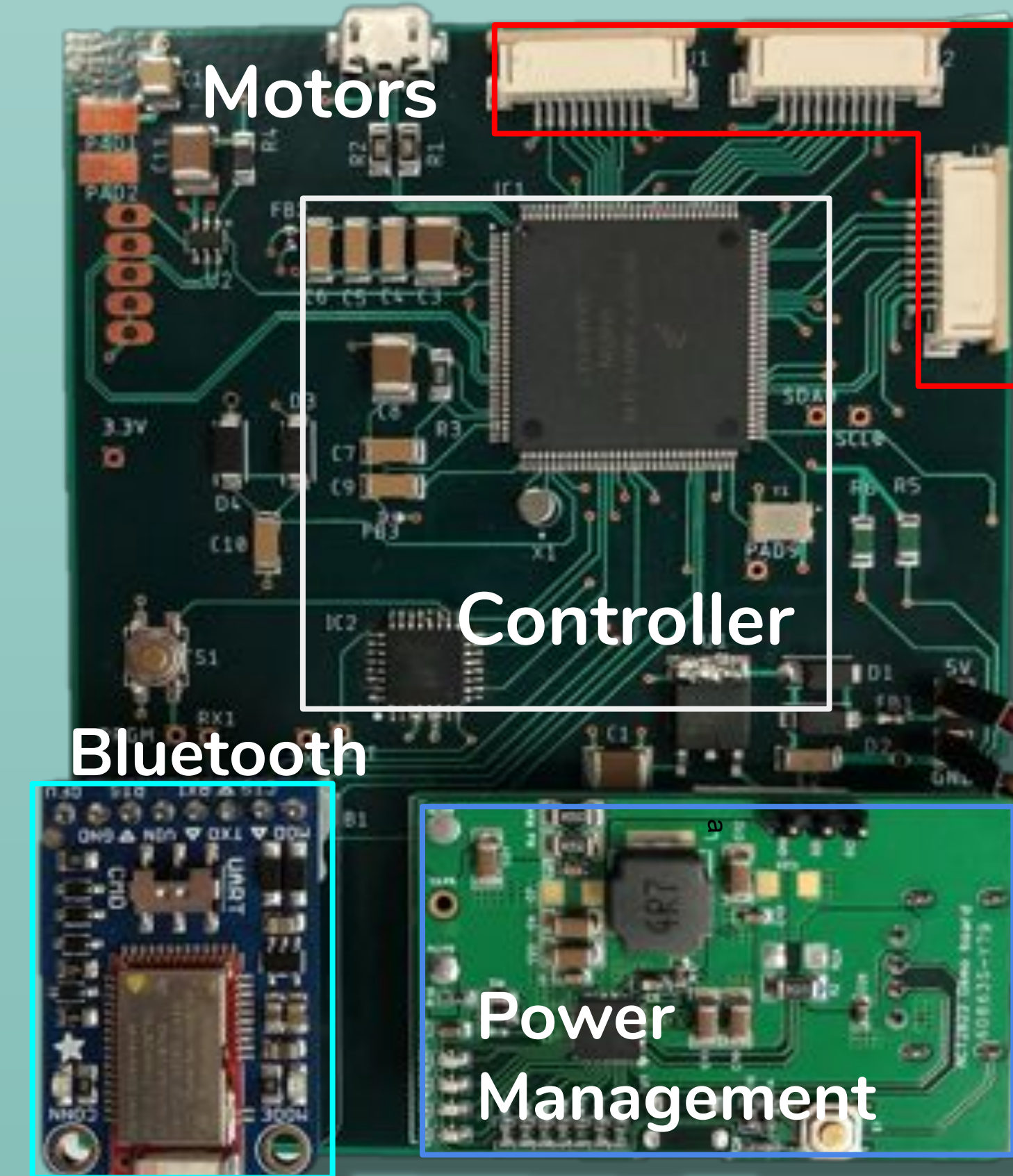
Hardware Components

Motor Control PCB

- Final product houses 3 peripheral PCB boards internally
- Contains driving circuit to control 7 groups of motors
- Motors are driven by PWM signal in groups of 2 independently
- Simplifies wire routing through massage pad

Main PCB

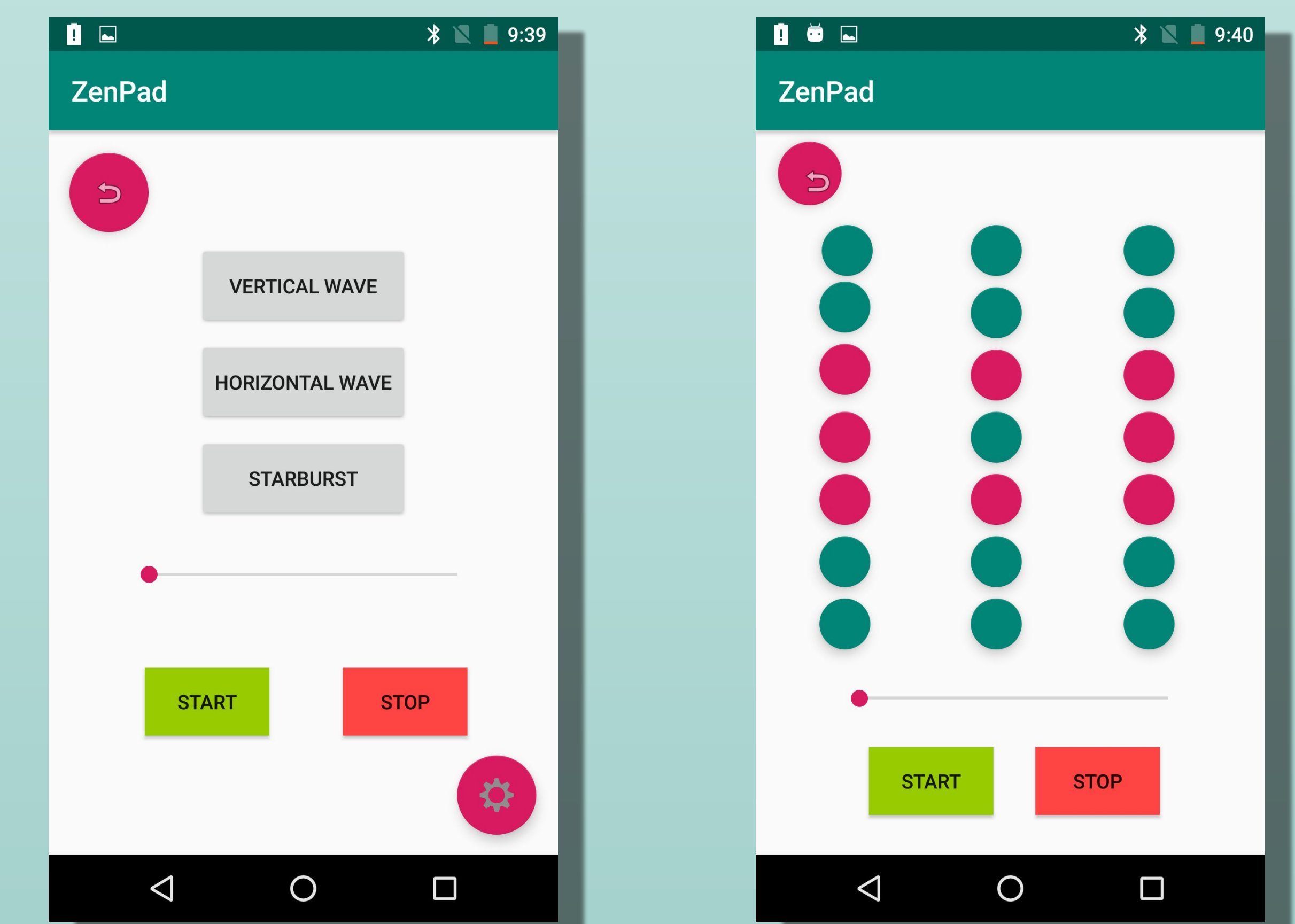
- Integrates BLE module, microcontroller, battery management IC
- Powered directly by a Li-Ion battery and connects to the motor control PCBs via low profile ZIF connectors



Firmware

- Operation mode is determined by commands sent from the mobile application
- Packet data is broken up into three sections
 - Byte 1: custom or preset mode
 - Byte 2: motor selection or preset message selection
 - Byte 3: intensity

Mobile Application



Preset Message

Custom Message

- Fully integrated Android application with BLE connectivity
- 2 pattern modes:
 - Preset: Select between pre-designed patterns
 - Custom: Design your own pattern
 - Adjustable intensity for massages

Future Improvements

- Refine Main PCB design for better reliability and cost savings
- Use flex boards for Motor Control PCB
- Extensive user testing and market research
- Professional Application development
 - Design and save custom massages

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