

G.M.A

Gesture Motion Assistant A Smart Home Automation Assistant using Hand Gestures



Electrical, Computer
& Energy Engineering
University of Colorado Boulder

Ali Alwosaibi, Igor Bakov, Yonatan Ghebrechristos, Ibraheem Khan, Chengkuan Zhang

Abstract

- Smart home automation assistant system which uses hand gestures to control in-house devices to help the elderly
- GMA is a functionally independent unit built to fit on user's hand as a glove that has various sensors to retrieve hand gesture data.

GMA Features:

- ✓ Assist with simple daily tasks.
- ✓ Control and command Bluetooth devices.
- ✓ Portable (weighs around 150g)
- ✓ Long battery life (more than 10 hours)
- ✓ Cheap (costs less than \$150)

The Solution to a Big Problem

50%

Increase in elderly requiring long term care that have no children by 2040



34%

Increase in older population since 2010

1/5

Will be at the age of 65 by 2050

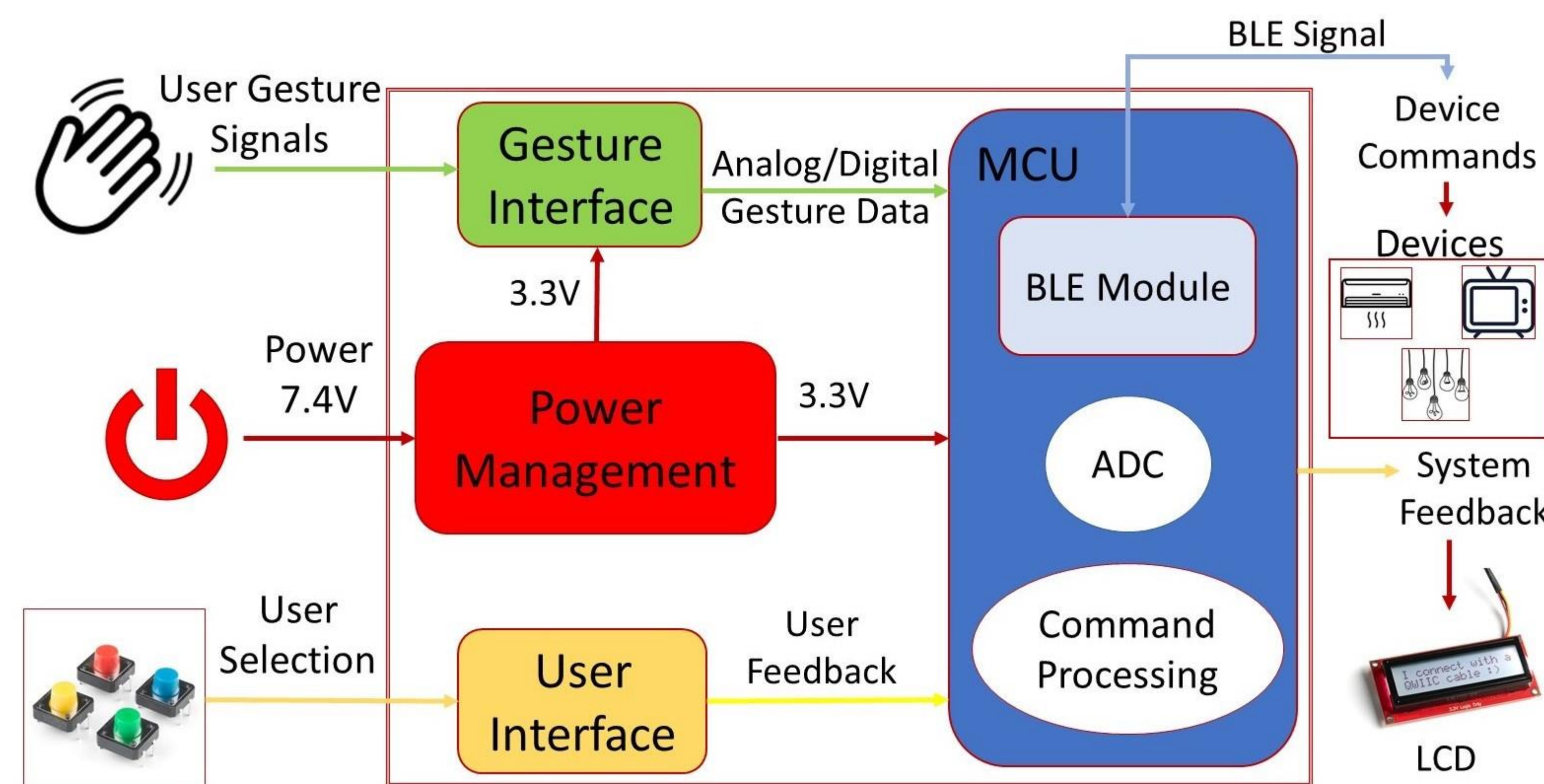
How GMA Works

1- Use buttons and LCD to edit list of connected devices and choose device in-use

2- Perform simple hand gestures to control the device in-use.

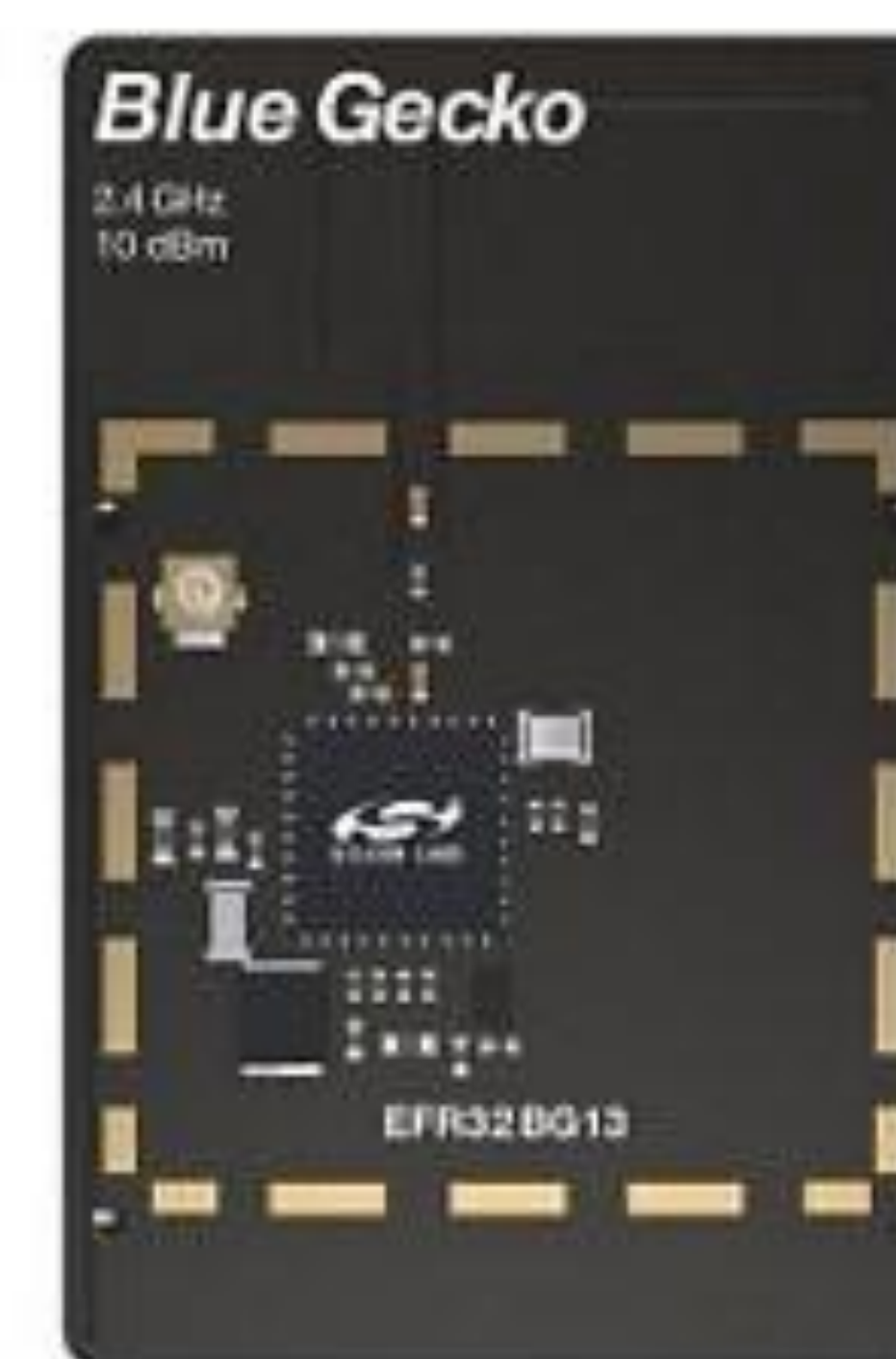
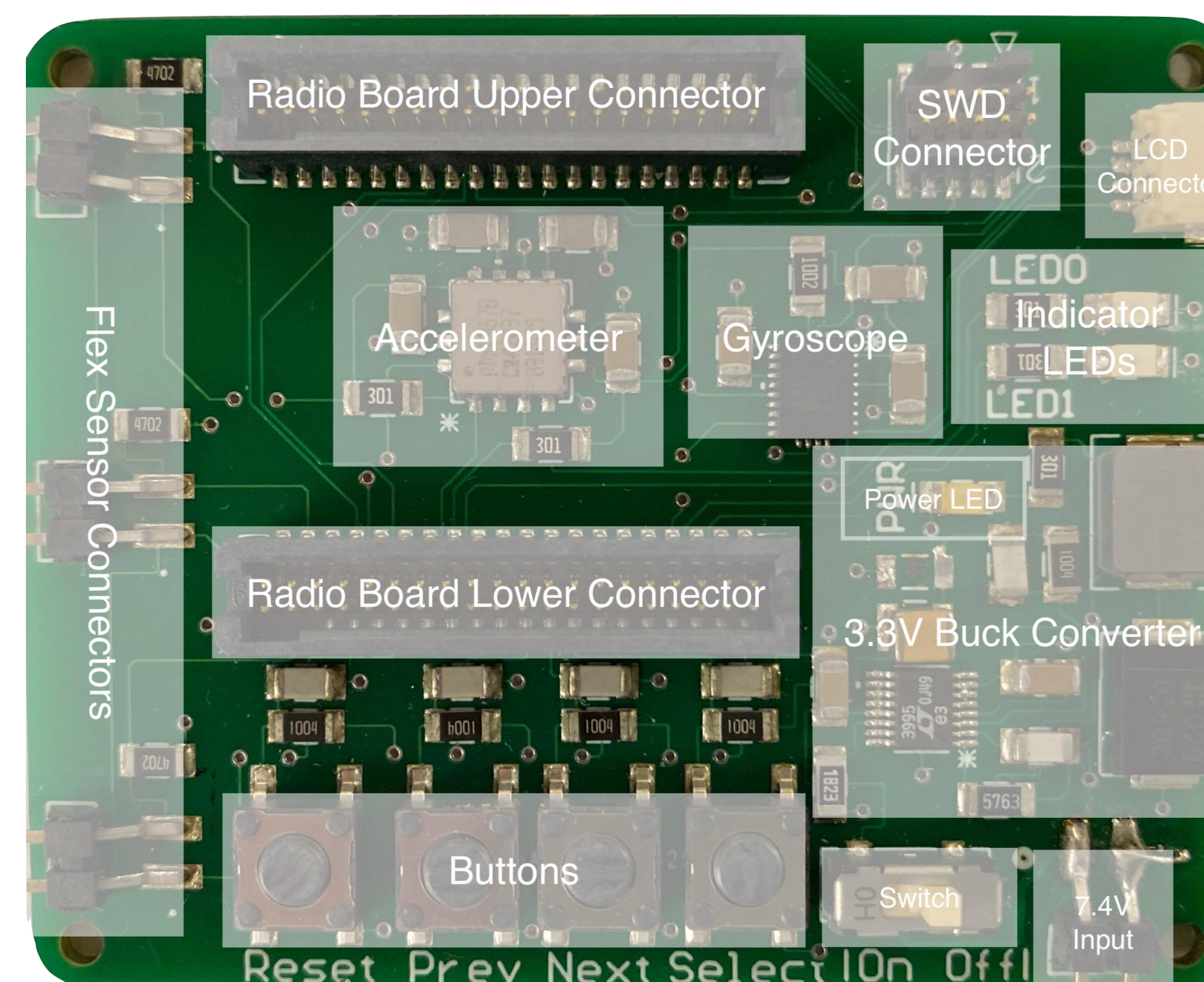


GMA Implementation



GMA Circuit Board

Custom designed PCB board that integrates the sensors, buttons, and power module. The PCB houses the radio board, Blue Gecko EFR32BG13, bridge. Finally, the PCB provides a connection to the battery and the LCD.



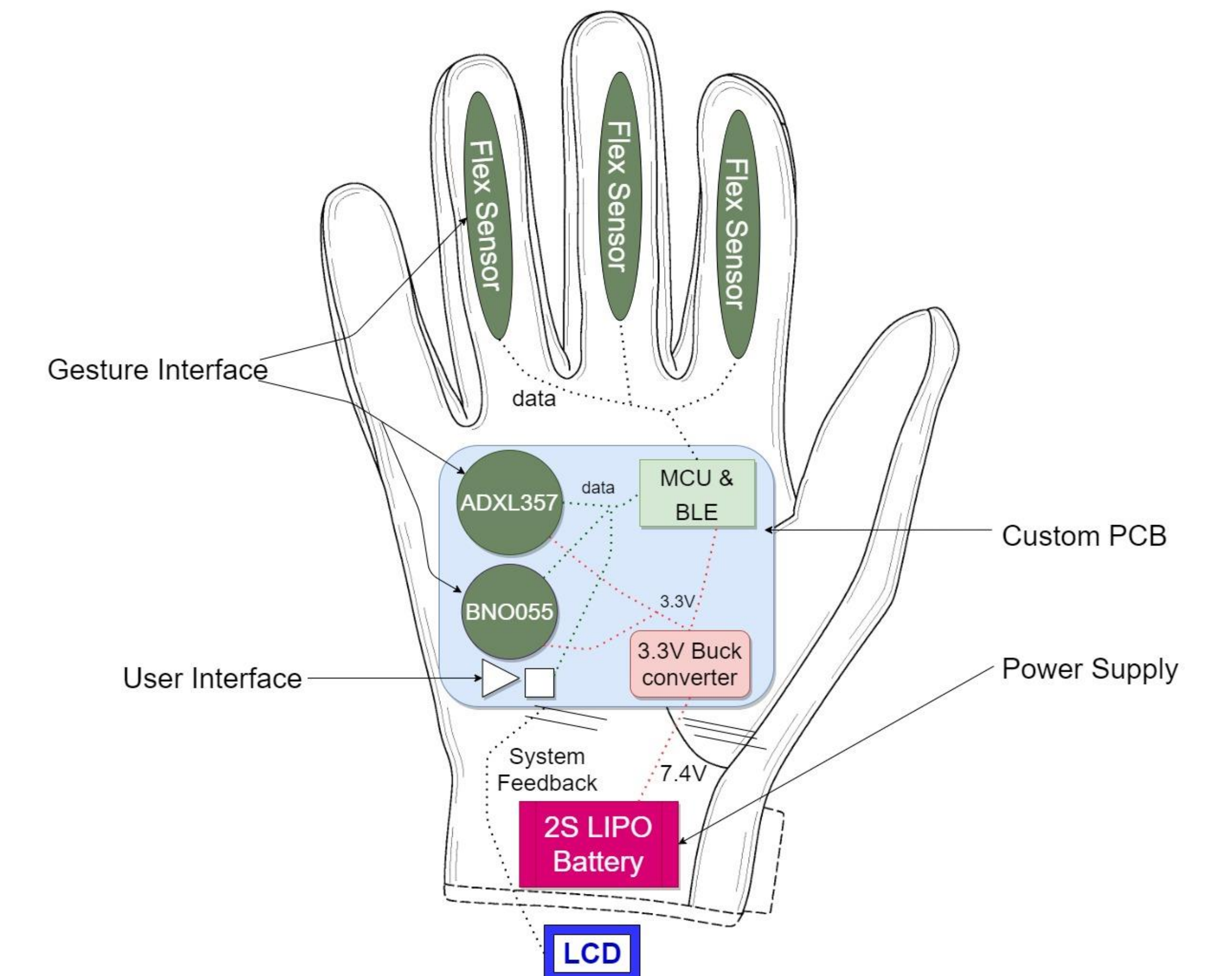
External Devices

EFR Connect Phone application has been used with GMA to demonstrate that the device is able to connect to Bluetooth-compatible devices

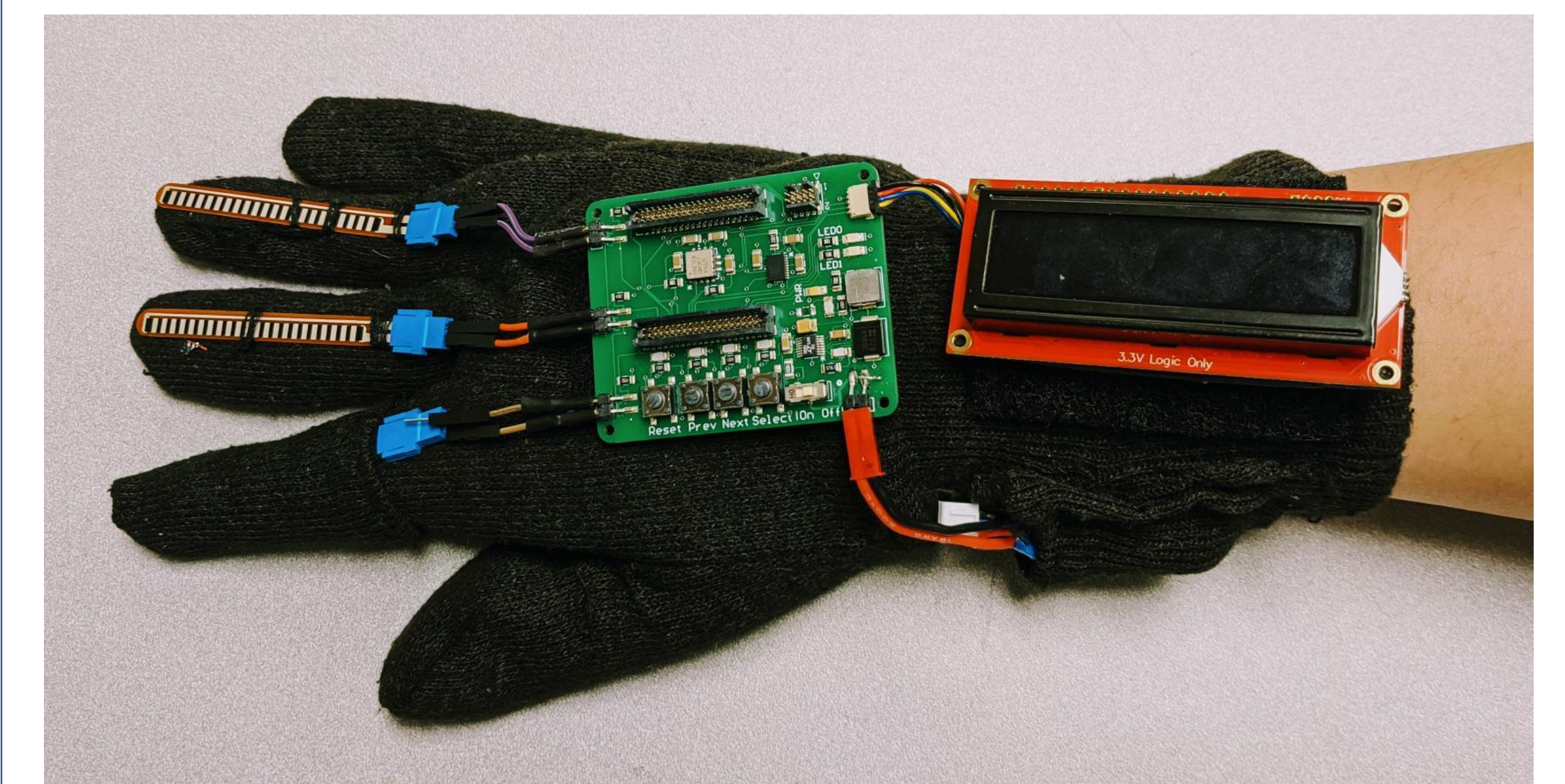


GMA Physical Design

Physical design Scheme



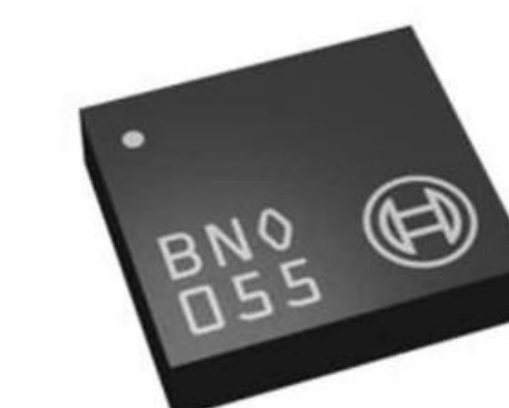
Final physical design:



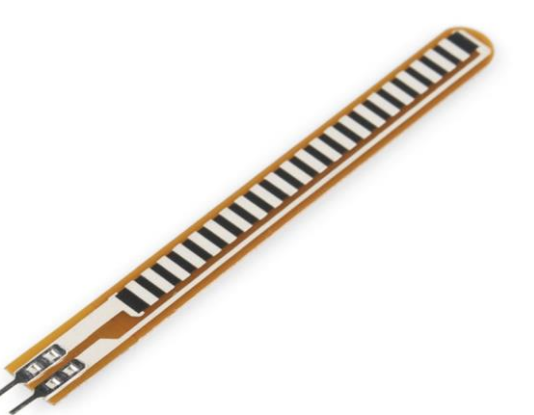
How Gestures Work



ADXL357BEZ Accelerometer detects the motion of hand



BNO055 Gyroscope detects the rotation of hand



SEN-10264 Flex sensor detects the motion of fingers