

# Cardio Bytes: Fit-tastic Module

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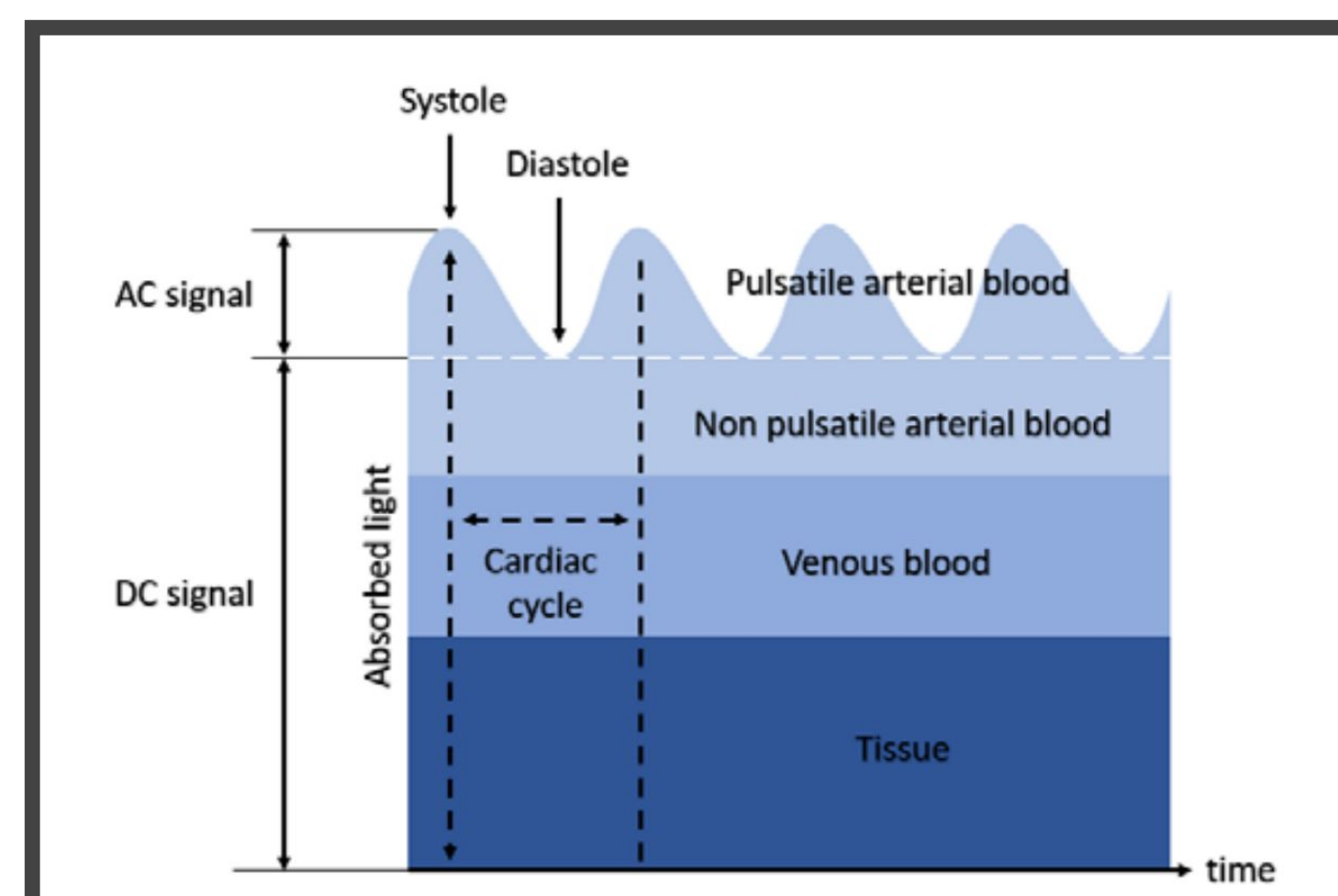
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## Project Highlights

- ❖ The device is solar powered for extended runtime.
  - Solar module is located on a hat to accommodate size.
- ❖ Pulse Oximetry to measure BPM and SPO2.
- ❖ An LCD screen to display basic fitness tracker features.
- ❖ Battery status and battery percentage.
- ❖ Bluetooth module to transmit data to an android device.

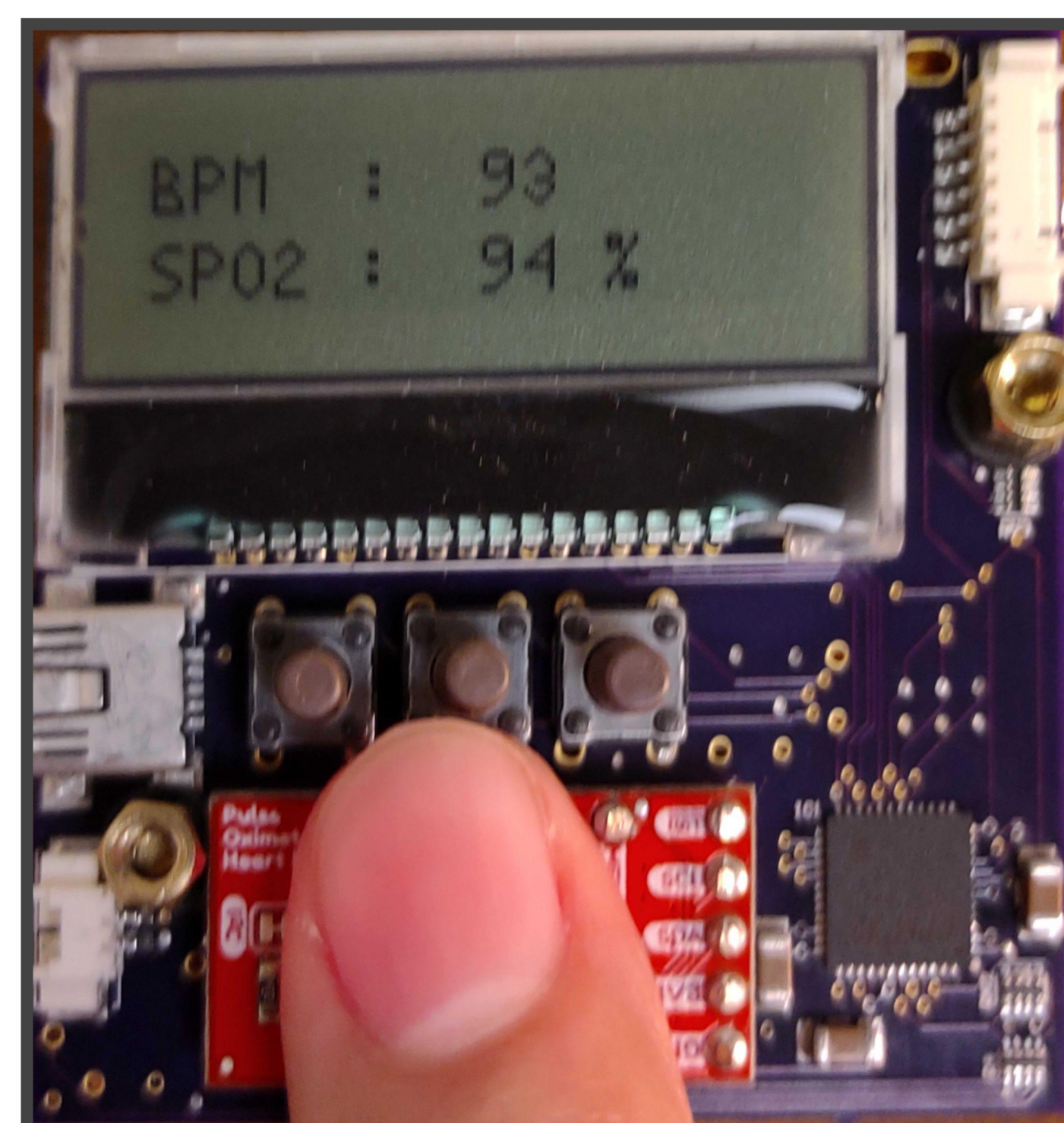
## Pulse oximetry and heart rate

Pulse oximetry is a non-invasive method of measuring blood oxygen saturation levels, the ratio of oxygenated hemoglobin to total hemoglobin. The MAX30101 uses reflective pulse-oximetry.



$$R = \frac{AC_{red} DC_{red}}{AC_{infrared} DC_{infrared}}$$

$$SpO_2 = 104 - 17R$$



## Objective

Team Cardio Bytes aimed to create a low power wearable embedded system that is capable of measuring Blood oxygen concentration (SP02) and heart rate. That data will be provided to the user via a display as well as providing the capability to transmit data over Bluetooth. In addition, the user will be able to charge the device using an attachable solar module or by mini USB.

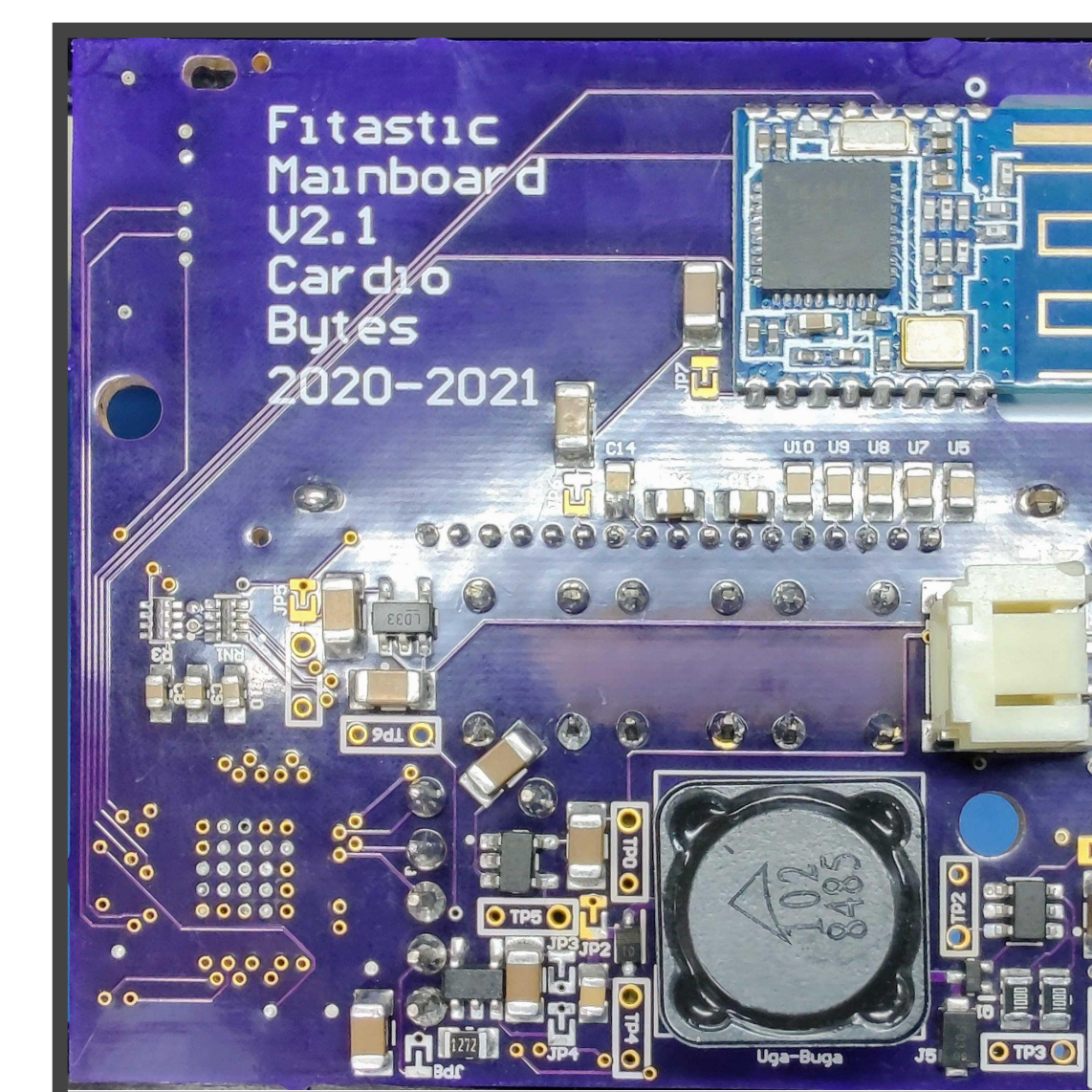
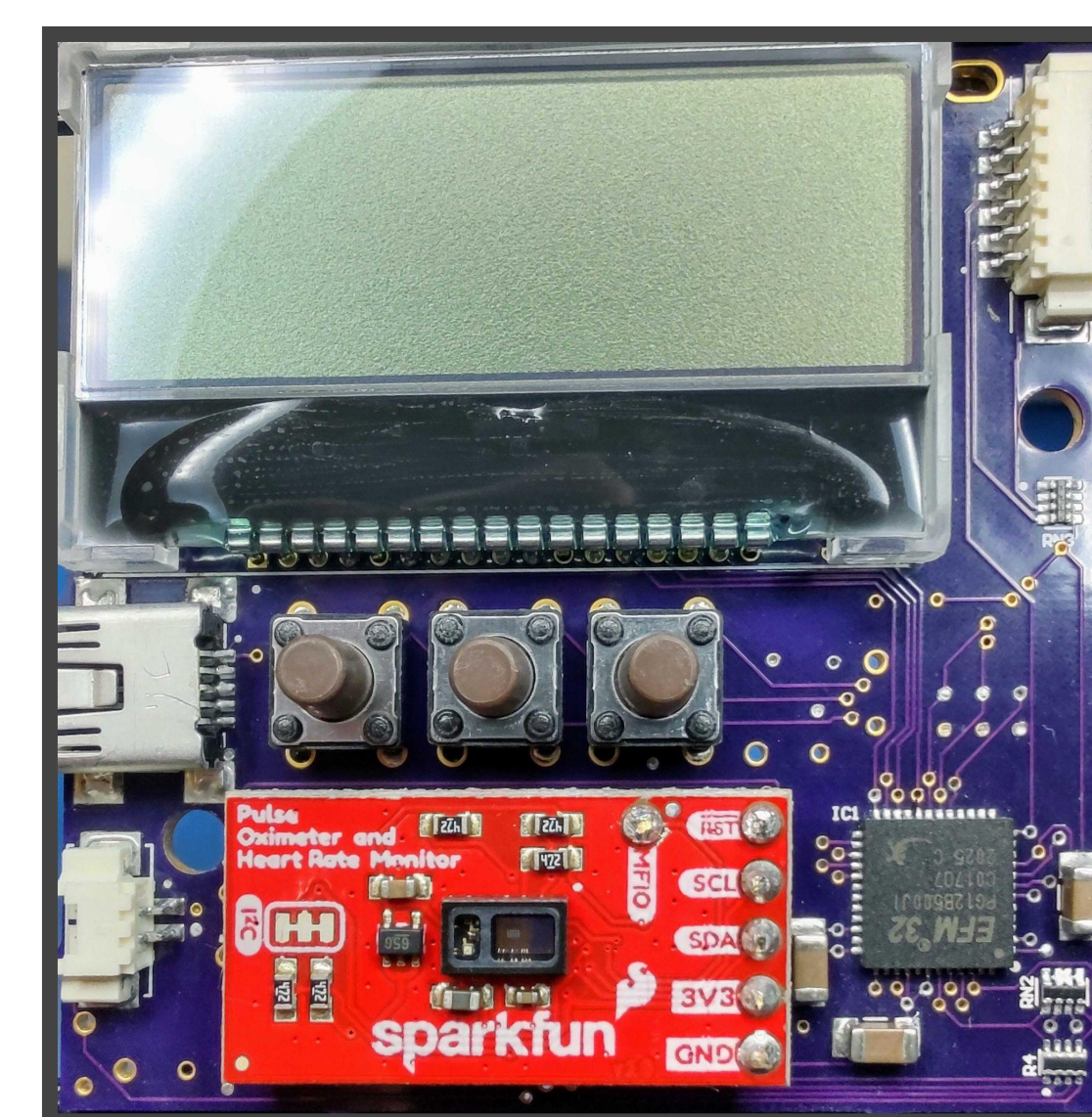
## Wearing the Device

The solar module is on the hat and time is shown on the display



## PCB

- ❖ A 4-layer PCB is implemented.
  - Subsystems such as the Pulse Oximetry, display and BLE are directly soldered onto the PCB
  - The solar module is mounted on the hat.

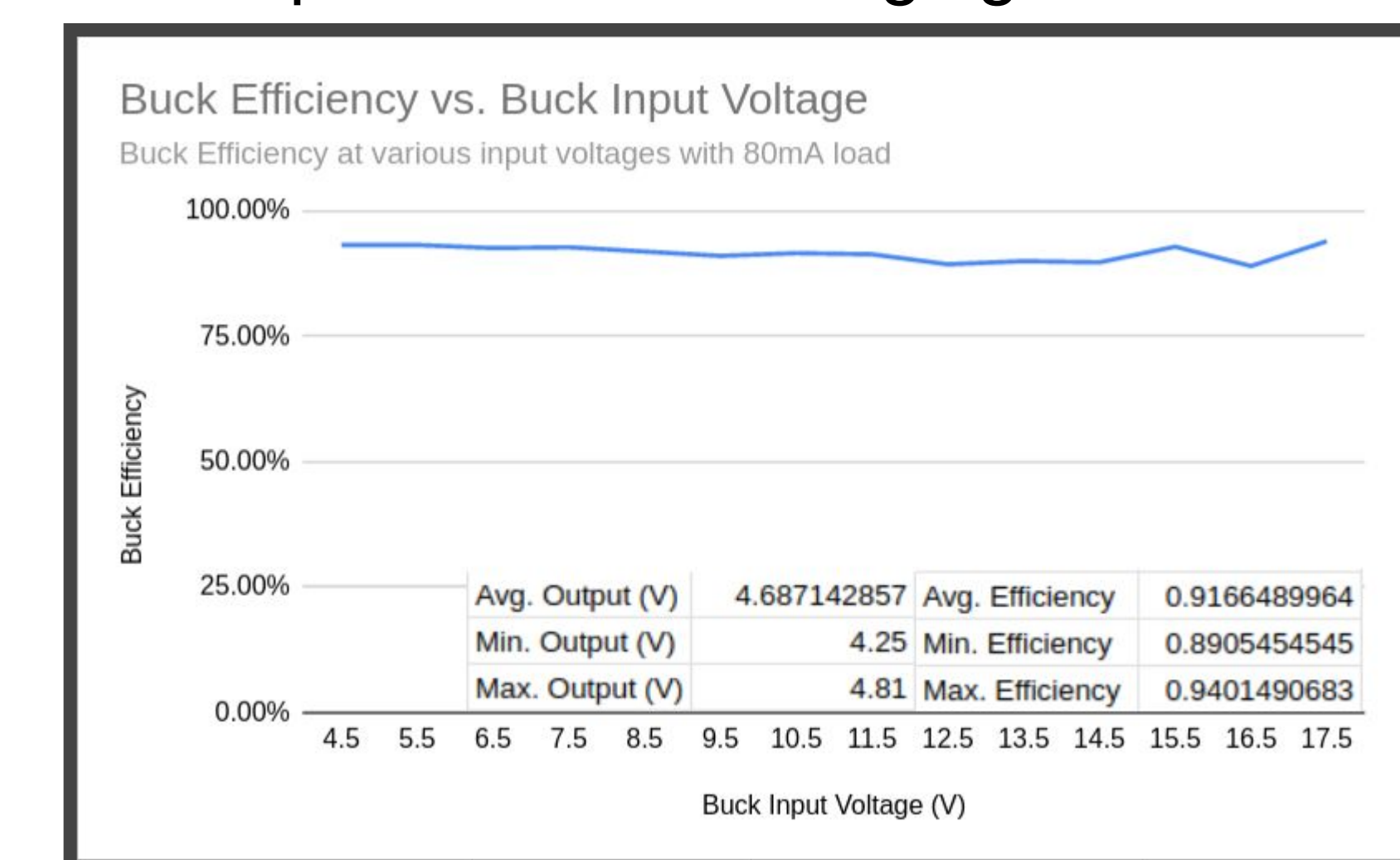


## Display:

Low energy Chip-On-Glass LCD from Newhaven Display with a resolution of 128x32 pixels. Driven using custom frame generation software and a SPI interface.

## Solar Charging

- ❖ Designed a custom buck converter to provide steady output voltage over a wide range of input voltages in order to provide the widest range of possible conditions over which the solar panels can charge the battery. Average efficiency of 91.66%.
  - Provides up to 80 mA of charging current.



## Block Diagram

