

# Smart Mask

Team 2 (Microsoft)

(Ben and Jenny)



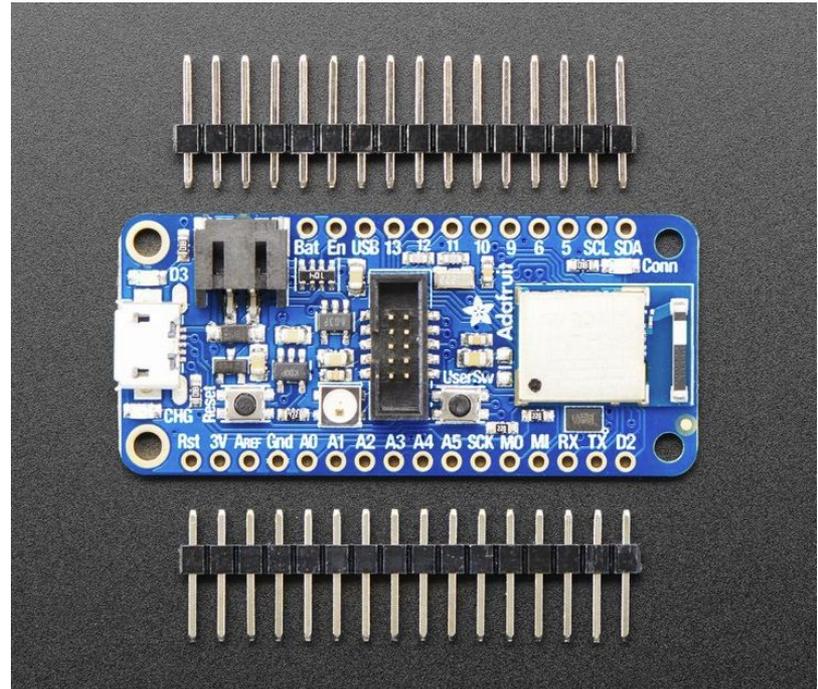
# Overview



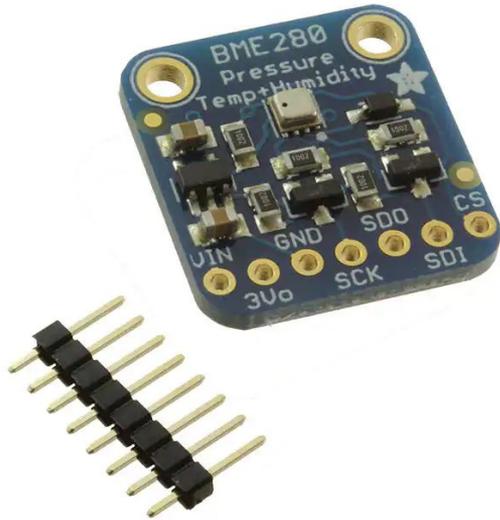
# Adafruit Feather nrf52840

Bluetooth-capable microprocessor with Cortex-M4f processor

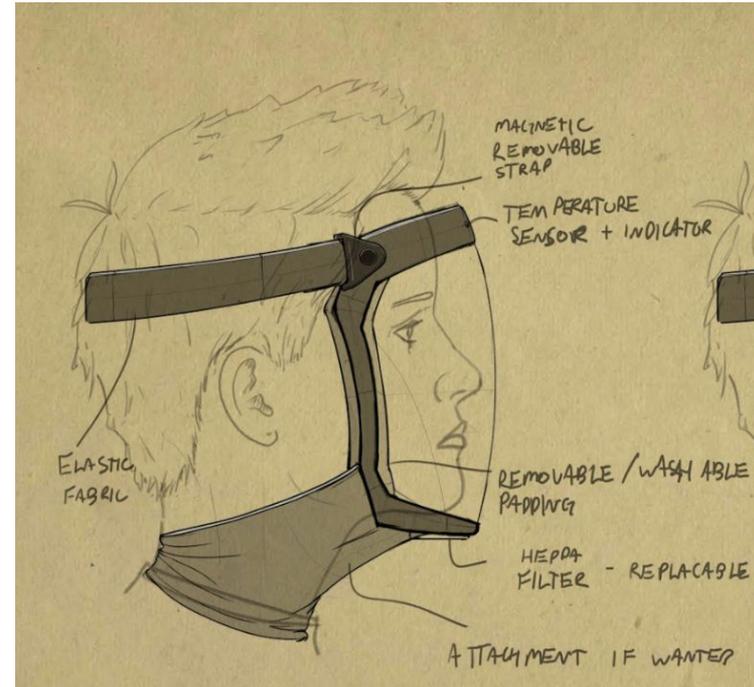
- Trivial phone connection
- Sufficient memory to operate the display
- PDM interface for microphone data
- Plenty of I/O



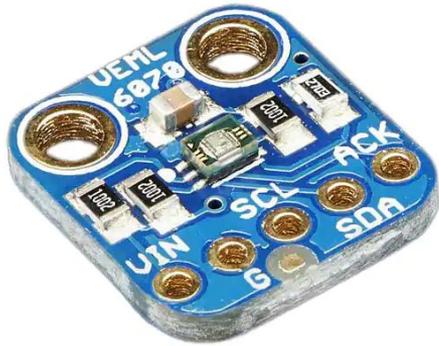
# Internal Temperature Sensor + Indicator



- Monitors body temperature to determine if the user has a fever
- Indicator LED glows red if feverish
- Exact temperature is displayed on the LCD screen
- Can be disabled in settings

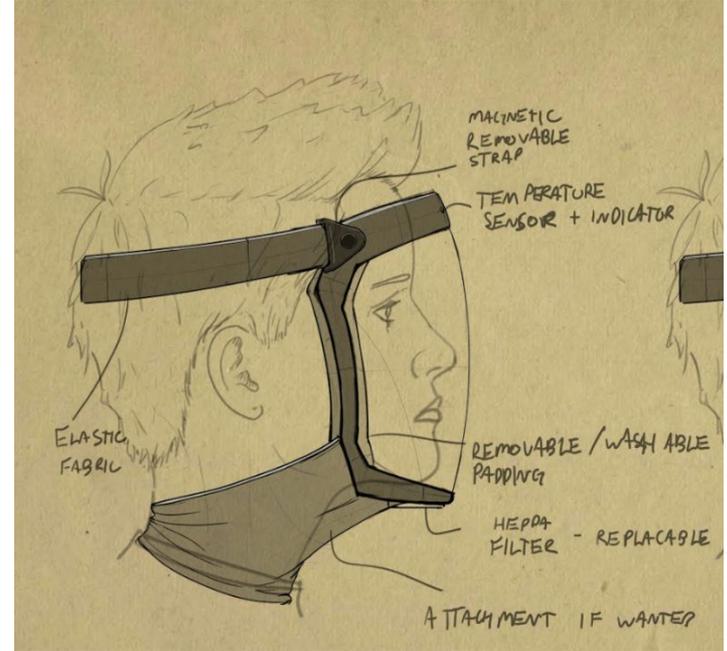


# UV Sensor



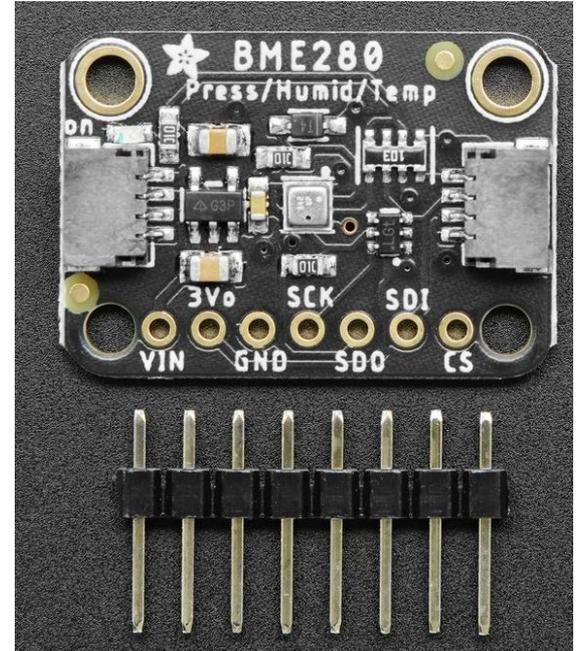
Monitors UV exposure throughout the day to help avoid overexposure

- UV index is provided in the HUD and phone app
- Embedded in the exterior of the top band



# 2x BME280 Environmental Sensors

- One monitors internal conditions, one monitors external
- Internal and external humidity + pressure are compared to monitor mask fitment
  - If these values rapidly equalize, a leak has been detected
- External sensor also provides real-time weather data to the HUD and phone app



# Battery Requirements

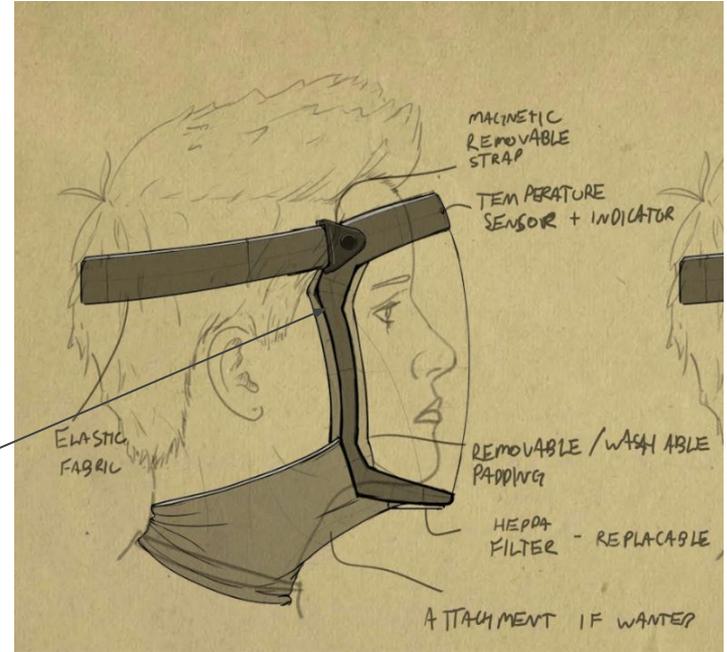


- 1.2 Ah rechargeable LiPo cell
- Exposed USB-C charging port on the underside of mask

# Microphone + voice amplification button

We're using a simple PDM microphone to pick up the user's voice audio

- Voice audio is transmitted to phone app
- App uses phone's amp + speaker to project the speaker's voice
- Voice amp. Feature is toggled based on a button on the left side of the mask

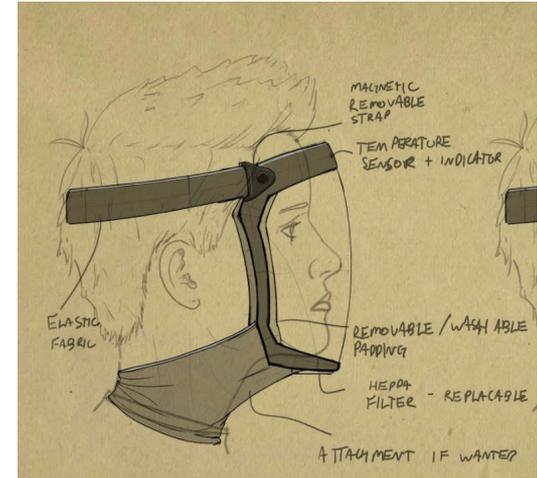


# Air Quality Monitoring Sensor



Monitors external air quality

- If total measured VOC (volatile organic compounds) or CO2 exceeds safety threshold, alerts the user via the HUD/phone app



# Embedded SHARP display



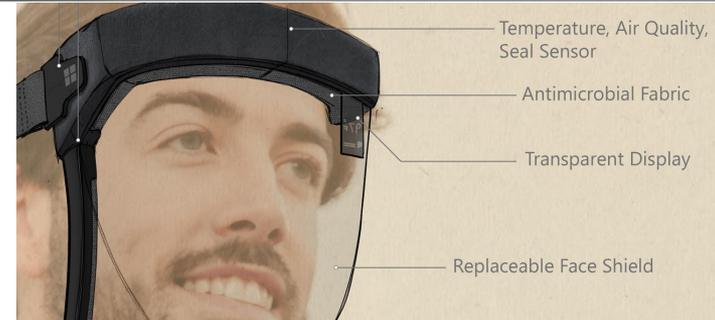
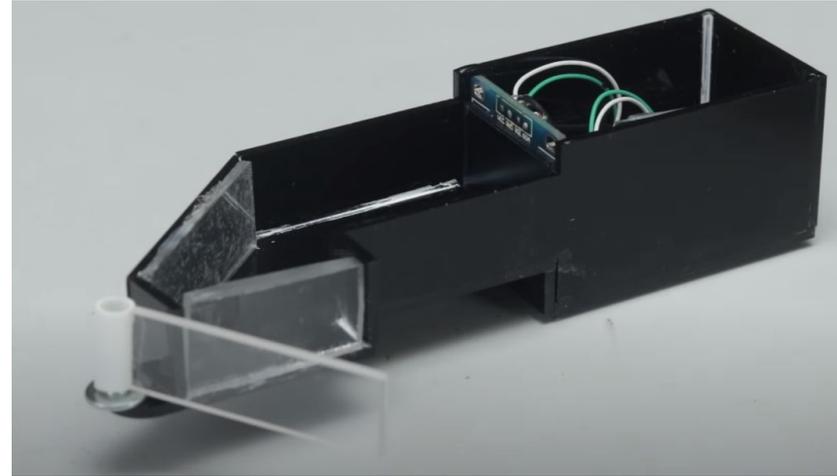
- Low power 144x168 monochrome LCD display
- Contents are reflected and magnified onto mask face Google-Glass style

## Displayed metrics:

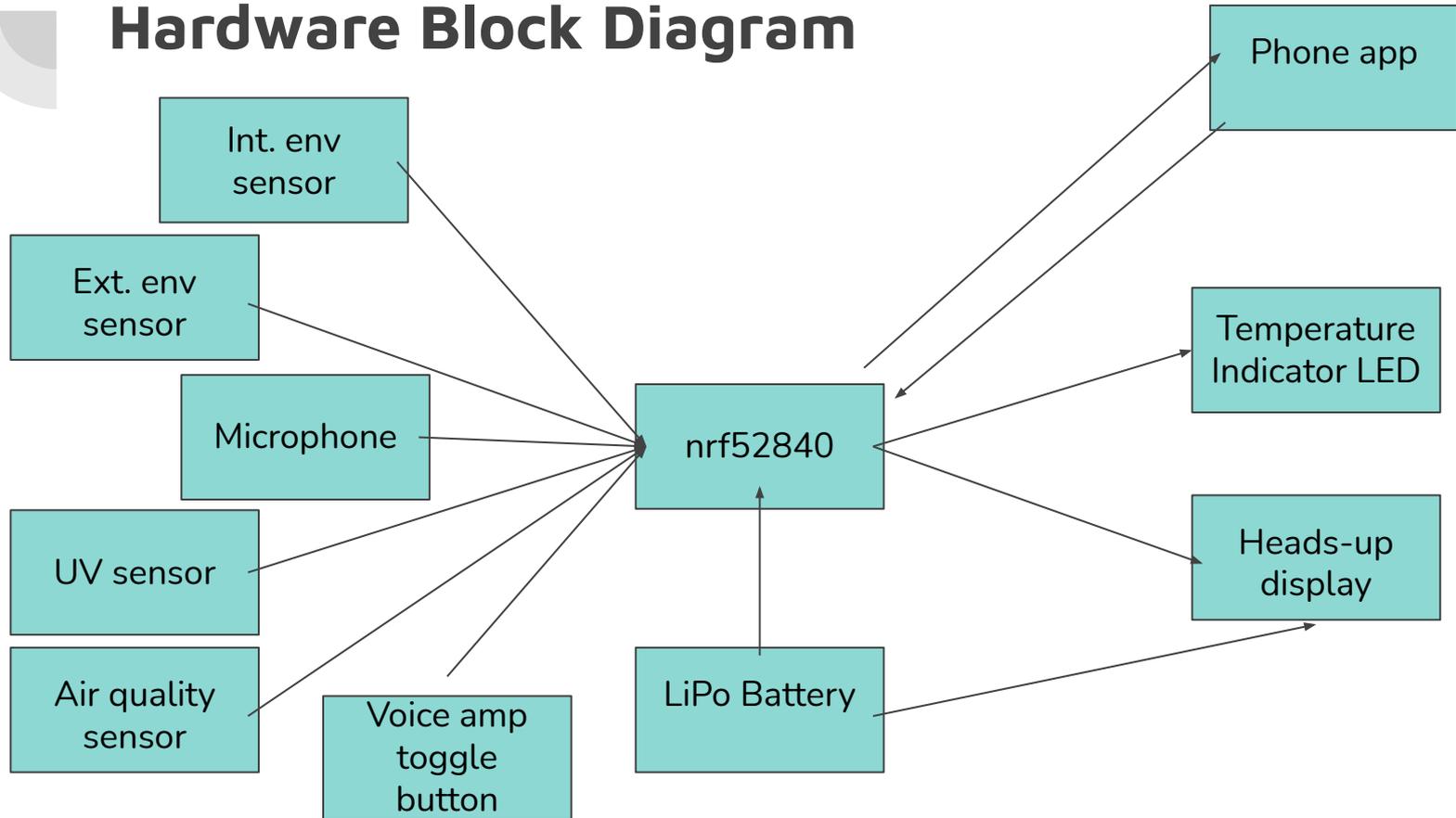
- UV index
- External temperature
- Humidity + air pressure
- Air quality (tVOC + CO<sub>2</sub>)
- Body temperature
- Battery status

## Displayed alerts:

- Mask fitment alert
- Phone push notifications
- Voice amplification toggle
- Low battery warning
- Poor air quality alert
- Body temperature alert

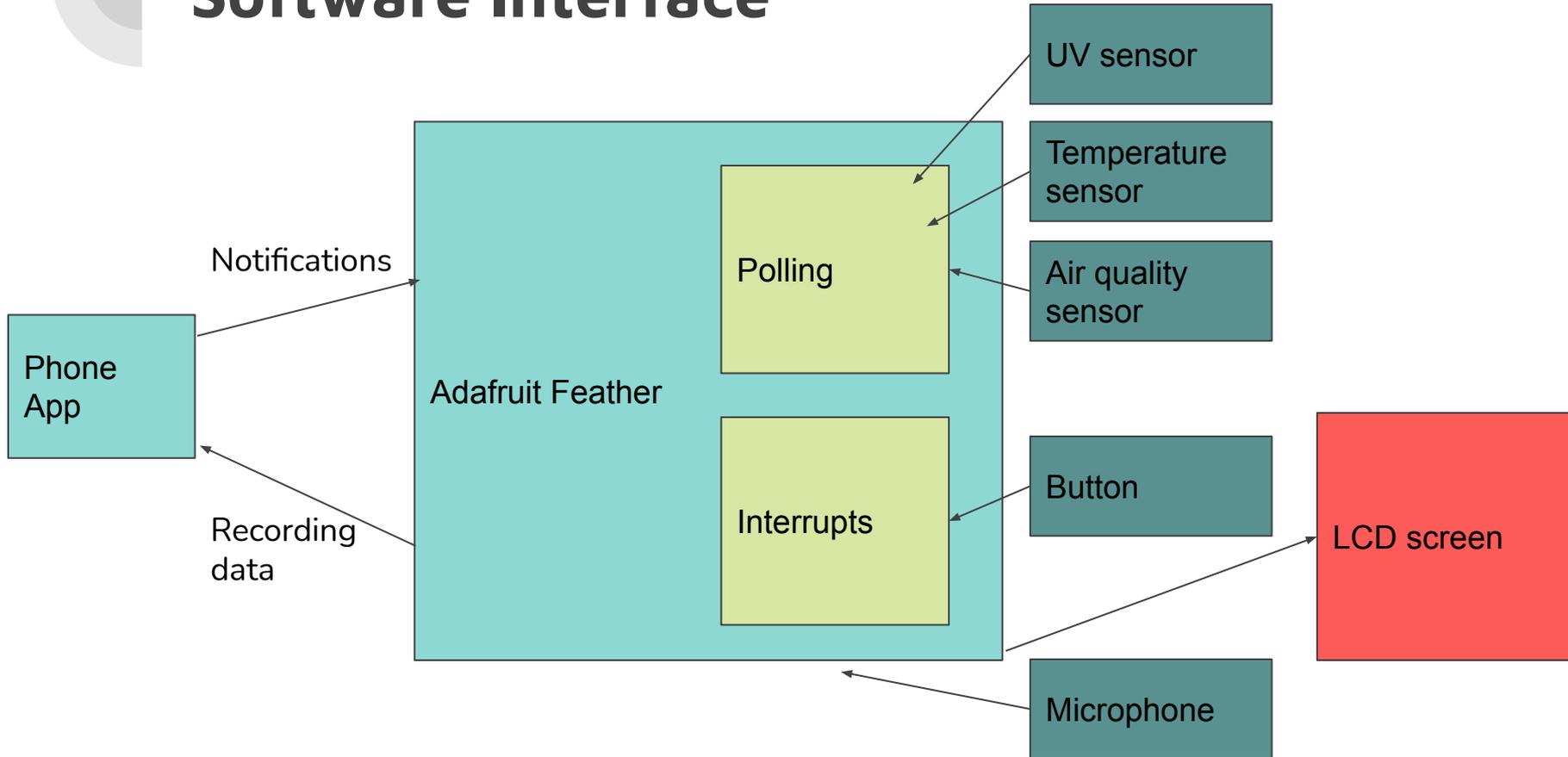


# Hardware Block Diagram





# Software Interface





**Thank you!**