Project Apollo

An open source oxygen concentrator

http://project-apollo.org

#project-oxygen-concentrator

Project Apollo

Why

- O2 needed for ventilators, oxygen therapy
  - Typical FiO2 0.3 … 0.5, up to 1
- Oxygen generation is a big problem in developing countries
  - No established infrastructure
  - Oxygen bottles are expensive
- People are already looking at alternative (local) ways for producing and delivering oxygen

https://www.economist.com/graphic-detail/2021/03/09/hospitals-are-running-out-of-oxygen-to-treat-covid-19-patients

https://www.cidrap.umn.edu/news-perspective/2021/03/who-sounds-alarm-over-covid-linked-oxygen-crisis

https://apnews.com/article/oxygen-crisis-africa-latin-america-eb0d2731a8613c1ae218db7d32a227a6

ONE YEAR

Project Apollo

What is it

- Goal = enabling people around the world to build the prototype ASAP
- Focus = Simplicity and speed of build
  - Simple, reliable design (zeolite-based PSA system)
  - Flexible, open source, off-the-shelf materials
  - Very low cost (aspirational target = $200 for 15 liters/min @ 80%)
- Final goal = Enable people to iterate and publish their own designs in the community

ONE YEAR

Project Apollo v2

How to build it

- Follow the published build documentation
- Buy/source the materials (check out the BOM)
- Build the prototype
- Validate O2 concentration and flow. Use a **good** reference O2 and flow sensor for calibration

Multiple iterations/variants have been built

- O2 concentration 45 … 70%, 5 lpm

Project Apollo v4

Apollo v4

- Focus = medical device
  - **Safety**: detect all failure scenarios
  - **Ease of use**: User experience and maintainability. Clear, actionable error messages
  - Self-regulating: Patient sensor/data feedback loop
- Control box
  - Touch screen for diagnostic messages, medical-grade buzzer
  - Open source, modular PCB design. Works with a variety of sensors
  - **Self-tuning:** valve timing, auto-adjusts to changes in compressed air input pressure, machine learning
  - Integration with SpO2 oximeter Bluetooth sensor
  - Cloud data integration for patient monitoring
- Self-contained enclosure
  - Built-in compressor
  - Full focus on thermals, airflow, noise reduction

Collaborations

- Funding: Quick2space.org
- Volunteers: Helpful Engineering, Microsoft Garage, Public Invention

Documentation, code

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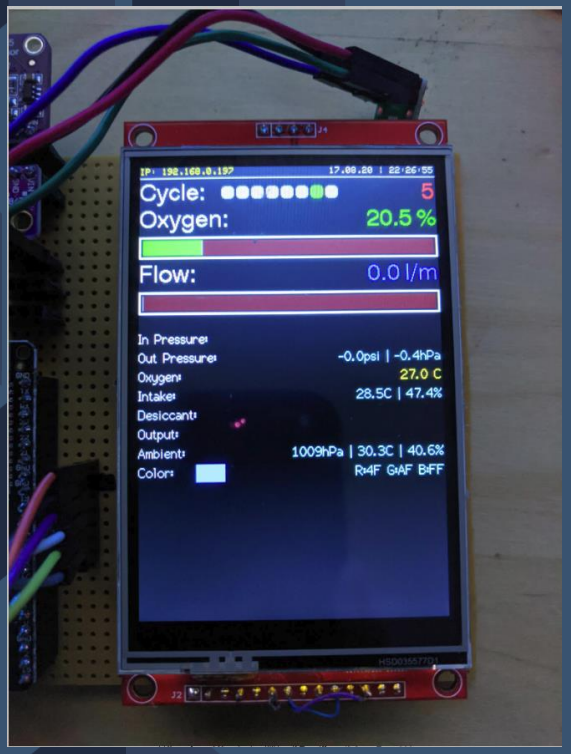
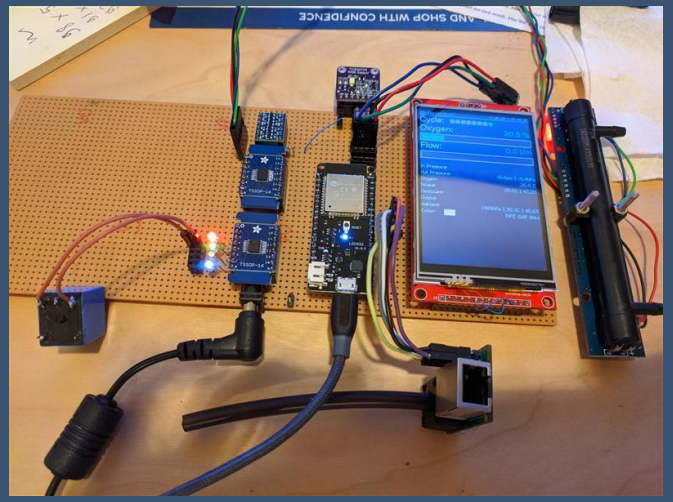
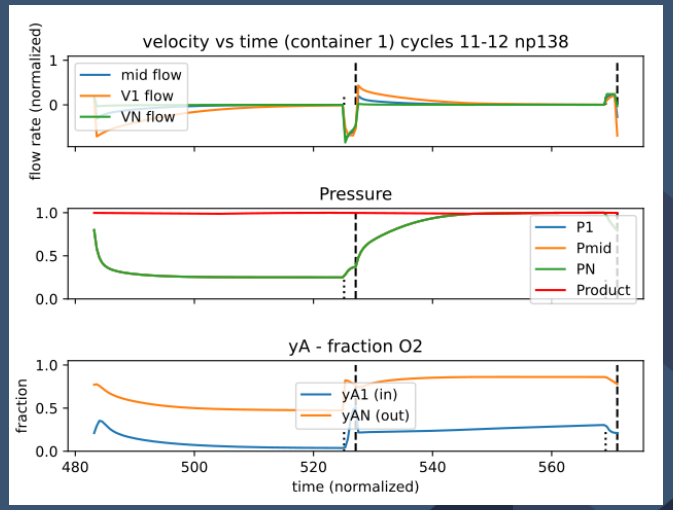
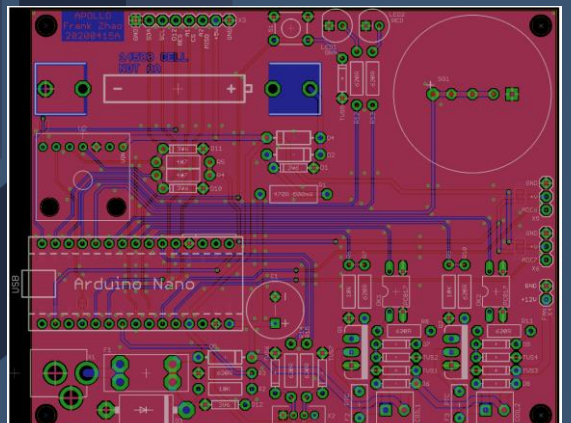
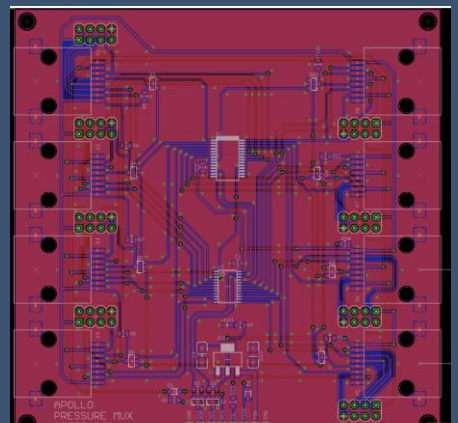
Project Apollo v4











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Thank you!