Methods | Design | Analysis

The system consists of a capnography and a spirometry subsystem.

- The gas mask acquires the capnography signal. The particulate filter, water trap, and hydrophobic filter improve the quality of the signal. The SpirinIR sensor measures gaseous CO2 levels by monitoring the amount of IR light passing through a filter after some of this light is absorbed by the CO2 molecules. The pump removes gas from the system.
- The flow tube and differential pressure sensor acquire the spirometry signal and measure the pressure detected upon forced expiration, respectively.
- The Arduino functions as the microcontroller, the TFT display outputs the results, and the SD Card stores the data to be sent to a physician.

Results

Capnography

- Figure 3 shows the CO2 waveform extracted by the peak detection algorithm implemented in MATLAB for a healthy adult.
- All peak values (EtCO2 readings) fall within the expected, normal range of 5 to 6% CO2.

Figure 3. Recorded capnogram

Figure 4 shows the PEF values recorded from a healthy individual.
- All peak values fall within the expected, normal range of 500 to 614 L/min for an adult 22 years old with a height between 5 ft and 6 ft.

Figure 4. Recorded PEF measurements (expiration phase)

References