

Senior Design Capstone Project: Respiration Monitor



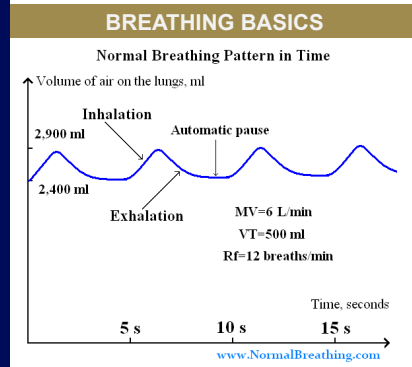
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 Website: <http://seniordesign.ee.nd.edu/2013/Design%20Teams/crystalbreath/index.html>

Team
Crystal Breath

GOAL: Create a device that continuously measures and analyzes breath and can be used in an operating room environment.

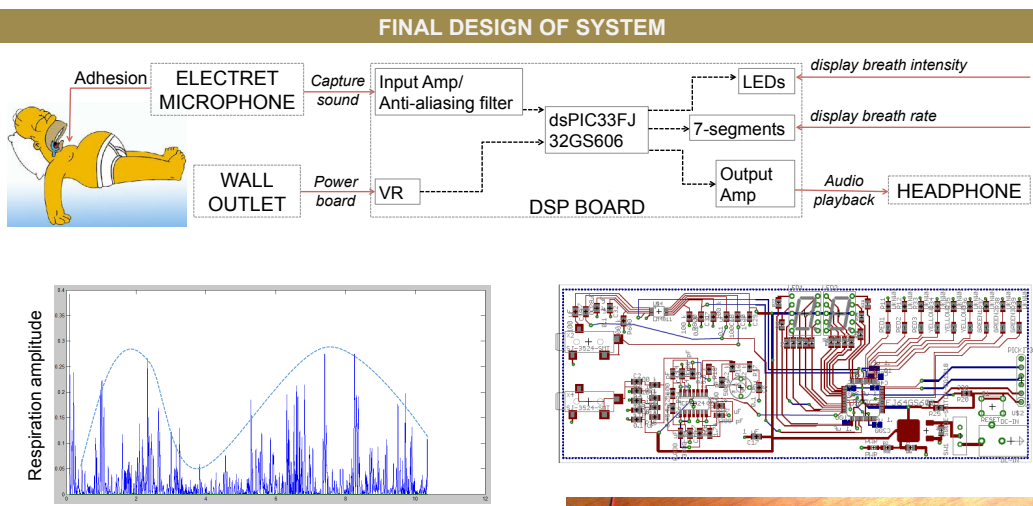
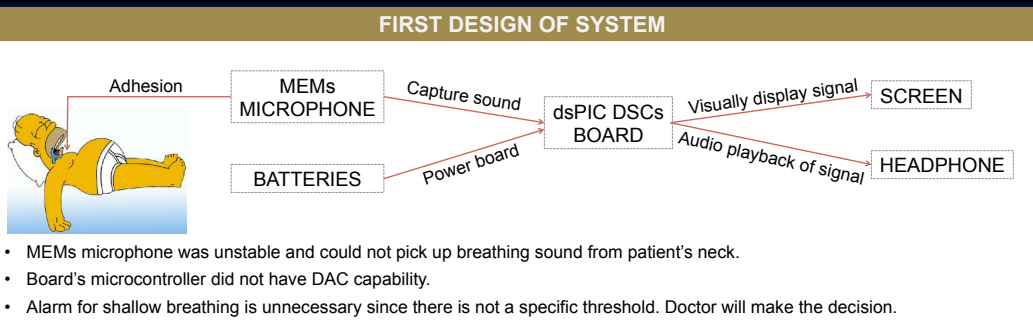
MOTIVATIONS		
	Respiration Monitor	Stethoscope
Automatic	✓	✗
Continuous	✓	✗
Small	✓	✗
Available	✗	✓

- DESIRED FEATURES**
- Record breathing sounds using microphone
 - Audio playback of breath
 - Visually display breathing rate and intensity
 - Small and easily attached to the patient's body
 - Inexpensive



Group	Age	Normal Rf (breaths/min)
Newborns	Up to 6 months old	30 - 60
Infants	6 months to 5 years old	24 - 30
Toddlers	6 to 12 years old	20 - 30
Children	6 to 12 years old	20 - 30
Adults	13 years old and up	12 - 20

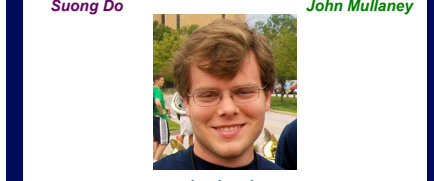
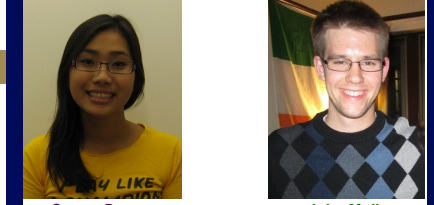
- Automatic pause period: 1 to 2 sec
- Sick people have higher breathing rate (over 30 breaths/min)
- Respiration intensity maximum between 500 Hz – 1000 Hz (Bajowala *et al.*, *Baby Breathing Monitor*)



- Seven segment LED display shows respiration rate (breaths/min)
- Audio jack receives analog output for speakers/headphones
- Potentiometer adjusts microphone gain
- Low-Pass filter allows frequencies under 3300 Hz
- 10-bit ADC converts analog signal from microphone to digital signal
- Digital signal interpreted based on amplitude of respiration and LEDs lit in succession

- CONCLUSIONS**
- Our device is able to detect respiration signals.
 - We designed a working DSP board.
 - Greatest challenge was programming board to analyze input signals.
 - Possible improvements include visual display of signal waveforms, connection capability to computer for more processing and storage power.

TEAM MEMBERS



ACKNOWLEDGEMENT

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