

SILICONE HEAD MODELING AIRWAY FOR SLEEP APNEA RESEARCH

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OVERVIEW/GOALS

- Our ultimate goal in this research project is to be able to measure the frequency spectra throughout the airway with different degrees of blockages.
 - This will allow us to compare frequencies between a restricted and non restricted airways.
 - Thus allowing us to quantify levels of sleep apnea at different blockage stages.

	BME Capstone Design General Timeline	09/05/14	09/12/14	09/19/14	10/03/14	10/10/14	10/17/14	10/24/14	10/31/14	11/07/14	11/14/14	11/21/14	12/05/14	12/12/14	12/19/14	12/26/14	01/02/15	01/09/15	01/16/15	01/20/15	02/06/15	02/13/15	02/20/15	02/27/15	03/06/15	03/13/15	03/20/15	03/27/15	04/10/15	04/17/15	04/24/15	05/01/15
	1. Team & topic																															
	Submit Preliminary Proposal																															
	Submit Rough Draft Proposal																															
	4. First Mold Attempt																															
	5. Second Mold Attempt																															
	6. Final Mold Attempt				•••••																											
	7. Set-up Respiration Pump																															
	Integrate Electronic Stethescope with Phone																															
	Learn Snake Camera and Catheter																															
)	10. Record Frequency Data and Test Blockages																															
	11. Mid-year progress report																															
C	12. Project prototype																				1											
	13. Testing & improvement					ļ																										
\supset	14. NEBEC Conference paper																															
	15. Grant proposal (TBA)					ļ															Ĭ											
	16. NEBEC Conference (TBA)															Ì																
	17. Final Report																															
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DESIGN PROCESS





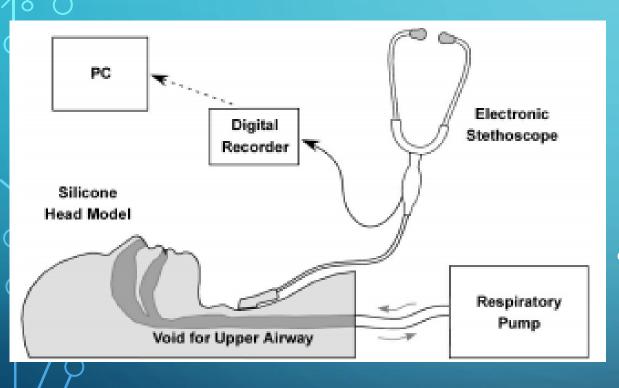
Materials

- Smooth-On Mold Max Silicone Rubber
- AGAR AGAR Geleton
- Oven-bake clay
- Wood (for airway)
- Vacuum
- Harvard Apparatus model 607
- Snake Camera
- Balloon Catheter
- Electronic Stethoscope/Cell Phone





WHAT MAKES OUR RESEARCH UNIQUE



- We will be guiding a balloon catheter with a snake camera to block different spots within the airway. This allows us to map out and measure the different blockages and develop relationships between the blockages and the levels of sleep apnea.
- We will control the level of a blockage by inflating and deflating the balloon to certain levels to indicate different degrees of blockage (severity of sleep apnea).

REFERENCES

- Carlucci, Melissa, Maureen Smith, and Susan J. Corbridge. "Poor Sleep,
 Hazardous Breathing: An Overview Of Obstructive Sleep Apnea." Nurse
 Practitioner 38.3 (2013): 20-28. Academic Search Complete. Web. 25
 Sept. 2014.
- Iber, Conrad. The AASM Manual for the Scoring of Sleep and Associated Events: Rules, Terminology and Technical Specifications. Westchester, IL: American Academy of Sleep Medicine, 2007. 45-47. Print.
- McNaught, Andrew, Connor Walsh, George Douleh, Ying Sun, PhD, and Eugene Chabot, PhD. "An Upper Airway Model for Studying the Acoustic Properties of Breathing Sounds." (2014): n. pag. Web. 25 Sept. 2014.
- Shanker, Thaeje, Gemma Downey, Eugene Chabot, PhD, and Ying Sun, PhD. "A Silicone Human Head Model for Testing Acoustic Properties of the Upper Airway." (2012): n. pag. Web. 25 Sept. 2014.