UW BME Design

3D Mouth Model

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Advisor: Mitch Tyler

Outline

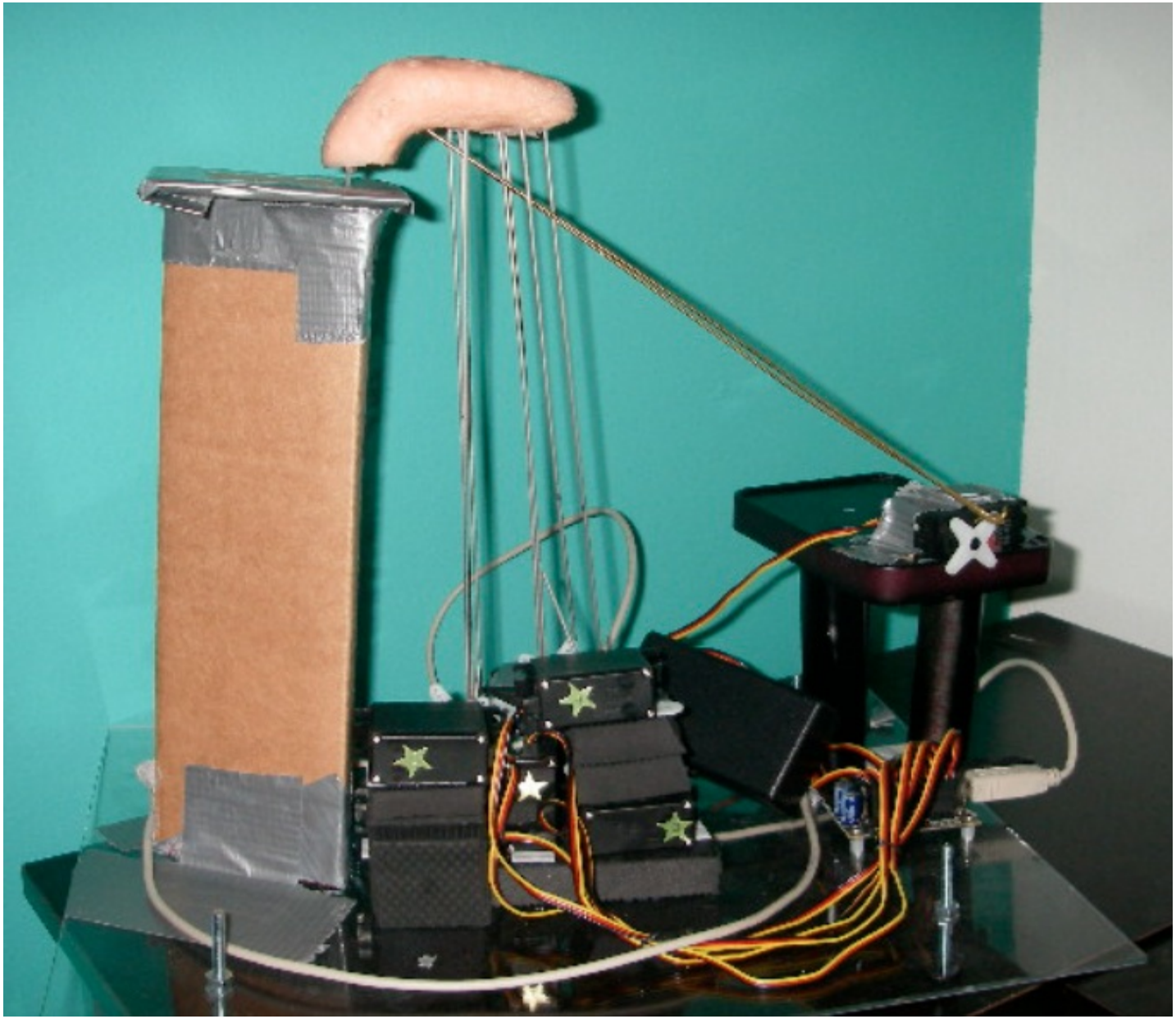
- Problem Statement
- Background Information
- Product Design Specification
- Design Ideas
- Design Matrix
- Final Design
- Future Work

Problem Statement

Supervisor: Dr. JoAnne Robbins

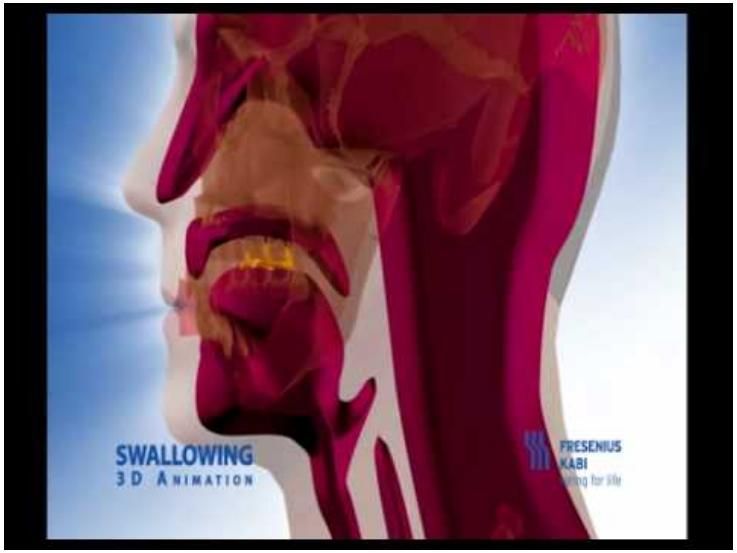
Focus:

- Dysphagia (difficulty in swallowing)
- 3D model of the tongue and mouth
  - Stable base
  - Mouth cavity
- Assess pressure generation



Physiology of Swallowing

- Swallowing is complex



Normal Swallow

Abnormal Swallow

Dysphagia

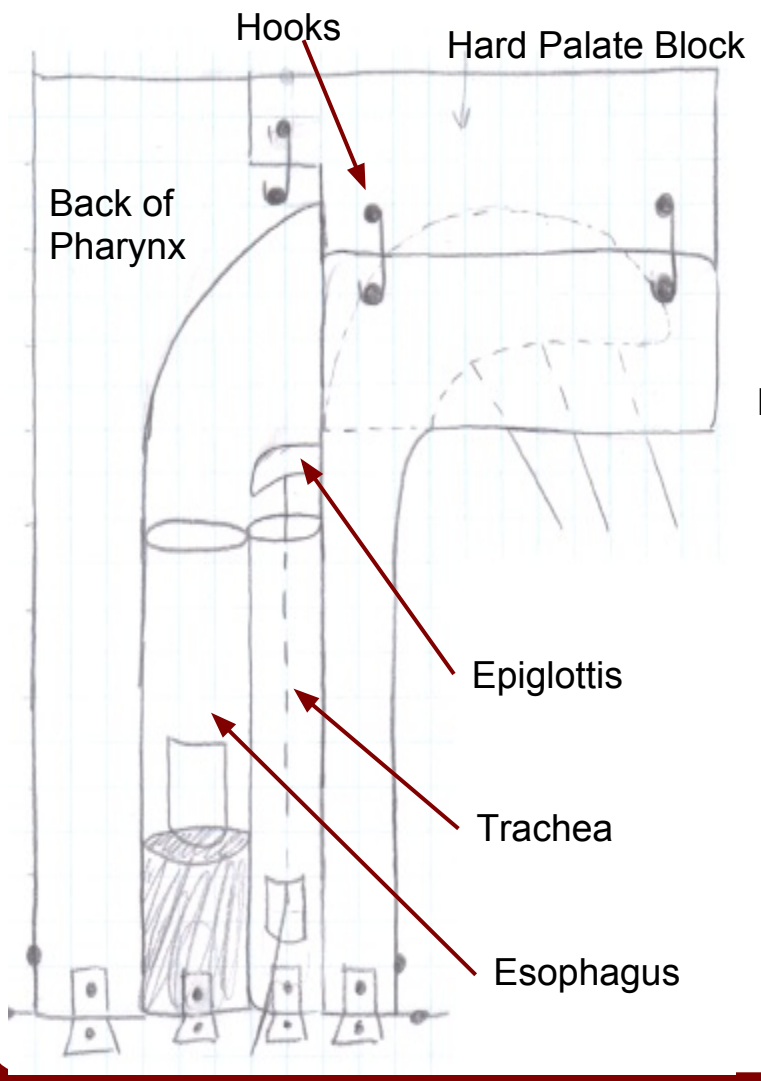
- Dysphagia is a condition where swallowing is difficult.
- Dysphagia affects over 18 million people in the U.S.
- Caused by stroke, injury, or neurodegenerative disease
- Can lead to life-threatening illness

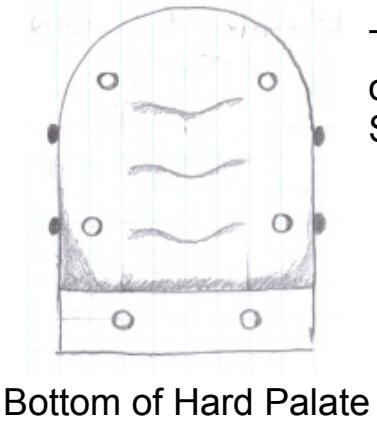
Project Design Specifications Key Points

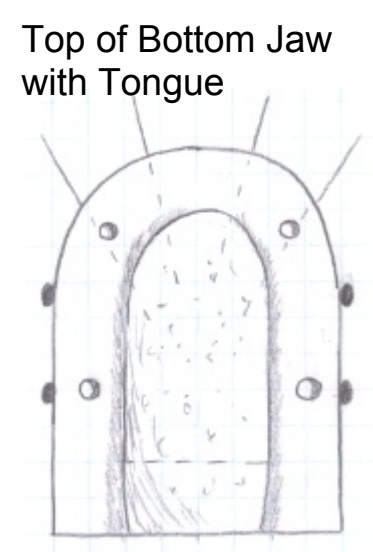
Project focused on developing a 3D model of the tongue and mouth.

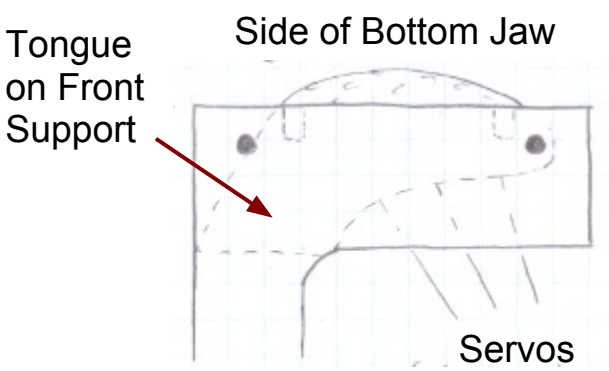
- Performance Requirements
- Anatomical Accuracy
- Safety

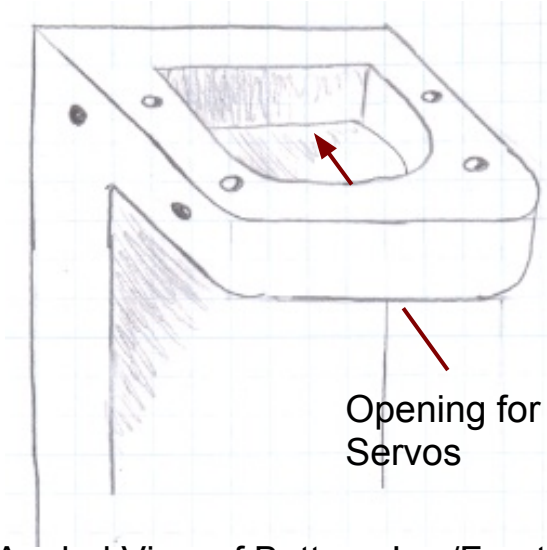
Design 1 - Polycarbonate Enclosed Cavity



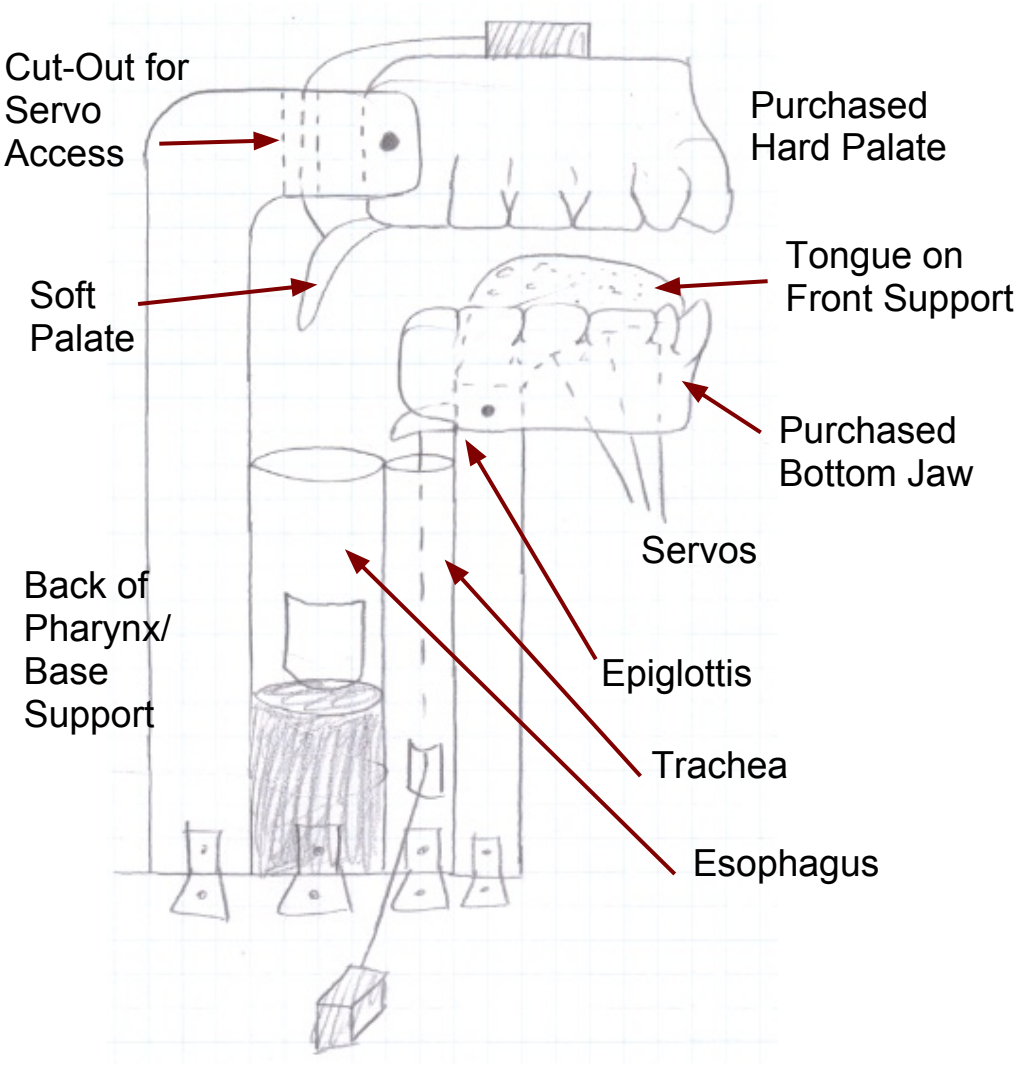




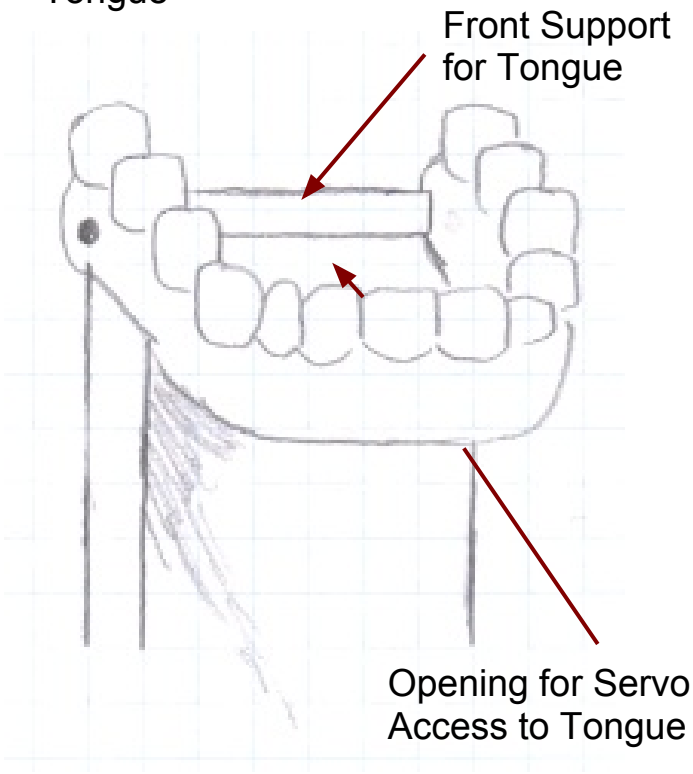




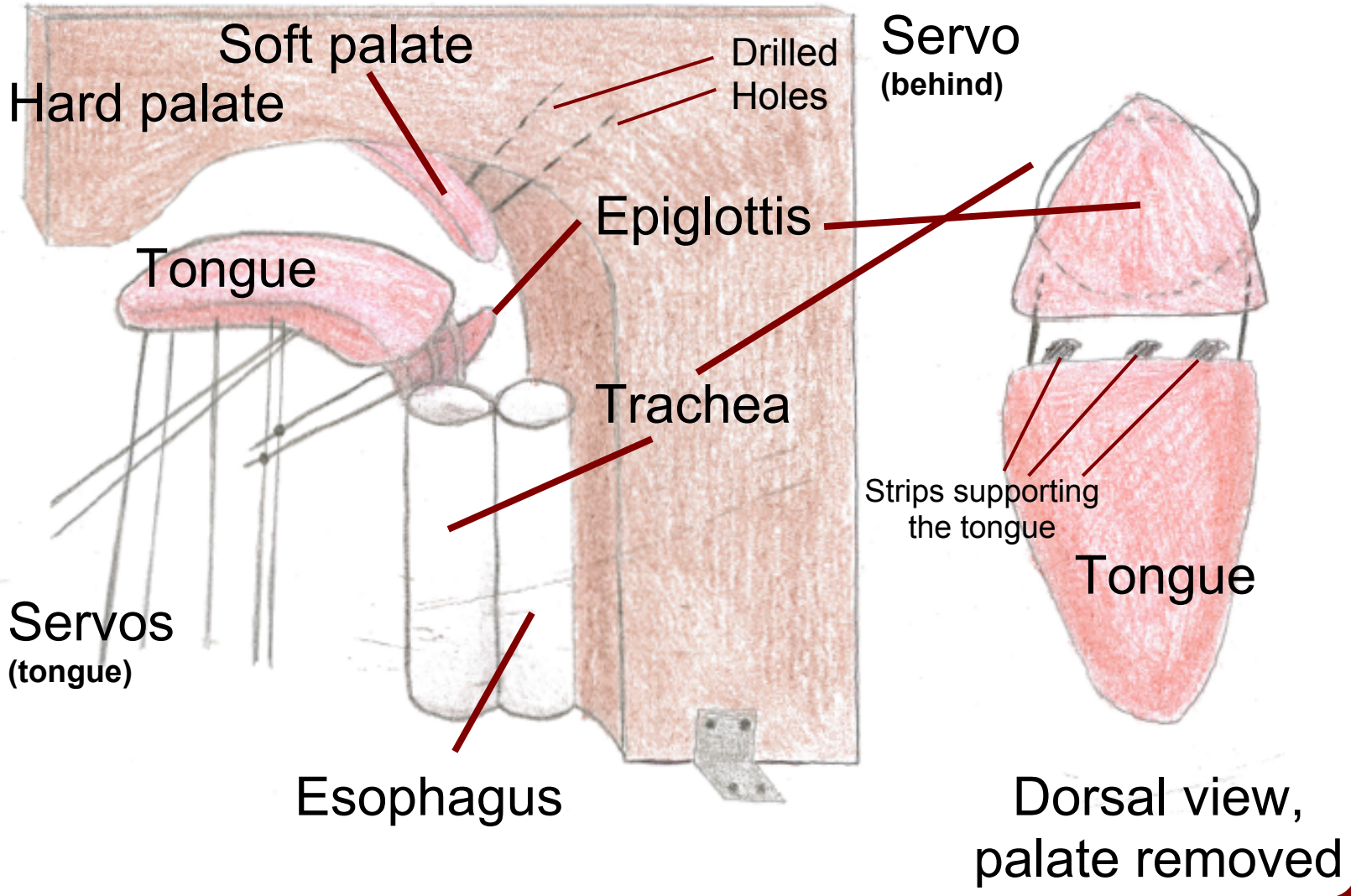
Design 2 - Purchased Oral Cavity



Angled View of Bottom Jaw/Front Support Without Tongue



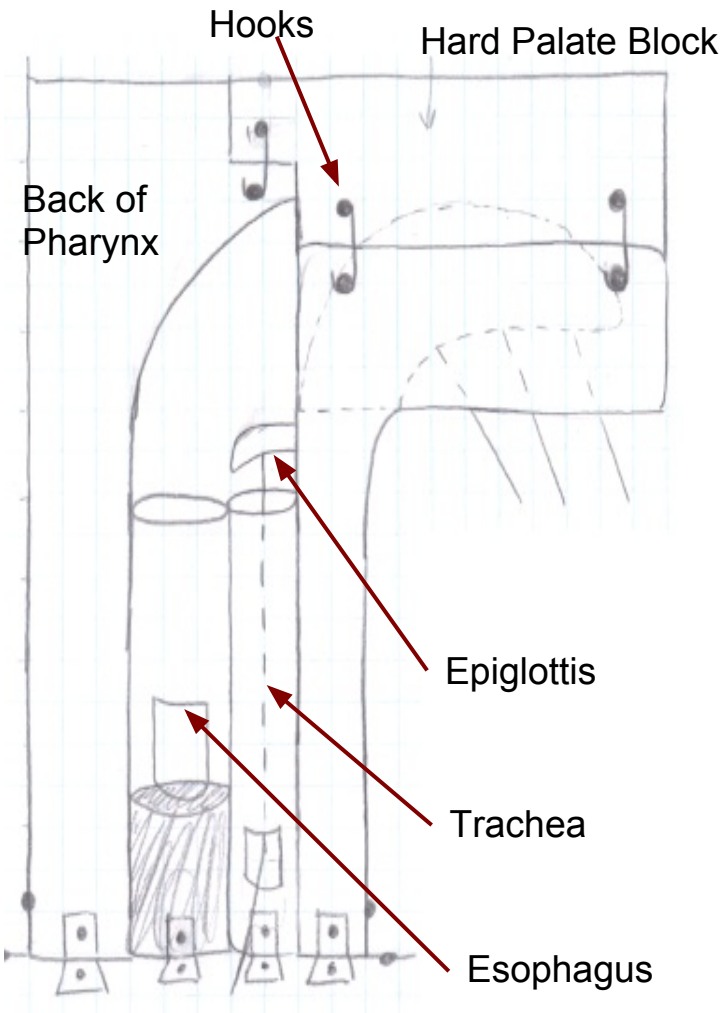
Design 3 - Wood base



Design Matrix

Categories	Weight	Design 1	Design 2	Design 3
Functional Accuracy	25%	4	4	3.5
Anatomical Accuracy	20%	4	3	3
Ease of Manufacturing	15%	5	3.5	2.5
Modifiable in Future	15%	4	4	4
Client Preference	10%	4	2	3
Durability	10%	4	3	4
Cost	5%	3	2	4
Total:	100%	4.1	3.325	3.35

Final Design



Future Work

- Selection of materials
- Manufacturing (3D Printing?)
- Testing for functionality
  - Stability
  - Simulation (with bolus)
- Data analysis
- Testing with MOST device

Acknowledgements

We would like to thank our clients,
Dr. Joanne Robbins and Jacqueline Hind, our Advisor, Mitch Tyler, and Naomi Humpal.

References

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View publication via DOI: DOI:10.1007/s00455-007-9089-0

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Youtube videos courtesy of ThickandEasyUK

Questions?