Toothbrush Project Presentation

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Project Outline

I. Analysis of Customer Needs
II. External Search for Concept Generation
   a. Literature Search
   b. Patent Searches
   c. Product Dissection and Benchmarking
III. Revising the Design Statement
IV. Internal Work for Concept Generation
V. Concept Generation
VI. Concept Selection
VII. Embodiment of the Design and Feasibility Analysis
   a. Materials and Manufacturing Processes
   b. Detail Design

Project Management

- We divided up all the work evenly among the three of us.
- We decided what each person did based off of their skill level in certain things. For example, Julian is the master at drawing things, so we designated him to complete most of the drawings for our product.
- Overall, we completed the project in a time-efficient manner and didn't have any problems.

Customer Needs

We gathered data from a total of 12 customers.

<u>Top Five Ranked Customer Needs:</u>

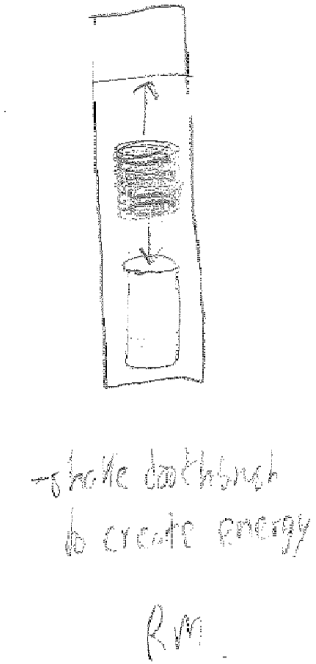
1. Sustainability
2. Safety
3. Effectiveness
4. Size of Brush Head
5. Cost

External Search

- We conducted some background research on our product in labs I and II.
- We looked up former patents for toothbrush designs.
- In the product archaeology, we researched the history behind electric toothbrushes.
- In the benchmarking section, we compared four current-day electric toothbrushes.
- Using these external searches, we determined the most important features to emphasize in our product.

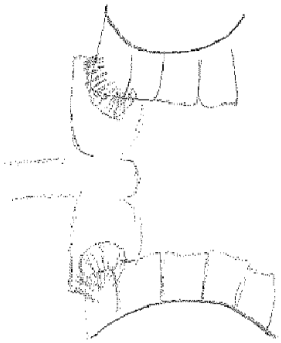
Concept Design

- Rechargeable Battery
- Shake-Powered

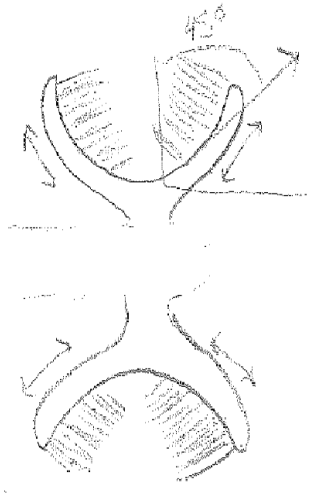


Concept Design (cont.)

- Retractable



- Dual Sided Brush Head



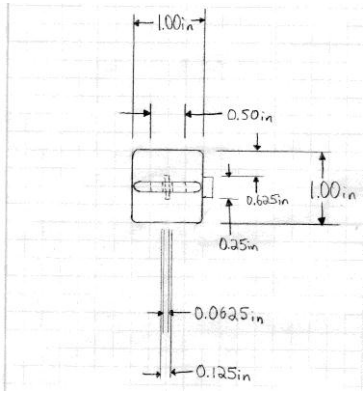
Morphological Chart

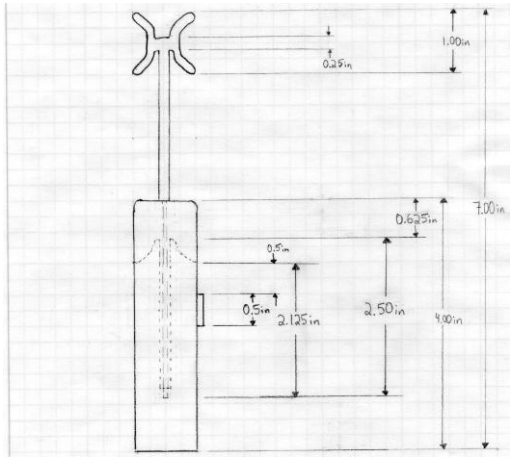
Brush Head Design	**Body Design**	**Power Generation**	**Energy Mechanism**
Dual Brush Head	Retractable	DC Motor	Gear
Double Rotation	Brass Knuckles	AA Battery	Crank
Circular and Back and Forth	Grooves	Solar Panel	Circular pin Motion

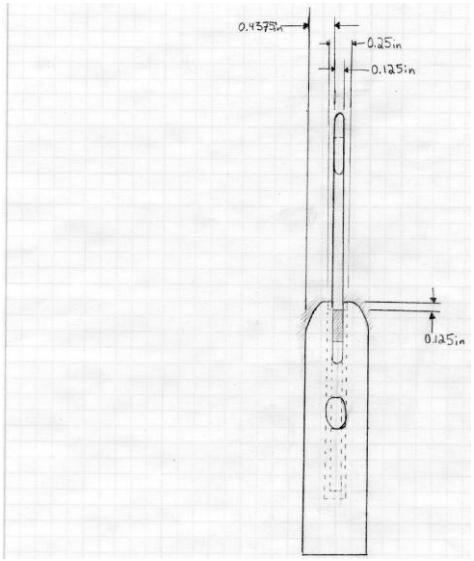
Concept Selection

	Size	Weight	Durability	Safety	Total	Rank
Weighting	**0.2**	**0.2**	**0.3**	**0.3**		
Concepts						
Iteration 1						
Brass Knuckles	-1	-1	1	0	-0.1	2
The Retractable	0	0	0	0	0	1
Knuckle Grooves	1	0	-1	-1	-0.4	3
Iteration 2						
Brass Knuckles	-1	-1	1	1	0.2	2
The Retractable	-1	0	1	1	0.4	1
Knuckle Grooves	0	0	0	0	0	3

Final Design







How does our toothbrush work?

Power and Charge: The toothbrush uses 2 rechargeable AA batteries and uses inductive charging. Also, we added in a way of manually charging the battery. If there is not much battery charge left, all one has to do is shake the toothbrush. After about 30 seconds, it will have created just enough energy to power the toothbrush for about 3 minutes. The toothbrush is powered by a small battery.

How does our toothbrush work? (cont.)

Toothbrush Head: We decided to use the multi-head feature for our product. In this feature, there are 6 microbrushes that clean the top and bottom teeth at the same time. This results in a significantly faster time it takes to brush one's teeth. The time it takes is between 30 and 40 seconds. The toothbrush head wraps around and hugs the gums to ensure that all the teeth are cleaned very effectively.

Conclusion

Overall, we designed a super efficient electric toothbrush that should meet at least 4 out of the 5 most important customer needs. It is made out of the most sustainable materials, is extremely safe to use, is more effective than any other electric toothbrush ever made, and should be very affordable.