# Torch Team Final Report

Disrupting the Portable Charger Space

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## ABSTRACT

As our group started our design journey, we began with a singular guiding principle: to base our project in the lived experience of college students. In light of this precept, our minds immediately sprung to one problem that we, along with many of our friends, have often confronted: the inconvenience posed by a dead phone battery. We call our solution Torch. Torch is a combination portable phone battery charger/bottle opener packaged in an aesthetically pleasing and compact form factor explicitly designed to appeal to the 18-26 age demographic. While we acknowledge that alternative solutions to the portable charging problem already exist, we noted several drawbacks in such designs; notably, other battery packs can be bulky and often necessitate cumbersome cords. For Torch, we discarded the assumption that a battery pack should fully charge the user's phone, allowing us to implement a more functional, aesthetically pleasing, and ultimately superior product.

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**Report Layout and Editing** – Cameron Van de Graaf

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## EXECUTIVE SUMMARY

As previously stated, we acknowledge the opportunity for an elegant solution to the mobile phone charging problem. After analyzing existing products in the marketplace, we identified several shortcomings that could be rectified and unnecessary features that could be eliminated. In seeking a streamlined, compact solution we developed the keychain as an ideal carry location for the device. Ultimately, our group's goal is to provide our customers with the ability to charge their phones in emergency situations so that they don't have to worry about their device dying when they need it the most.

We subsequently conducted market research to ascertain the probable size and scope of our customer base. Analyzing the portable battery market at large, we found an $11 billion industry dominated by suppliers from China. These manufacturers demonstrate an overwhelming emphasis on the functional, rather than the stylistic elements of design, and indeed compete in an almost purely competitive market where price and charge capacity are the only two variables. Our key takeaway from this analysis was that there seems to be room for a viable niche subsection of the market whose value proposition is founded more on aesthetic design than pure cost competition. Subsequently, we explored the specific phone platforms and decided that the iPhone, due to its superior market penetration and consistent charging connector, was a better initial market to target.

In terms of likely customers, we feel that college students, especially those involved in Greek life, would be an ideal initial market for Torch. To further capitalize on this market, we decided to include a bottle opener in the design, a move which should allow our customers to consolidate keychain accessories and save pocket space. Furthermore, we conducted a market survey via a mobile polling application that yielded very encouraging data, which suggest that nearly 50% of our peers would be interested in purchasing a product similar to ours.

As regards the design process, we began with several weeks of ideation and group brainstorming to conceptualize a high level approach to the functional and stylistic dimensions of our problem statement. Once we ironed out the general framework of Torch, we moved into a 3D modeling phase using SolidWorks to rapidly iterate through several different designs. After completing this phase, we successfully 3D printed our chosen design

and procured circuit components from a third party website. Finally, we soldered our circuit board together and refined our raw materials to finish a functional first-generation prototype that successfully charged an iPhone. Unfortunately, we weren't quite able to fit the size constraints in this prototype, and cost was higher than we would have liked. We have already initiated plans to refine Torch in the second-generation product, thereby obviating the aforementioned issues.

In terms of manufacturing and distributing the Torch, we have already begun to examine college bookstores as an ideal outlet for our product. Drawing on several case studies of past brands that have succeeded in capturing the college age demographic, namely Southern Tide, Yik Yak, and Raging Mammoth, we believe that the crucial elements for success are a reputation for quality and usability coupled with a persuasive ground-up marketing campaign. Our projected revenues and costs for both bear and bull sales outcomes left us feeling enthusiastic about the future of Torch.

## INTRODUCTION

### THE NEED FOR A JUMP CHARGE

Imagine yourself at a party, music festival, wedding, or other event. Now imagine seeing that ominous tiny red sliver on the top right corner of your phone where a filled battery icon should be. How are you going to get a cab or an Uber to get home? How are you going to get in contact with your friends or loved ones in the event of an emergency? More than likely you don't have a USB cord and a wall charger on hand. Now imagine having a wireless, portable charger small enough to fit on your keychain that can provide you with the jump charge you so desperately need. All of a sudden your problems are solved and you're free to proceed without worrying.

At a time when 80 percent of young adults in the U.S. own a smartphone, there's never been more of a need for such a device [1]. Smartphones are amazing devices, but the fact is their battery capability often falls short as we become ever more dependent on their myriad features. Charging accessories with the ability to hold more than three times the battery life of an iPhone are already on the market, but they are often cumbersome and require cords that most people are unwilling to carry around on a daily basis. For example, a

company called Anker offers a device called the Astro E4 that can deliver six times the charge of an iPhone 5S [2]. However, the Astro requires a separate USB cord, is too cumbersome to fit comfortably into a pocket, and could definitely not be toted around on a keychain. Thus, with inconveniently sized devices such as this that require separate cords flooding the market, there exists a very real opportunity for a small, cordless device that can be carried around daily without being noticed.

## POSSIBLE SOLUTIONS

As far as possible solutions to the jump charge problem are concerned, a variety of options could be explored. For one, a smaller version of devices such as the Astro E4 could be used to solve the problem. However, even if the Astro E4 were made small enough to fit comfortably in a pocket or on a keychain, it would still require a USB cable to work, so the user would have to have one on hand at all times. Thus, a wireless solution definitely seems more appealing. However, the issue then becomes charging the device itself. It would certainly be possible to place put a USB port on the device so that it could be charged by a USB cord when the user is not using it, but even this could prove problematic if the device died or was very low on battery when the user needed it. The key to solving this problem lies in utilizing power supplied by another device that people, especially college students and young adults, often have on hand: laptop computers. By incorporating a USB male part into the device, users will be able to use their laptops to charge their phone chargers, making it even less likely that they'll ever be stuck with no way of getting any charge. Additionally, incorporating the USB male part makes it easy to add an extra feature to the device that allows users to transfer files between their computer and their phones while charging. Thus users get a two in one in that they can both charge their phones and connect them to their laptops to transfer photos, songs, videos, and more simultaneously.

## THE KEYCHAIN AS A PRACTICAL CHOICE

The last piece of the puzzle is figuring out where users would keep the device. The simplest answer to this question would be pockets and purses, but given the small size of the device, people would be likely to lose it if it were placed somewhere they're constantly fumbling around looking for various items. Thus, making the devices keychain-compatible seems like the best way to prevent people from losing them. Most people are already used to

keeping a keychain in their pocket or purse so adding another item to the keychain is unlikely to be a significant inconvenience. Since car keys and especially house keys are difficult to replace, people carefully keep track of their key chains; many people may even see adding a charging device to their key chains as a plus since it will provide extra weight to the key chain and in doing so decrease of losing precious house keys and car keys. You want to be able to feel your keys in your pocket so you always know they're not lost, and adding a little extra weight with a charging device could be effective to this end.

## PROBLEM STATEMENT

Our group's goal is to provide people with the ability to charge their phones on the go so that they don't have to worry about their device dying when they need it the most. This goal is the driving force behind our project and any features we add to our final product are ultimately tangential. Beyond simply providing people with the charge they so desperately need, however, we strive to incorporate design principles to make the device as user-friendly as possible. This means optimizing not only the charging speed of the device, but also its feel, its shape, its texture, and everything else that goes into making a complete product. We're not just trying to produce another charger; we're trying to create a cutting edge, well-engineered device whose exceptional design will set it apart from the competition.

In addition to the wireless aspect, the biggest differentiator for the problem we're trying to solve is that we're not trying to deliver multiple battery charges or even one full battery charge; doing so would require the device to be too cumbersome and plenty of companies are doing this already. Rather, our device will need to pack just enough charge to revive a phone that has just died or to maintain a phone on its last legs when the user most desperately needs his or her mobile device. We believe that this is where the need really lies among users today. People have chargers at home and almost everyone makes sure to plug in their phone before going to bed. Thus large portable chargers only really make sense for camping trips or other long outings where outlets will be unavailable. But what we're getting at is an everyday necessity that has not been fulfilled by existing products. We want users to never feel isolated because they're more than ten feet from an outlet, and we want to incorporate our device seamlessly into their daily lives.

# MARKET RESEARCH

## THE PORTABLE BATTERY PACK MARKET

Over the past 10 years, an explosion in the number of portable electronic devices carried by the average consumer has fueled a concurrent rise in the portable battery pack charger market. According to a MarketsAndMarkets report, the size of the market at large is expected to reach $10.94 Billion by 2020, at an estimated compounded annual growth rate of 17.53% from 2014 to 2020 [3]. The report states that the Asia-Pacific region is the leading contributor to growth followed by North America and Europe. It further states that industry stalwarts include: "BYD Battery Co. Ltd (China), Energizer Holding Inc. (U.S), LG Chem Power Inc. (South Korea), Mophie Inc. (U.S), Panasonic Corporation (Japan), Simplo Technology Co. Ltd. (Taiwan), Sony Corporation (Japan), and Samsung SDI Co. Ltd. (South Korea)" [4]. Given the size of the space and number of viable competitors, it is clear that Torch cannot hope to compete on purely functional terms as the sheer economies of scale leveraged by the above companies makes competing on cost terms highly impractical. Rather, Torch must adopt a different value proposition that emphasizes brand and build quality in order to create competitive separation.
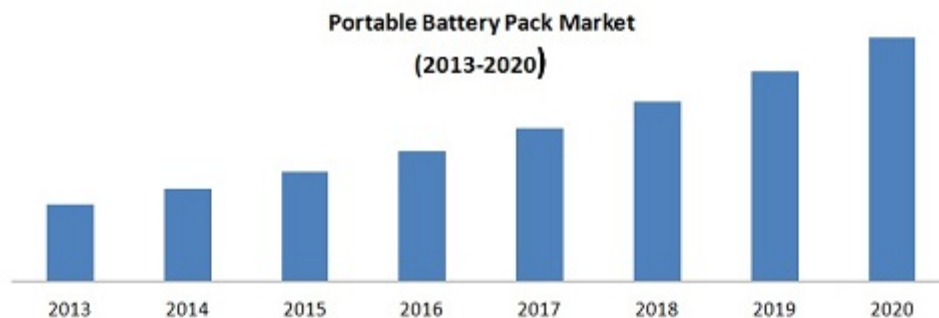


**Figure A:** Estimated growth of the portable battery pack market [4]

## IPHONE VS. ANDROID:

*Standardized connection*

Android is a mobile operating system that runs on handsets made by many different carriers; therefore, it is difficult to construct a standardized product that is compatible with the different charging interfaces used by these phones. On the other hand, every member of Apple's past few generations of iPhones has utilized the same proprietary Lighting connector. While this means that we would have to pay a

licensing fee, it also assures us full penetration of the iPhone market as opposed to limited penetration of the highly fragmented Android market.

*Market share*

Apple's market share in the US mobile market is strong and growing stronger. After the release of the iPhone 6 and iPhone 6 Plus, iOS market share jumped from 43.1% in October to 47.4% in November [5]. Moreover, sales are expected to remain high for the foreseeable future given the tremendous brand awareness possessed by the iPhone, network effects, and a generally high build quality to the iPhone itself.

## TORCH SPECIFIC FACTORS

## KEY DEMOGRAPHICS

In writing, there is an oft-repeated maxim that goes along the lines of "write what you know." At Torch, we believe the same adage also applies to design. As college students ourselves, we have an acute knowledge of the quotidian inconveniences that face our peers. Considering the ~19 million people in four-year universities in the U.S. alone, we see the college age demographic as a vast demographic with disposable income and a willingness to adopt new products [6]. Therefore, as far as implementing the product is concerned, college campuses certainly seem the logical starting point. Furthermore, 77 percent of college students use their smartphones first thing when they wake up in the morning and 92 percent of college students use their phones during idle time at school or work [7]. Thus, beyond merely owning smartphones, college students are using them all the time and are certainly having issues with battery life. When using your phone to listen to music while biking or working out, or while studying, or even while sitting around doing nothing, you're sure to run low on battery near the end of the day even if you started off with a full charge. Additionally, the bottle opener functionality of our device definitely increases its appeal to collegians. The Stanford bookstore already offers a keychain flashlight with a bottle opener on the end, so our device would fit in perfectly with the merchandise already being offered. And Stanford is not the only school selling keychain bottle openers to students; according to Wellesley College's bookstore website, students can buy Wellesley-themed keychain bottle openers too, demonstrating the existence of a market for portable bottle-openers among college students. By combining portable phone charging capability with portable bottle opener functionality, our device meets two common needs many college students

experience, so it seems we should be able to gain traction quickly. Our device combines two devices many college students would pay for separately for their key chains, so we should have no problem establishing ourselves and creating a brand name among our target audience.

## MARKET SURVEY

To gauge potential interest in Torch, we conducted a survey of 186 Stanford undergraduates using a mobile polling application. The question read: "How interested would you be in a $20 stainless steel, portable iPhone battery charger/bottle opener small enough to fit on your keychain?" Participants were presented with four response options: would never buy, might buy, would probably buy, and would certainly. As the chart below indicates, there appears to be significant interest in such a combination product within our target demographic of college-aged students. Moreover, we believe the price point of $20 is achievable given potential cost reduction due to economies of scale.
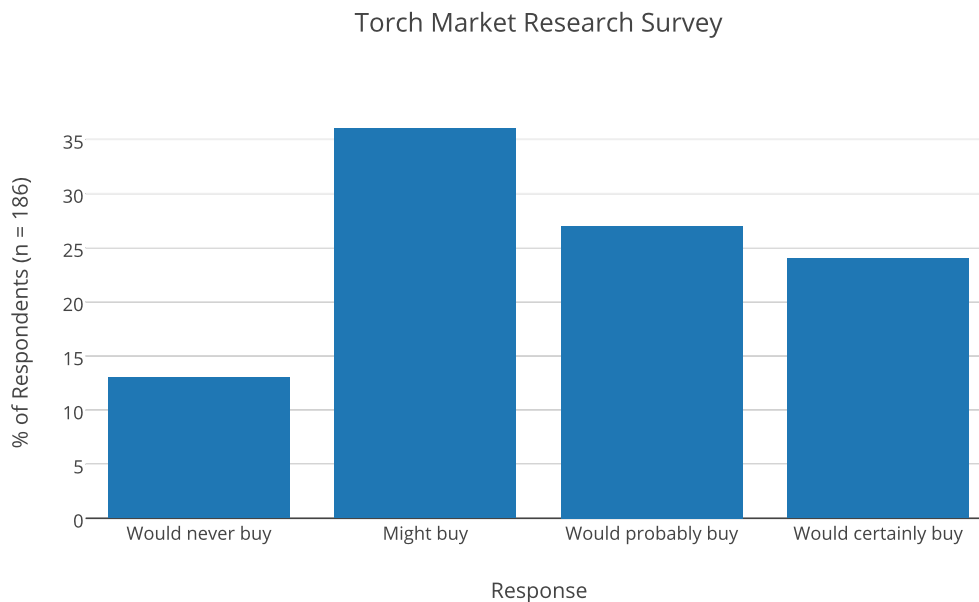
Torch Market Research Survey



**Figure B:** Preliminary in-house market research survey

# DESIGN THINKING

## DESIGN OVERVIEW

Our design hinges on the fact that our product is targeted at a younger audience, particularly college students. As a result, we took into account the things college students often carry around so we could seamlessly integrate our product into their lives. Because college students and young adults are old enough to drive, most already carry key chains. Thus, we figured that making our product key chain-friendly would allow users to attach the device to the key chains they already own and forget about it until they need it.

Going along with the idea of painlessly integrating our device into a young adult's daily life, we took a minimalist approach with the overall design of the device. We thought about making the device flashy and colorful so that it would standout among the other items on the key chain, but we decide against this since, again, we want our device to fit in seamlessly with what young adults are already doing. We believe that the general need for the device will lead people to buy it, so we don't have to go overboard with our design to make our device attractive to consumers. Take the iPhone, for example. The design is minimalist, sleek, and attractive, but certainly not flashy. Nevertheless, it has been an international sensation due to the enormous need for a device that so perfectly fits into a person's daily life and in so many respects makes life easier and more enjoyable. Throughout the design process, we went through different design iterations in which we experimented with a variety of approaches. However, we found the minimalist, sleek, and functional approach to be the most in line with our mission.

## OBJECTIVE TREE

The objective tree is a visual representation of the goals and objectives that drove our project. First and foremost, the objective tree helped us see the relative priority of our various goals and weigh our objectives relative to one another. Going along with the design thinking we were exposed to on our field trip to IDEO, putting ideas and goals on paper in an organized fashion can really help clear up the clutter that clouds our thoughts and inhibits our creativity. The goals reflected in the tree also align with the general principles of design discussed in the design overview section. Charging speed and functionality are certainly

crucial to our device, but we're careful not to look past the importance of details such as the size and shape of the device in order to allow us to create a sleek, minimal device that can be seen as an asset rather than an encumbrance.

## MORPHOLOGICAL CHART

The morphological chart helped us explore possible solutions to various issues we were trying to solve in our project. Making this chart forced us to break up the overarching problem we were trying to solve into sub-problems that could be looked at in isolation. By brainstorming and coming up with various possible solutions, we were able to come up with the best approach to solving the problem rather than just proceeding with our first inclinations.

*Function*                                                  *Options*

| Features | Lighter | Wine-Opener | **Bottle Opener** | Card-Holder | Phone-Case |
|---|---|---|---|---|---|
| Battery | **Quick Burst** | Full Recharge | Large-Scale Bank | Disposable | **Rechargeable** |
| Input/Outputs | **USB** | Wire/Chord | **Lightning Port** | Micro-USB | Wireless |
| Shell-Material | Aluminum | **Stainless Steel** | Plastic | Steel | Wood/Other |

**Figure C:** Torch Morph Chart

## GALLERY SKETCHES

The gallery sketches really brought our project to life. By delving into the design process we broke a lot of the assumptions we began the project with. Overall, however, the most fascinating aspect of design is how you often end up with something quite different from what you set out to create. Nevertheless, as long as you adhere to the fundamental principles of design thinking, you're sure to come out with something better than you initially wanted to make.
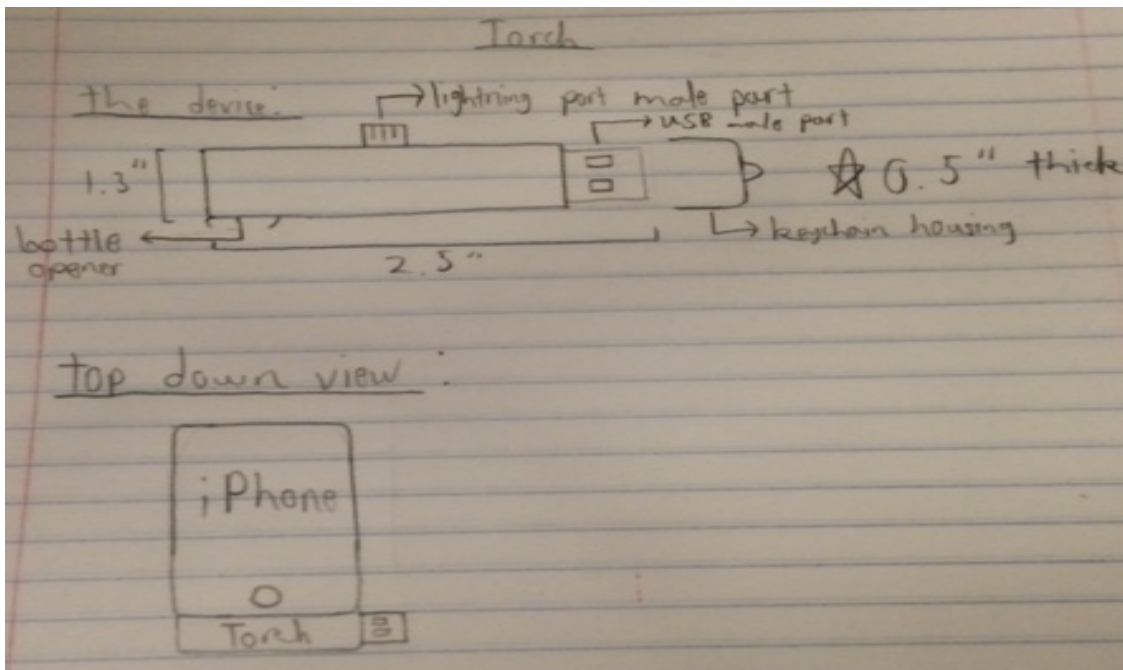
**Figure D:** A Torch Gallery Sketch

## PROTOYPE VERSION 1

### DESIGN OVERVIEW

We set out to design our first generation prototype as an aesthetic, yet functional solution to the problems we hoped to solve. We attempted to produce an ideal version of what we wanted our product to look like, while simultaneously working on the technical components of the project without focusing on the merger of the two concepts. We produced a few initial sketches (Figure E), and then did a more substantial mock-up in SolidWorks (Figure F). This covered the fundamental appearance of the shell, but we also needed to consider the schematic for the battery component of the device. The general flow of this process went from the computer to male-USB, to circuit, to battery, back to circuit, to lighting port, and finally to the phone (Figure G).
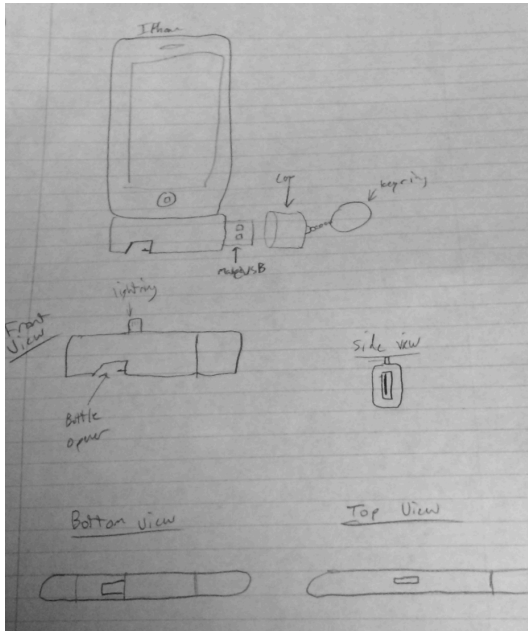
**Figure E:**
Here are the initial design sketches of the Torch. Here you can see the various angle views of the design
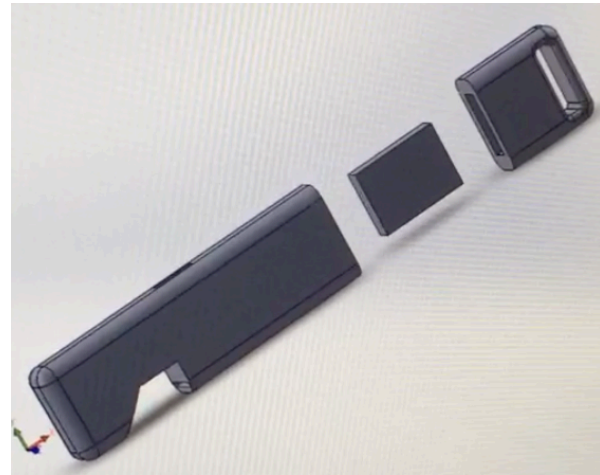


**Figure F:**
SolidWorks mock-up and animation of the initial torch design. Not pictured are the bottle opener piece and lightning port.
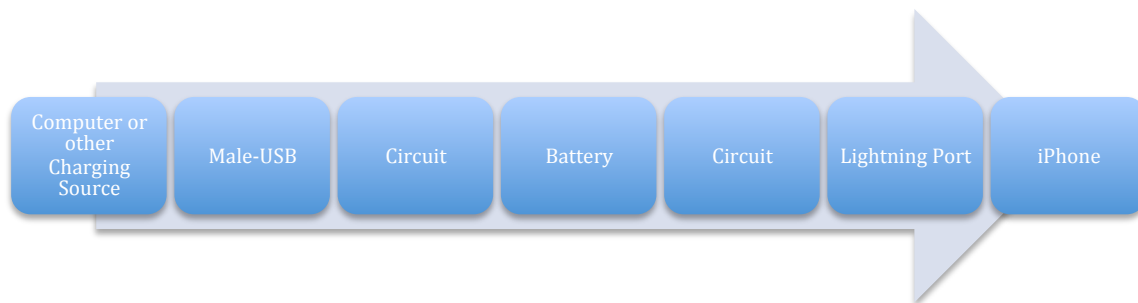


**Figure G:** Flow diagram of circuit from charging source to the phone. Energy is stored in the battery until it needs to be discharged into the phone.
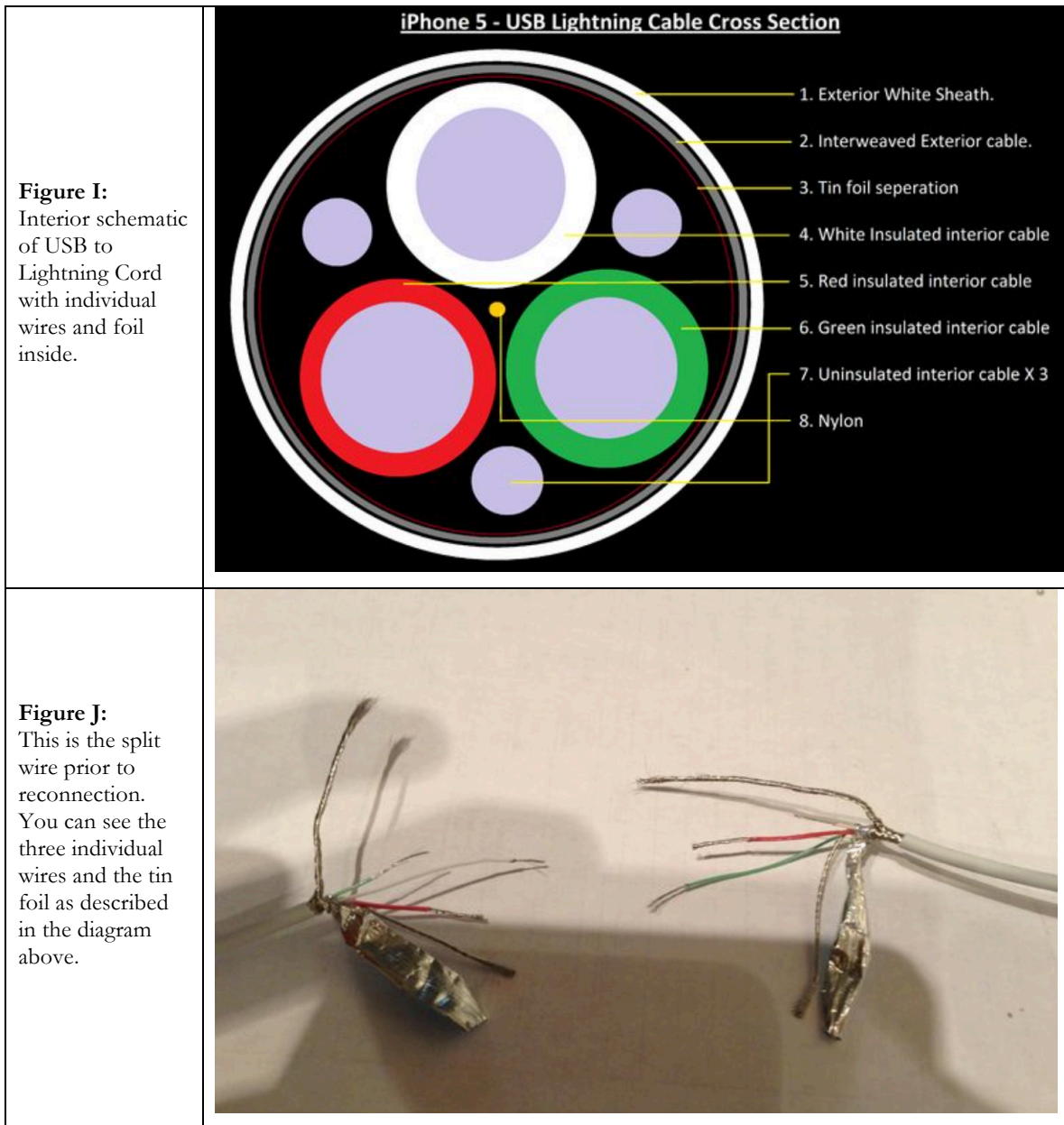
Since these various parts are not made specific for our design, we needed to do some serious modification to these pieces. The two most important pieces of our electrical component, the circuit and battery, required the most consideration in what to buy. For example, your standard rechargeable AA lithium battery is not of a suitable form factor for our model. Instead, we investigated different options from a catalog of circuits and batteries. For the battery, we settled on a lithium ion polymer that is both thin and powerful. The output ranges from 4.2V when completely charged to 3.7V. This battery has a capacity of 500mAh for a total of about 1.9 Wh.

For the circuit, we needed a female-USB adapter, a port for the battery, as well as a micro-USB adapter to complete the process explained above. The female-USB would take in a male-USB to male-USB cord, and the micro-USB would take in a micro-USB to lightning port cord. We corresponded the dimensions of the circuit and battery so that they could be stacked on top of each other to optimize space efficiency. The completed functioning circuit, pre-wire stripping, is pictured below (Figure H).

**Figure H:** Completed circuit from charging source to the circuit and then to the iPhone. Note that the circuit need not be plugged into the charging source to charge the phone.



Looking at the image in Figure H, the cord space used to connect the devices is far more massive than we could afford in our shell design. Thus, we needed to devise a way to shorten these wires, since the shortest length they are normally offered in is 6ft. One of the difficulties with this task is that the Lightning wire has three individual cables inside of it that all transmit different things (Figure I). Thus, a basic strip and reconnect could not be done here. To fix this problem, we had to strip the main wire, and then reconnect each of the interior wires individually (Figure J).

| | |
|---|---|
| **Figure I:** Interior schematic of USB to Lightning Cord with individual wires and foil inside. |  **iPhone 5 - USB Lightning Cable Cross Section**<br><br>1. Exterior White Sheath.<br>2. Interweaved Exterior cable.<br>3. Tin foil seperation<br>4. White Insulated interior cable<br>5. Red insulated interior cable<br>6. Green insulated interior cable<br>7. Uninsulated interior cable X 3<br>8. Nylon |
| **Figure J:** This is the split wire prior to reconnection. You can see the three individual wires and the tin foil as described in the diagram above. |  |

## DESIGN PROCESS

Because of the capabilities of 3D printers, the process for our first prototype was largely time intensive on the computer-design side of things. We spent hours crafting an elegant, yet practical design in SolidWorks, working through drafts and drafts of something that would be both portable and structurally sound. We also had a substantial amount of work required in the construction of the electronics. The building steps are listed below:

**Figure K:** Design process flow-chart

      To get to the current shell and circuit design we went through numerous iterations of design thinking. Assumption-storming was another key component of eliminating some of the preconceived ideas we had about the product, such as that you wouldn't be able to use the product when it is charging. These concepts helped us transform our product from a device with external wires and a completely different bottle opener to a space efficient design, which was one of our priorities going in.
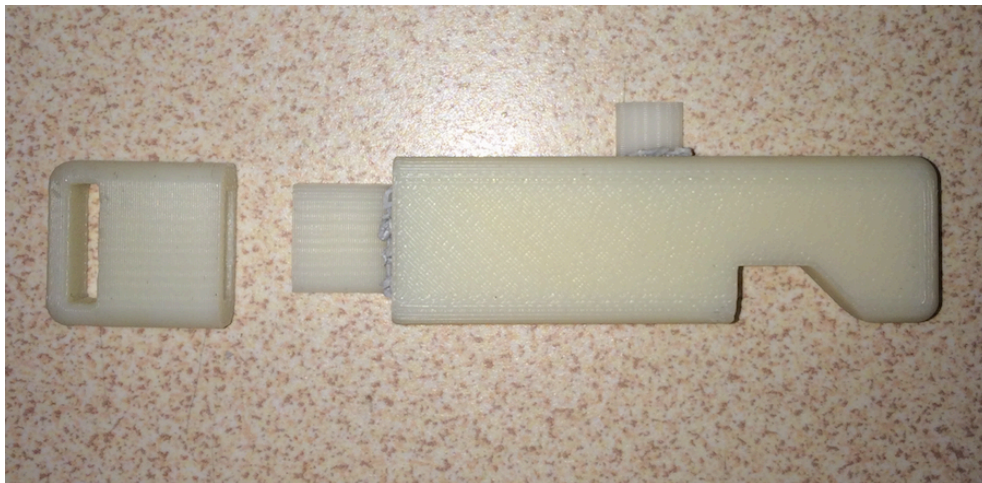


**Figure L:** A 3D printed model of the design with the cap removed. The lightning and USB pieces are also made of plastic here

## PRELIMINARY COST ESTIMATE

**Materials**
- Circuitry - $7.00
- Battery - $11.00
- Stainless steel shell - $1.50
- Lightning port male part - $1.00 (Licensed from Apple)
- USB male part - $1.00
- Total Cost - $21.50

Cost estimates are often difficult to compute at this stage of the product realization process, especially because scale is so important in the computation of price. However, for a small-scale order, we believe that the figures above accurately represent what it would cost to produce a single Torch. The circuit, being pre-made and not customized, would run us about $7.00. The battery, also not customized, would cost $11.00. Also, steel estimates are conservative on a volume basis. The other components' costs are readily available.

A key cost that is not factored into the equation is the production cost. The reason this is the case is because on a per-unit basis production costs are incredibly variable. Due to economies of scale, the cost it took is to make one unit is far more than the marginal cost of producing 100 or 1000 units. If you have a production line and specialized machines, this cost would decrease rapidly.

## PRODUCTION VERSION 2

One of the key issues that we did not address in the building of our initial prototype was the combination of the shell and circuit models. However, after constructing both pieces, we realized we needed a slightly larger volume so that the circuit and battery can fully fit in the shell.

To address this we will expand the existing design by a few millimeters in the X and Z directions (when facing the object from the front). This will give us the appropriate volume to fit the internal components, without affecting the usability of the device. If we change the Y direction, the device will become a bit cumbersome.

## PRODUCTION COST ESTIMATE

**Materials**
- Circuitry - $3.50
- Battery - $4.50
- Stainless steel - $0.50
- Lightning port male part - $0.75
- USB male part - $0.75
- Total Cost - $10.00

These costs incorporate a larger production line, which is why our costs are cheaper. The new total cost of $10.00 would give us a sizeable profit margin of 50% at a selling price of $20.00. Again, it would be unwise for us to try to predict the size of the production set-up, which is why it isn't included.

# PASSING THE TORCH

## BUSINESS MODEL

In a nutshell, we would like to define Torch as a branded lifestyle product targeted toward the college market. Initially we would push Torch on members of Greek letter organizations, whose strong network effects would enable the nodal expansion of our customer base. The primary advantages of this product characterization and efficacy of this business model are shown by the companies below.

## BRAND IDENTITY CASE STUDIES

**Southern Tide**:

Southern Tide is an apparel and accessories company founded in 2006 by a South Carolina college student named Allen Stephenson. After dropping out of school to build the company, Stephenson achieved a high level of success; in 2011, Southern Tide was named to Forbes' list of fastest growing companies. Impressively, the company recorded a three-year growth rate of 3,121% between 2009 and 2012 . A key part of this success is the brand identity of the business – the company emphasizes athletic endeavors and outdoor activity in much of its advertising. Furthermore, the brand ambassador program has been tremendously successful. By appealing to college students, especially at large Southern state

schools, Southern Tide became an extremely profitable business. Today, yearly revenues exceed $30 million [8].

**Yik Yak**

Similar to Southern Tide, Yik Yak was founded at a Southern college – namely Furman University. The founders have aggressively pursued a brand ambassador program that distributes cups, ping-pong balls, and other low cost items emblazoned with the company's logo to other universities. Today Yik Yak is valued at $400 million.

**Raging Mammoth:**

Though less well established than the above companies, Raging Mammoth offers a product that is most similar to ours in terms of its limited scope and complexity. The origins of Raging Mammoth was a post to the crowd funding website KickStarter to create a beer shot-gunning tool (*Note: To shotgun a beer is to puncture a hole in the side of the can as to facilitate more rapid consumption of the beverage*). Despite the seemingly trivial nature of the product, the product was able to raise $60,000 due to its fit within the subculture and its slick promotional materials [9]. The founders' irreverent tone: "share this with your friends, families, clubs, fraternities, sororities and secret orders, so that we can get these bad boys made" and self-effacing description, "we like to have a good time and want to make your good times that much better" are certainly among the keys to their fundraising prowess. Raging Mammoth proclaims that they "believe **life's too short**, and that **good times should never end**." Just as Jimmy Buffet doesn't simply sell music, but rather the island lifestyle – Raging Mammoth sells the party life.

**Essential Factors:**

Crucial factors we gleaned from the above companies include the necessity of both developing an appealing logo and building a lifestyle associated brand. As a result, high margins are possible.

## RELATIONSHIP WITH COLLEGES/LICENSING

As expressed before, the target market for Torch is undoubtedly the college demographic. The logical next step, as far as marketing is concerned, would be to utilize the already existing distribution network of college bookstores as one selling outlet for our

product. Partnering with a bookstore would add an additional layer of complexity, however, because there are licensing logistics that would need to be dealt with.

In order to place a Stanford logo on the Torch, for example, we would need to pay the University for the rights to the logos. Such an endeavor would cost $4,500 - $21,200 for 10 schools [10]. Although this is a pretty steep cost, the distribution channels that colleges provide are an enormous benefit to us. Additionally, we would be able to offset some of this cost by increasing the sale price. Having a college logo would allow us to charge a bit more, because it is more customized than a plain model.

Another distribution channel that is already pretty established is the Greek life community. Culturally, our product aligns with some of the attributes of Greek life, which makes it a logical choice to offer a Torch with customized fraternity/sorority's letters on it. Additionally, there is no licensing fee for this type of customization, so our margins would be even larger for this product line.

## REVENUE AND COST ESTIMATES

The figures below display some projected sales, revenue, and cost data for approximately the first 12 months of Torch realization.
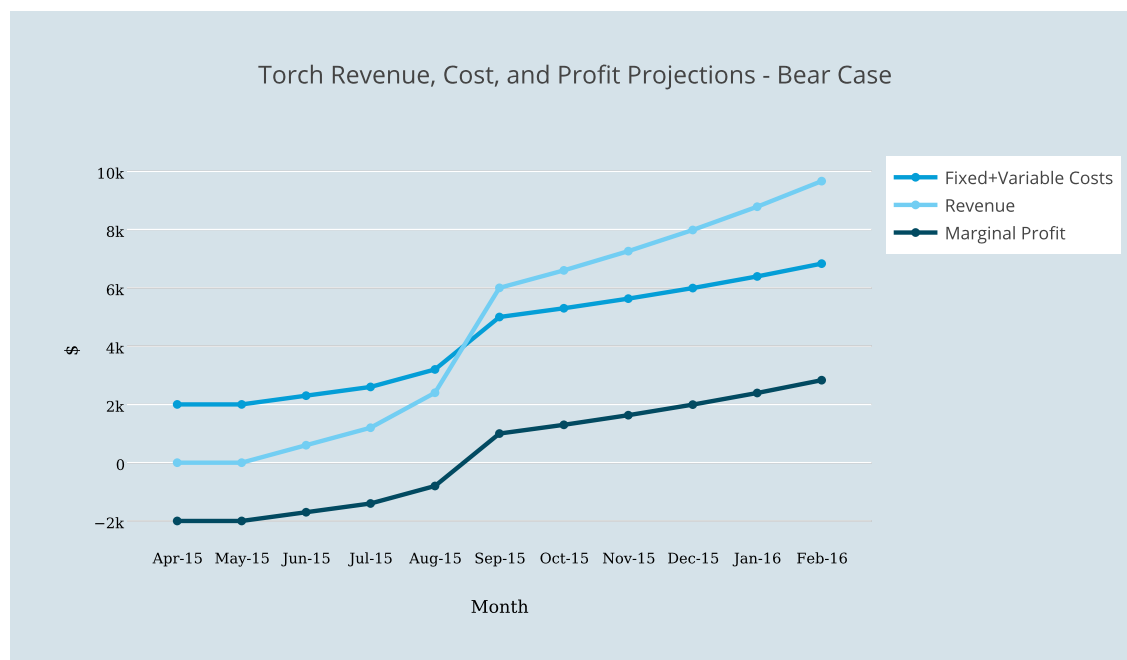


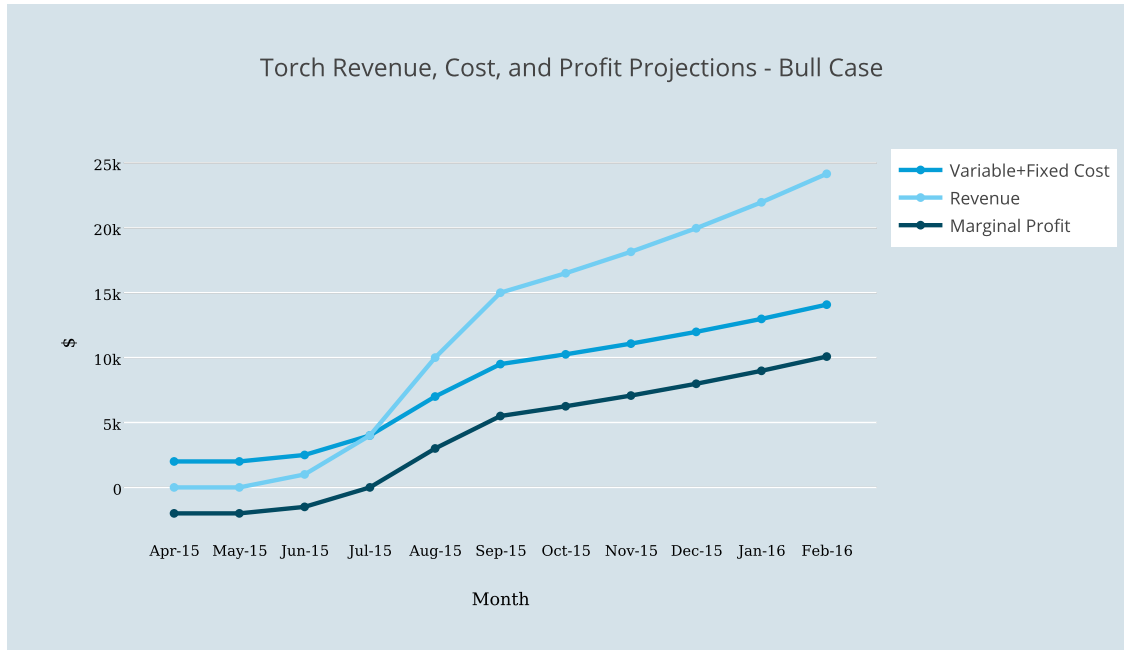**Figure M:** Bear case financial projections

**Figure N:** Bull case financial projections

These estimates are based on conservative and hopeful sales data respectively. They assume fixed cost of $2,000/month, variable cost of $10/unit, and price of $20/unit.

## INTO THE FUTURE

The future certainly holds promise for our device. With so many college students and young adults in need of jump charge capability, the Torch is definitely something we want to take to market. Our design at the moment is somewhat simple, but it's functional and highly portable. In order to start selling our device, we'll need to find a manufacturer and if we get large enough, we'll certainly need investors to help bankroll our operation. Ultimately, however, we could extend our brand beyond a simple portable phone charger. Using the same principles of engineering design that we've utilized to design our device, we'll be able to modify the device, add extra features, and come up with entirely new products that could have even larger impact. But as far as the portable charger space is concerned, we hope to introduce a disruptive product that will prove so useful that people who never even knew they had a need for such a device will end up buying one. On the whole, with Torch and any future versions of it we design, we strive to provide people with the ability to proceed with daily lives without worrying about the battery lives of their cellular devices, and

we plan on continuing to use core design principles to do so in the most effective and user-friendly way possible.

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