ECE 140A - Winter 2023

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Safety on Hand (SOH) Final Report

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1. Executive Summary

Safety on Hand (SOH)

Given the current climate of violence and crime at an all time high, the safety of innocent people should be our top priority. Many people are afraid to leave their homes, go to work, school, etc, due to the increased rates of crime all throughout America. The most innocent victims in these crimes can mainly be children, which is why parents are not able to feel safe even letting their kids go to school. If parents had a way to atleast monitor their children's locations while they are out in a public place, that would give them a sense of security knowing that they can track their children and stay alert for potential problems that could arise. Which is why, the idea we chose for our final project is to create a wearable wristband for children, called the Safety On Hand (SOH).

SOH is a wearable GPS location tracking device that is designed as a minimal, sleek, and comfortable wristband for kids to provide parents a way to keep track of the location of their children in real-time.

This final MVP report is broken down into ten sections: articulating the product vision, identifying our market and customer, job stories, the economic model, MVP hypothesis, team introduction, lean canvas diagram, ethical sustainability and a final video presentation link. We first identify the problem for the target customer, and describe what SOH is at a high level in the product vision section. We review the current research and products that exist in the wearable device market for children, to get an idea of what basic components are needed to develop this product in the market and customer identification section. The customer personas and job stories section focus on interviews with parents, to infer on the current pain points that parents have when it comes to their child's safety. We review economic models and costs for producing a wearable GPS tracker, to develop the estimates in the MVP hypothesis section. The lean canvas diagram section covers all the components researched above as a diagram. We also acknowledge the ethical sustainability concerns, to ensure transparency when developing the components and resources for the product. We ensure we have an idea on how to build a sustainable product in this current climate. The report concludes with a link to our final presentation to introduce the team, and SOH to potential investors.

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2. Articulating Our Product Vision

What does the product do?
At a high level, this wearable tracking band uses GPS technology to track the location of the wearer at all times. The SOH band is coupled with a mobile application that parents will use to actually view the location of their child, receive active alerts, and keep track of any changes in location.

How does the product work?
The wearable GPS tracking device for kids works by integrating a GPS tracking component into a lockable wristband that is worn by the child. The parent downloads a mobile app that pairs with the device, providing real-time location updates and enabling the parent to lock or unlock the wristband remotely. To use the device, the parent first steps up the wristband and installs the mobile app. They pair the wristband with the app and enter the child's information, like their name and age. Once set up, the parent can view their child's location on a map, set up geofencing alerts, and receive notifications if their child leaves a designated safe area.

What are the key features of your product?

1. GPS tracking
2. Lockable wristband
3. Mobile app
    a. Active bracelet location visibility
    b. Emergency alerts
    c. Geofencing: create virtual boundaries around specific areas
4. Wireless charging
5. Durable and waterproof

What makes the product unique?
SOH is unique in that it combines a sleek, simple wristband design with advanced GPS location tracking capabilities and a comprehensive app for parents and teachers, prioritizing both safety and simplicity. The lockable wristband adds an extra layer of security to prevent the band from being easily removed. The geofencing capability allows parents to set boundaries around their child and receive alerts if any "fence" is passed. SOH does not include an interface screen, allowing it to fully embody a normal wristband, yet still offering the computing capabilities found in other wearable GPS tracking devices.

What is your unique value proposition?
The unique value proposition of SOH lies in its combination of a simple, secure design with wearable tracking components all at a very affordable cost. We understand that giving a young child a smart phone/watch is not feasible and we want parents to still feel secure about their child's safety. The wearable solution is not meant to be detachable, enhancing SOH's durability

while also decreasing the risk of the wristband being misplaced or damaged. By eliminating an interface screen, we simplify the tracking process, and blend SOH seamlessly into everyday use, making it truly a wearable computing device that is practically unnoticeable by the child. The lockable feature adds an extra layer of security by preventing forced removal of the band, and the geofencing technology provides peace of mind by sending alerts to parents and teachers when the child is outside a designated area. Overall, SOH offers a unique value proposition by combining simplicity, security, and location tracking all within a compact, lightweight, and easy to wear wristband.

Product Vision Summary:
"SOH is a product that acts as a GPS tracking device for families with young children who want to have a sense of security and know the location of their children when they leave their home at all times. We're different from products like AngelSense and JioBit because the tracking device is affordable, wearable (not just a detachable component) and provides geofencing capabilities, incorporating the product seamlessly into your everyday life. We'll generate revenue through a one-time-purchase of the wristband itself, and a service plan that can be billed monthly or annually."

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3. Identifying Our Market

Target Market:
The market for the wearable tracking device for children includes parents and teachers who are concerned about the safety of their children and want a reliable tool to monitor their whereabouts. This includes children who are too young to have a phone or are not yet responsible enough to carry one, like children between the ages of 0-12. This market would likely consist of parents in their 20s to 40s who are comfortable with technology and use mobile devices regularly. They would be willing to spend money on products that prioritize their child's safety.

Total Market Size:
According to childstats.gov, there are approximately 48 million children in the U.S ages 0-11. Since not every parent would be interested in purchasing this product, the addressable market can be inferred based on the age of the child, parents' interest in actually monitoring their child's location, and price of the product. We can assume the addressable market would consist of parents under the age of 12, and estimate around 30% of parents with children under the age of 12 might be interested in buying SOH for their child. In addition, the price point may reduce the addressable market, so we can assume that 50% of parents would be willing to pay the price range for this product. Therefor, given this information, we can calculate the addressable market size as follows:

(total children in the U.S. between 0-11) * 0.3 * 0.5 = approximately 6 million parents.

Distinct properties of this market:

- **Demographic data:** The target market is parents of young children, generally in their 20s to 40s. Parents who make between low to high income, or are more comfortable with technology and regular users of mobile apps and computing devices. Children with special needs are more prone to getting lost, wandering away from parents, or unpredictable.
- **Location:** SOH may be particularly useful and appealing to families who live in areas with higher crime rates or large cities where there is more of a risk of getting lost or abducted, as well as schools that are near highly populated areas or activity around the school. It may also be useful for families who travel frequently or take part in outdoor activities, like camping or going to the beach.
- **Timing:** This device can be used year round, but is in high demand during school year sessions, holidays seasons, or any other times where there is a lot of activity and children are more susceptible to being separated from their parents like theme parks or crowded events.

- **Convenience:** The wearable tracking device market should be convenient and easy to use for both parents and children, therefore this market may include parents with a busy schedule who cannot always be with their child. Busy parents who will want a reliable tool to help them monitor their child's location, while still being able to integrate easily into their lives.
- **Safety and privacy concerns:** This market may also include parents who are concerned about their child's privacy while using a wearable tracking device, so one that does not jeopardize neither the child nor the parent's personal information.

Top competitors and SWOT analysis for each:

Jiobit: A GPS tracker targeted for children, the elderly, and pets. Small, lightweight device that is attached somewhere on the person or animal, or placed in a bag or backpack.

- Strengths:
    - Real-time location tracking: Allows parents to monitor their child's location in real-time
    - Location history: Allows location history for 7 days to help monitor child's movements if needed
    - Long battery life: A battery life of up to 20 days on a single charge
    - Secure: Uses intrusion-resistance hardware and end to end encryption with cryptographically signed software to prevent malware
- Weaknesses:
    - Subscription: All features can only be accessed through their monthly subscription, which may not be appealing to some customers.
    - Cost: Jiobit is on the more expensive side of wearable location trackers on the market, reducing the addressable target market size since lower income families will not be as easily accessible to this product.
- Opportunities:
    - Market increase: The wearable tracking device for people and pets is growing, making Jiobit be more discoverable and increase their market size.
    - New features: Different features can be created with each iteration, like different types of tracking preferences based on who is being tracked, like health monitoring for the elderly and different emergency response capabilities.
- Threats
    - Competition: The wearable tracking device market is very competitive, so Jiobit must maintain a customer base despite the established companies already on the market, and future competitors.

AngelSense: Kids' GPS tracker to help protect children with disabilities like autism. A detachable tracker that attaches to backpacks or clothes, offering an assistive speakerphone, live monitoring and proactive alerting.

- Strengths:
    - Voice monitoring: AngelSense offers real-time GPS tracking and a "Listen In" function which lets parents listen to their child's environment, providing additional verification that their child is being treated properly.
    - Durable design: Designed to withstand wear and tear as well as being non-removable, including 3 security pins that require a special magnetic key to remove.
    - Health and well-being tools: Step counter, location activity playback, consistent updates throughout the day
    - Customer service: Offered via phone, email, live chat, which helps customers troubleshoot problems effectively as they arise.
- Weaknesses:
    - Limited battery life: Up to 24 hours depending on the use, which can vary and not be a true estimate of battery life.
    - Cost: AngelSense also has high monthly fees, reducing the addressable target market size since lower income families will not be as easily accessible to this product.
- Opportunities:
    - Expanding market: The wearable tracking device is constantly growing, making AngelSense have an opportunity to grow its customer base and be more discoverable.
- Threats
    - Competition: The wearable tracking device market is very competitive, so AngelSense must remain innovative despite the established companies already on the market, and possible future companies.
    - Privacy and safety concerns: AngelSense must be transparent with customers about potential privacy problems that could arise, and how their data is being used and maintained.

Tack GPS Tracker: Simple GPS tracker with no audio or extra features aside from one SOS button activated with two concurrent presses.

- Strengths:
    - Simple and easy to use: Easy set up and straightforward user interface, which makes it convenient for parents to quickly use the product.
    - Affordable monthly fee: $3.99 a month making it budget friendly and more accessible to lower income families.
    - Long battery life: Up to 30 days battery life

    - Improved location accuracy: Tack connects to the AT&T LTE network and pings nearby Wi-Fi routers for improved location accuracy indoors and out.
- Weaknesses:
    - Limited features: Despite providing accurate location information, Tack is limited in the features it can provide, resulting in parents looking elsewhere for more comprehensive capabilities.
    - Connectivity issues: Cellular coverage dependent, meaning areas with poor connectivity may result in less accurate location data.
- Opportunities:
    - Expanding features: Tack could add further safety features to make it stand out against its competitors, such as voice monitoring, more frequent updates, and different location accuracy strategies.
    - Partnerships: Tack can work with different schools, companies, hospitals, law enforcement agencies in the area to offer their product as a service which can increase their market size and discoverability.
- Threats
    - Competition: Tack has high competition with a number of well established competitors, so in order to maintain secure market share, they should expand in an innovative way to help remain relevant.
    - Privacy and safety concerns: Like all wearable tracking devices, data breaches and other safety concerns pose a risk to the user and must be handled accordingly to ensure a notable reputation and maintain customer trust.

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4. Identifying Our Customer

Prospective Customer Interviews:

Interview 1 Transcript (Conducted by Sarkis): *Friend circle of married adults with children*

Q1: Have you heard about any kids' tracking devices (after I explained what our product is)?

- "The only thing I can think of is if you hid the air tag somewhere on your child, but that is not made for tracking and will notify any iPhone nearby when followed."
- "When I heard GeoFencing, I'm sold."
- "Concerns me missing the notification when kids cross the geofence, and I'm a person who hates phones, so it's not in my routine to check in on my phone, so my concern will be that I missed the notification, and I might be too late."

Q2: What ages do you think this product should be aimed at?

- "2 years old to 18 years old. As a parent, I like to know where my children are at all times."
- "But there's another concern: kids are rebellious, especially mine, so if he knows it's a tracking device, he will take it or give it to someone else in school. It's better not to explain, and what other parents will think about the fact that I'm taking my kids and there are other kids with him is very concerning."
- "The bracelet idea for me is a bit iffy because if it's not cool, the kid will take it off, but the air tag is good, but with that, it should be in his backpack or pocket, so you need to slide it in there somehow and forget about it or wash it."
- "So the watch idea is good, but in the worst case, someone takes the kid away for "too many swear words." So if the bad guy sees a watch, he will be alerted and take it off, but with something non-technical, they won't bother with that."
- "The other concern is what if, let's say, my kid took it off of his wrist and gave it to someone; how would I know that it was him and that he was not in danger? And how would I know if he put it back?"

Q3: How much do you think this product should cost?

- "There should be no price tag for my child's safety, but that doesn't mean I'm going to spend hundreds of dollars on it. I think it's good to say you can make two products, one for the expansive population that the rich can afford and one for the regular population, so if we're talking about the rubber, 20 or 30 dollars and a monthly fee of maybe 10 dollars."
- "So as a marketer, you can strike a deal with phone companies to offer the bracelet for free to parents if they make a one-year contract with them, including the tracking and activation of the bracelet. Or you can sell it in bulk."

Q4: Any additional ideas or suggestions for our product?

- "I would say if you are making a bracelet do something adjustable or custom made, maybe with their favorite character or like the charms (forgot the name that girls were with beans of different charms for friendship and such), you can hide the tracking in it, but I can see some adults might gift that to their crush and track them, so you can come up with a good idea. You're becoming an engineer, so do your thing."

Interview 2 Transcript (Conducted by Priya): *Sister who has a four year old son named Elijah.*

Q1: Have you ever lost Elijah in a public place, and if so, how did you feel?

- "There was this one time when Elijah was only one and a half and he kept walking around Target and I lost him for 30 seconds or so and I was TERRIFIED."
- "But I turned the corner and he was just walking so fast and exploring."

Q2: How do you currently keep track of Elijah when you are not with him?

- "Elijah is always with me or his dad so I just always make sure to check if he's near me whenever we're out. But when he's not with me, his teacher or dad will be tracking him for me."

Q3: What are the main concerns about Elijah when he's not with you?

- "Anytime you leave your kid somewhere, it's always scary. Kids are vulnerable, they do where they're told when their parents aren't around. Kids don't know danger. Kids can't sense danger like adults can."
- "For the most part when he's at school I try not to worry but in general we have to think about how safe the school is, like if strangers can come inside the school easily."
- "Or if his teachers are treating him badly, I heard some stories about people working at daycares who don't treat kids well since it's not their kid so they don't care as much."
- "But in general I trust that he's in good hands."

Q4: Would you be interested in a wearable wristband for Elijah where you can track his real-time location through an app and be alerted if he's out of the safe location?

- "Yes! I was considering buying an Elijah and Apple air tag but I wouldn't know where to put it."
- "I feel like it would be a good product but the only concern is would Elijah want to wear it."
- "He'd have to be interested in wearing it."

Q5: What features would you like to see in this wearable tracking device?

- "Different appearances."
- "Good performance, good quality, advanced GPS, accurate."
- "Comfortable."
- "There should be a way that our children should be able to notify their parents when they don't feel safe."

- "Kid friendly and appealing to them, make it the next cool thing to have."

Q6: What do you think of a lock feature where it's not removable by anyone but you or whoever has access to the app to unlock it?

- "Yes, that can be good, but if it needs to be removed right away then that would be an issue."

Q7: How much do you think it should cost?

- "Around $70."

Q8: Any other problems you see with it besides what we already mentioned?

- "Make sure the battery lasts long enough, and gives accurate locations."
- "Make sure kids are willing to wear it."

Interview 3 Transcript (Conducted by Shasta): *My mom and her friend with two young children.*

Q1: What is the biggest concern regarding your child's safety when you take them out in public?

- "Concerned my child will get lost or perhaps attacked by someone"
- "Large crowds and wandering off"
- "Vulnerable when by themselves"

Q2: Would being able to track your child's location during these trips make you feel more at ease?

- "Yes, as a parent I want to know where my child is."

Q3: Would you want to be able to set location boundaries that alert you if your child went outside?

- "Yes, this is functionality I would pay for"

Q4: What are your thoughts on this tracking coming in the form of a bracelet your child wears that can pair with your phone?

- "Could work as long as the design is sleek and discrete"
- "Benefit is that it is always going to be on the child so ensure that it is securely attached"
- "Don't necessarily want my child to know I am tracking them though"

Q5: What are some additional features you would want in such a wearable device?

- "Reliable battery life"
- "Make sure kid or someone else cannot take it off"
- "Be in the form of a toy almost. I want my child to WANT to wear it"
- "Main thing is styling options, but must be discrete"

Q6: What are the main locations you are worried about losing your child?

- Big crowds, parks, playing in the neighborhood, concerts, sporting events, amusement parks, malls, large events

Q7: How much would you pay for this child tracking bracelet?

- $50 to $70

General Customer Journey Map

Phase	Awareness	Consideration	Purchase	Onboarding	Advocacy
Activities Performed/user Action	Researching viable child tracking products	Brows for a video ad Ask if any friend used it before	Use online shopping sites and wait for the product or go to nearest electronic store to make the purchase	Unboxing and setting up account	In a park talking about the product to other moms and how safe and comfortable she feels having a peace of mind
Touchpoints	Tracking band ad	Landing page	Company Website, order/ cart confirmation, payment page	Product manual, testing through use	Sharing via social media and word of mouth. Reviews on product page
Emotions	Curiosity	Speculative	Excitement	Comfort	Passion
Positive/Negative Percent (0 - 100)	70	60	65	80	75
Customer Expectations	Simple access to industry options	Top viable options shown through internet search, but skeptical at first if GPS tracking helps	Simple UI to order product on company website	User manual should be very intuitive and customer support should be easily	Community of like-minded individuals sharing input, product updates

Customer Personas

Persona 1: Sally (Busy Mom On the Go)

- **Demographic data**:
  - Name: Sally
  - Age: 27
  - Gender: Female
  - Occupation: Student and part time worker
  - Marital status: Co-parenting
  - Children: One 4-year-old son
  - Location: San Jose, California
- **Personal Interests:**
  - Spending time with family, trying new food, hiking, healthy eating and cooking
- **Favorite Existing Brands:**
  - Apple, Starbucks, Target, Adidas
- **Tech Adoption Curve:**

    - Early pragmatist: Given Sally who is a 27 year old mom who is currently going to school and working, she is likely to fall under the pragmatist category, since she considers a wearable tracking device, but it cautious and needs some convincing that the wristband is worth purchasing.
- **Engaged Activities**
    - Involved with school volunteering and extracurriculars for her children
- **Job-to-be-Done:**
    - As a busy mom who juggles work, school, and being a parent, Sally needs an effective and easy wearable GPS tracking device for her son, to keep an eye on her son's location while she's not with him. Her son should be able to easily accept the product, and have no issues wearing it for long periods of time.
- **Current Experience:**
    - Sally uses a combination of phone calls and text messages from the father to track her son's whereabouts. However, she finds these methods difficult and cumbersome, especially when she is busy attending classes or at work. She also has to rely on direct communication from someone in order to find his location, and currently has no way of knowing his exact location when he is not with her or his father.
- **Pain Points:**
    - Difficulty keeping track of her son's location at all times
    - Fear and stress of not knowing where her son is in the event of an emergency
    - The need for a better solution way of monitoring her son's whereabouts
- **Opportunities:**
    - Offer Sally a wearable tracking wristband for her son with real-time GPS location tracking, geofencing capabilities, and updates on location changes
    - An easy to use mobile app for parents like Sally to monitor and receive alerts in the event of an emergency
    - Customization for the wristband that allows her son to be willing and motivated to actually wear the product.
- **Net Promoter Score:**
    - 2/7
    - Communication tools like texting and calling her son's father or communicating with teachers has been limiting for Sally when it comes to keeping track of her son's location at all times. She is open to exploring new options that offer a better solution to ensure her son's whereabouts than the current solution she has.
- **Would Recommend Solution:**
    - No, the current solution that Sally has would not effectively address being able to know her son's location in the event that a teacher or the father is not available via text or call. She would benefit from a product like a wearable tracking device

which allows her to be aware of her child's location without having to rely on another person to retrieve this information.

Sally's Journey Map:

Phase	Awareness	Consideration	Purchase	Onboarding	Advocacy
Activities Performed/User Action	Unaware of current solutions	Sees a lot of problems with current technological solutions which are "overdone"	Strictly communicating with partner	Still awaiting purchase of device, struggling to keep up with updates while busy with work/school	Repeatedly expressing her frustrations with friends. Lack of a valid solution thus far.
Touchpoints	Tracking band ad	Landing page	Company Website, order/ cart confirmation, payment page	Product manual, testing through use	Sharing via social media and word of mouth. Reviews on product page
Emotions	Unsure	Speculative	Frustration	Hopeful	Waiting
Positive/Negative Percent (0 - 100)	20	30	0	20	20

Persona 2: Adam (Busy Dad of Two Elementary School Children)

- **Demographic data**:
  - Name: Adam
  - Age: 34
  - Gender: Male
  - Occupation: Technology Consultant
  - Marital status: Co-parenting
  - Children: 7-year-old daughter and 8-year-old son
  - Location: San Ramon, California
- **Personal Interests:**
  - Community Involvement - Volunteering, School Meetings
  - Active Lifestyle - Gardening, Daily Gym, Biking
  - Health Conscious - Healthy Cooking, Meditation
  - Gaming - Video/Board Games
- **Favorite Existing Brands:**
  - Beats, Nike, Whole Foods, Samsung
- **Tech Adoption Curve:**
  - Adam is a 34 year old dad currently working in the tech/business industry. He is generally comfortable working with most modern technologies, particularly

Samsung products found in his home ecosystem. Since he is considering a wearable tracking device, he is cautious and needs to be convinced that the wristband is reliable and secure.

- **Engaged Activities**
    - Avid technologist and DIY
    - Soccer dad and PTA member
- **Job-to-be-Done:**
    - As a busy dad who juggles work and parenting, Adam needs an effective and easy wearable GPS tracking device for his children, to keep an eye on their location while he's not with them. As a consultant, he travels quite often for work and needs a way to reliably track his children from his phone. His children should be able to easily accept the product, and have no issues wearing it for long periods of time. Adam herself also wants to ensure that the product is safe, secure, and reliable.
- **Current Experience:**
    - Currently Adam talks with his wife to stay updated on family activities while he is out working. Adam is pretty involved with the sports teams that his kids are a part of so he is responsible for most late night practice pickups. Sometimes he struggles to find his children at the large field of soccer practices and has been frustrated on numerous occasions. He relies on finding one of his kids' teammates or fellow parents to find out where his children are at that moment. Recently, he tossed an AirTag into his son's soccer bag which allowed him to see the general area in which he is waiting.
- **Pain Points:**
    - Adam's main problem came from the fact that he was not ever able to reliably track where his children were at. Even after implementing the "AirTag" hack, he struggled to get accurate information all the time. One of his son's teammates accidentally took the wrong bag and Adam was following another child around thinking it was his son. The zone that the AirTag showed was generally not specific enough and could not provide Adam the tracking information outside of this particular setting. He wanted to be able to tell exactly when his son was leaving the field so that he could meet him directly at the exit.
- **Opportunities:**
    - Provide Adam with the wearable GPS tracking bracelet for his kids
    - Sync up the device with his phone to provide real-time location tracking
    - Set geofence boundaries around soccer field to know where his son is without getting any mixup
- **Net Promoter Score:**
    - 4/7

    - AirTag kind of works but is never recommended for humans and the potential for mixups is relatively high
- **Would Recommend Solution:**
    - Adam would not recommend his AirTag solution to friends or family since it was not fully reliable. He has experienced some mixups at soccer practice and wants something that is more generally applicable.

Adam's Journey Map:

Phase	Awareness	Consideration	Purchase	Onboarding	Advocacy
Activities Performed/User Action	Only aware of AirTag	Made do with the AirTag, realizing that there are drawbacks	Implemented AirTag solution, but still seeing some problems	Needs a better solution, very tough to balance work and personal life	Spoke to some coworkers and has learned about SOH
Touchpoints	Tracking band ad	Landing page	Company Website, order/ cart confirmation, payment page	Product manual, testing through use	Sharing via social media and word of mouth. Reviews on product page
Emotions	Hopeful	Frustration	Speculative	Hopeful	Excitement
Positive/Negative Percent (0 - 100)	30	50	40	45	55

Early-Stage Personas

- Persona 1: Mark and Jane (Parents)
    - Mark and Jane have a 3 year old who just started preschool, and they want to keep an eye on him for his first day of school without his parents accompanying him. They use this product to keep track of their child's daily locations in the school.
- Persona 2: Single Mom Sarah
    - Sarah is a single mom of 10 - 12 years old and she works two jobs. She wants to make sure that her kids are safe and sound when they reach home. By utilizing our tracking bracelet, Sarah can stay confident that her children are not wandering around from school while she works. Ultimately, she is able to monitor her kids' location and ensure their safety.
- Persona 3: Jason and Kelly
    - Jason and Kelly are the parents of their 5 year old daughter, who is going on a field trip to a museum. Her parents want to make sure that they know where her location is at all times while she is on her field trip, and use this product to ensure that she stays within the bounds of the museum, and the route back to the museum.

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5. Job Stories

Situation, Motivation, Expected Outcome
Format: When (context), I want to (job to be done), So I can (future).

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1. When I drop off my child at school, I want to be assured that my child is safely within their classroom, so I can feel confident that they are in the right place and can focus on my own schedule without worrying about their safety.
2. When my child is playing outside with friends, I want to be able to set a boundary on how far they can play, and be notified if they go beyond this boundary, so I can ensure they stay within a safe area and not go too far away from me.
3. When my child goes on a school field trip, I want to be able to track their location in real-time, so I can have peace of mind knowing they are at their intended location.
4. When my child gets picked up from school by their caregiver, I want to receive notifications that they have left the school and are heading back home, so I can have an idea of where they are at and not feel stressed out.
5. When my child goes to piano class which is located in a highly populated area, I want to receive an immediate alert on my phone if their location changes from the piano class to anywhere else.
6. When my child has a sleepover at their friend's house, I want to be able to quickly glance at his location before I go to bed, so I can have peace of mind and be confident in knowing that they are where they said they would be.
7. When my husband and son spend the day together doing fun activities like getting ice cream, going to the beach, and riding their bike around town, I want to be able to monitor their whereabouts throughout the day so I can quickly monitor their location without solely relying on my husband.
8. When my son goes on his first Boy's Scouts camping trip, I want to know when he arrives and leaves the campsite, so I can have visibility of his camping routine to ensure that I will know exactly where he is when I go to pick him up.
9. When my daughter wanders off while we're shopping at the mall, I want to quickly look up and go to her location, so I can make sure she is safe and with me.
10. When my son is out of my view at the beach, I want to receive an alert if he has gone beyond the designated safety perimeter we've established, so that I can be made aware right away and quickly get to his location to make sure he is okay.
11. When I drop my daughter off at her friend's house where from there they will go to Disneyland with her friend's family, I want to be able to track her location in real-time so I can have an idea of what rides they are currently on.
12. When I get a call that my child's school has gone under a lockdown because of a potential threat near the school's perimeter, I want to drive to their school and

continuously monitor their exact location, so I can have an idea of where they are during this scary situation.

13. When my son is spending the weekend with his grandparents and I am on a business trip, I want to be notified when they leave home to do an activity, and when they arrive back to his grandparents home so that I don't have to worry about where they are at any given moment.
14. When my older daughter spends the day with her little sister while I am spending my day with old friends, I want to occasionally view their location to see what they are up to, so I can feel content knowing they are spending quality time together.

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6. Economic Model

Available Channels

We will be mostly taking on partnerships because our product is not necessarily new to the market. There are different devices that are similar, like the Apple AirTag. But we plan to provide a better alternative, since our product falls into the existing chain of safety tracking for children, to extend as a wearable device as opposed to something like AngelSense (like an Apple AirTag). Our revenue model for SOH will be a direct-to-consumer (DTC) model, where the product will be sold online through our website and can be based on registration, and we will also consider selling our product on e-commerce platforms such as Amazon and Shopify. We will also partner with schools and child care centers to sell the product directly to parents. And as one of our interviewers mentioned, the product can be sold at The Big Four wireless telecommunications facilities-based services, where each company provides a high number of customers counted in the United States; for example, “Verizon: 142.8 million (Q2 2022). T-Mobile US: 110.0 million (Q2 2022) AT&T Mobility: 101.8 million (Q2 2022) Dish Wireless: 7.98 million (Q4 2022) ” were we can partner with them a exclusive packages with each one year contract the parents get on bracelet for free but our revenue will be based on the monthly subscription of GPS tracking.

<u>Platforms</u>

- E-commerce: Amazon, Shopify, eBay
- Educational Institutions: Schools, daycare centers, after-school programs
- Retail/Specialty Stores: Electronic, department, toy stores
- Telecommunications Providers: Verizon, T-Mobile, AT&T, Dish Wireless
- Online: Through our website, and can be based on registration
- In-person events: School or community events, parent teacher conferences, retail store demos

How Customers Will Find/Buy Our Product

If the above plan works, our customers will hear about out product to our partners and/or through thee-commerce website where the algorithm suggest our product to parents based on their purchases on kids toys etc, but we are also at first relying on Word to mouth where satisfying customer will suggest our product to parents in their circle (in a further implementation of the device we are thinking to give parents a free exchange to new model when they recommend and get 5 new customers, parents will think about the safety of their kids above all other thing and knowing there is reliable product in the market then our job is satisfying all the checkmarkes of the customers.

Advertising:

- Social media: Facebook, LinkedIn, Instagram, TikTok, Snapchat

- Word of mouth: Customers will suggest our product to other parents within their friends/family circle
- Search engine results: Online searches of wearable device for kids

Revenue Models

The product is based on first purchase and monthly fee for the gps services to the device, which in its turn every referral to cell phone network referral is a affiliation revenue, our goal is to sell the product for 99$ each and then charge 15$ monthly fee where as a regular customer getting a wireless tracking service is 10$ month which leaves us with 5$ per month per product and the cost to make each bracelet will be around 40$ take makes total cost 280$ and 120$ revenue per year per customer which is around 60% of revenue.

Models

- Direct-to-consumer (DTC) sales model: SOH is sold directly to customers through our own website or e-commerce platforms such as Amazon, being the main source of revenue for our product.
- Subscription-based model: Customers pay a monthly or annual fee for accessing the GPS tracking service via the app component, resulting in a recurring and stable revenue over time. Encourages customers to continue using the app.
- Retail partnerships: Establish partnerships with relevant retailers relating to children such as toys stores, baby stores, kitchen appliance stores.
- Telecommunications partnerships: SOH can partner with Verizon, T-Mobile, AT&T, Dish Wireless

Product Economics

COGS

The COGS (cost of goods sold) for each SOH device will include cost of materials, labor, shipping, and marketing.

Material costs: Battery for the wristband, accelerometer for detecting motion and orientation, bluetooth/wi-fi module to allow communication like updates and location monitoring with the app component, and a silicon shell enclosure.

Labor costs: Workers involved in the manufacturing and production process for testing and assembly of the product.

Indirect costs: Cost of rent of an office space, storage space, and manufacturing facilities. Utilities such as electricity, water, gas for the different buildings, as well as insurance to cover business risks like property damage. Salaries for staff from various departments such as human resources, a legal and marketing team as well.

We are planning to keep our fixed costs low by outsourcing manufacturing to cheaper and faster manufacturers who have been producing bracelets for decades. Our variable costs will mainly consist of marketing, storage rent and/or advertising expenses including the affiliation, where this strategy will guarantee our market value and getting recognized in the market.

Our margins will be calculated by the cost of the sell + yearly fee - the COGS to generate the revenue expected . We plan to price the SOH device at $99, with an estimated COGS around $40 and the monthly fee of 15$, which will provide us with a healthy margin of around 60%.

Fixed/Variable Costs and Margins

Fixed costs include: manufacturing equipment, rent, marketing/advertising, and insurance.
Variable costs: materials, shipping and handling, assembly costs, and prototyping.
Costs estimate breakdown:
Assumption: Sell 10,000 units at:
$99 each + $15/month for service (or $150/year) which makes around 280$ per year.

- Each sale is $280
- Prototyping: $20,000
- Materials for the “band” part of the bracelet: $2
- Electronic + power source component around 20$
- Packaging + handling and shipping 5$ per unite
- And around $5 for assembly + tax + server maintenance and fees
- And assuming around $2 per customer/device for web hosting and application
- Assumption: Sell 10,000 units
- Prototyping: $20,000
- And around 4$ per unit for the following
- Advertising/Marketing Display on various apps (Instagram, facebook, tiktok)Social media coordinator for videosPhotographer/Videographer, modelsPromotional videos

Manufacturing if we are going to make more than a million pisces

- CNC Mold : $500000~$1000000
- GPS electronic chipset for over 1 million pieces $18.65/per piece
- Putting together in China and packaging it ($2.65 per unit)
- Box $0.58/perbox
- Shipping from china around $5000 including customs
- Rent (Warehouses) - Trucking cost
- Total landed production cost 1,000,000 units: $21.885 +Legal Fees On Utilities + Ideas for customer acquisition + CACs

Estimated customer acquisition cost (CAC)

We are estimating the CAC to be around $15 per customer, which includes marketing, advertising, and sales commissions.

- Start off with free samples to smaller group
- Expand via word of mouth Online advertising (Instagram, Facebook, TikTok) And via Partnership with big wireless companies

After analyzing the different costs of SOH, we are estimating the CAC to be around $15 per customer. This would include costs of marketing, advertising, and sales commissions.
To motivate new customers, we plan to distribute free samples of our product to a smaller group of potential customers, which will cost $99 + $15 for the first month free = $114 * 15 new customers = $1710.
We will expand via word of mouth, as well as social media marketing which we can approximate to cost $5000 for the graphic design, copywriting, videography, data and brand monitoring, and advertising.
Finally, we plan to partner with big wireless companies to offer SOH as part of a service package. According to Verizon's website, they offer a 10,000 "Digital Ready" grant as a partnership with small business owners. We will estimate that partnerships with big wireless companies will cost roughly $10,000.

<u>Estimated Lifetime Value of a Customer</u>
We estimate the lifetime value of customer to be around 8 to 10 years depending on the age of the child in question and the other product directly competing with SOH, and the customer need and concerns of the child safety
We estimate the usage time for a child is 3-5 years, assuming that upgrades of the current wristband will be made available, and parents would want to upgrade the existing product.

We estimate the profit per customer:

- Cost of production calculated above for over 1,000,000: ~$22/p
- Priced at: $99
- Estimated profit per customer: $99 - $22 - $15 - $3
- Estimated profit per customer: $59

Lifetime value of a customer is calculated as:

- CAC: $15
- Legal fee $3
- Cost of production $22
- 3 years = 36 months $15/m
- Monthly prescription: $15
- $59 + ($15 * 36) = $599

7. MVP Hypothesis

Scope: We realized that customers don't feel safe enough yet in crowded public spaces, particularly for their children. Our product aims at parents of young, energetic, wandering-prone children who want to feel more secure about their family's safety. We hope to learn more about what concerns our customers share and how we can best tailor our product to meet their needs.We see huge potential for our product's implementation into amusement parks, schools, and other locations where location tracking could be supportive.

First MVP Iteration: Our first MVP iteration will include the GPS tracking bracelet in its base form with the foundational features, including the GPS tracking, geofencing, sufficient battery life, and lockable component. We want to ensure that real-time location tracking is shown to the guardian's personal device. They will be able to set geofence boundaries for their child and receive active alerts about their child's activity. Overall, we want to keep the primary features straightforward and relatively simple to optimize our MVP design time and get real feedback from customers to implement better functionality.

Real vs Concierge: For our wearable GPS tracking wristband for kids, testing in a real-world setting would provide valuable feedback needed on whether the technical features of our product are working as expected to provide accuracy, reliability, and durability. This includes the distance between the child's location and the parent's device to access the app, any interference from other devices within the child's area, and the strength of the GPS signal. For real-world testing:

We can gather participants of parents and young children, allow the parents to have access to the app while the child wears the wristband while they are outside of their home. We would test feedback from the participants and collect data from these tests such as the battery life, GPS tracking efficiency, and test metrics such as the design heuristics of the user interface provided in the app.

In addition, we can simulate testing other real-world scenarios in a controlled environment which uses the concierge approach. We can have participants simulate different scenarios of a child being in school, lost in different crowded areas, and whether alerts and geofencing from the device in a controlled environment are working as expected.

The combination of real-world and simulated scenarios will offer us valuable metrics when prototyping this product, with the concierge approach allowing us to test specific features in a controlled and iterative setting, while real-world customers who are actual parents with children can provide feedback on the overall experience of the product given real and unpredictable conditions.

Riskiest Assumptions: We assume that…

- Children will wear the bracelet with no problem
- Parents are concerned about child safety in crowded areas
- Parents are willing to pay for a GPS tracking bracelet to better ensure their child's safety
- User interface with the application should be simple and seamless
- Parents will share their happy product experiences with friends and family
- Viability of features we plan to implement

Data Collection:

We must perform the following actions to validate our assumptions and confirm the viability of our MVP.

- Organize interviews with our users (parents of young children) to discover detailed concerns and how we can best provide for them
- Conduct surveys to expand our reach and gather additional customer data
- Ensure the accuracy and range of our real-time location tracking service
- All of our features must work as intended (ex. geofence + active alerts accurately notify parents on time) → High consequence if product fails
- After MVP has been developed, potentially use crowdfunding resources like KickStarter to get pre-orders and gauge product interest
- Continuous improvement of product through parent use stories and understanding how our customers use the app
- Implement additional features as we learn what is required most in the safety market

Go/No-Go:

During the process of our MVP development, we will be able to get a better picture of whether or not it is worth it to continue to innovate in this space with our GPS tracking bracelet idea. If future data confirms our assumptions and we are able to really find a large customer base willing to pay for our solution, then we must proceed with our developmental process. However, if we see that there are a lot of issues during our growth such as a limited customer base with low interest, or if there is some significant privacy concern that we are unable to resolve, then we may need to reconsider the viability of our MVP.

Product Validation Tests

RIBS

R - Product is relevant since child safety is always a topic of discussion. Parents are willing and committed to ensuring the safety of their children.

I - This product is somewhat inevitable since there is a growing market of competitors. Parents want to also make sure that their child is always safe.

B - This product is not inventing any new technologies; it simply builds upon existing inventions to create an all-around better product.

S - Device is easy to implement, does not require any advanced technologies, and will easily pair with the parent's device. The child simply needs to wear the bracelet, which stays secured.

SIMPLE

S: wearable device is seamless, with a small wearable design that is unobtrusive to the child.
I: Mechanism/software that handles GPS will improve over time based on RESTful principles
M: Test kids who go to school or anywhere outside of their home, see if GPS can track outside of where children are usually supposed to be
P: Parents can know where their children are at all times, worry less about that, and include more features for added safety and security.
L: Wearable devices integrated easily into a child's life through wearable jewelry or a bracelet that they can wear anytime they go out, and can take off once they get home from school or not.
E: If a child gets lost but found easily through the wearable device, other parents would want to use the item for their kids.

RAT

Realizable: with current technology we can definitely develop a wearable gps tracking device
Attractive: very appealing to parents and caregivers who want to keep track of their child
Testable: can be tested by wearing the device and ask lab partner to track your movement and see if it will alert when the geolocation is moved

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8. Our Team

Shasta Subramanian (A16245048), Priya Senthilkumar (A17142735), Sarkis Bouzikian (A17125564)

Priya: Computer Science student from San Jose, California, who is eager to apply the knowledge I have learned in my course work so far into a physical product. I have learned about full stack development more in depth since taking ECE 140A, and will use my prior knowledge in web development to ensure that the software behind our app will produce an easy to use, aesthetic, and learnable user interface for users of SOH. Having a nephew myself, this aids in the overall theme of our product, centered around young childrens' safety.

Shasta: Computer Engineering student from San Ramon, California, eager to develop my knowledge and skill sets at the intersection of engineering and business. Through my professional work, research, and institutional experiences, I am able to apply my proficiencies into creating such an important technological product. I can utilize my expertise in both hardware and software systems to help support the team in any area. My passion for business and concurrent work in an entrepreneurship class has helped me understand how to advance an idea through concept and development to surpass our stakeholders' expectations.

Sarkis: Computer Engineering student from Fresno, California, with a background as a biomedical equipment technician, 3D design artist, and low voltage technician, and CEO of Solar Cleaning Specialist, I have worked in various fields and developed life skills in marketing and design, with great customer service and 100% satisfaction, and have worked on numerous projects combining art with electronics, such as building mechanical electrical costumes for weddings and events performances (you can look up my work in the ARTS OF MELON company based in Lebanon). On the note since childhood I was always encouraged and trained to build and solve problems on a daily basis.

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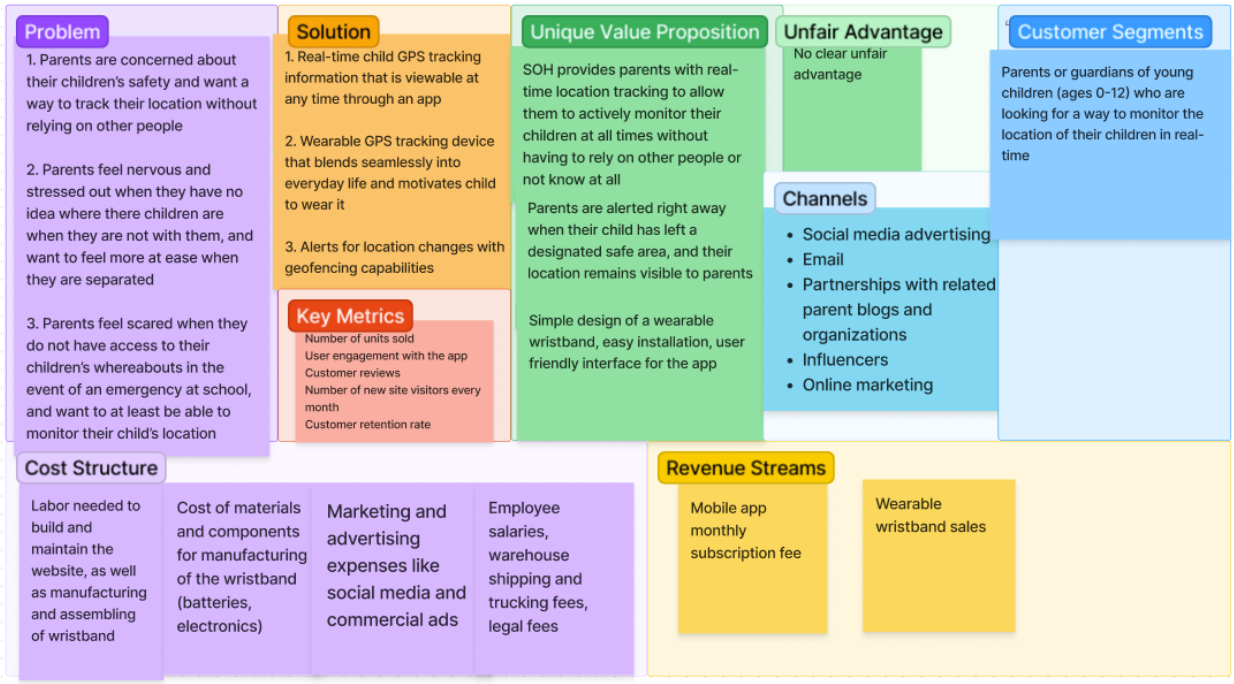
9. Lean-Canvas Sheet



Included in this diagram: The problems present the target audience experience and the respective solutions, as well as key metrics, unique value proposition of SOH, channels for how SOH will be reached to customers, customer segments, different variable and fixed cost structure, and revenue streams.

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10. Ethical Sustainability

Our product is sustainable in that it does not create any waste in the world and creates an overall safer environment for the people. At the base level, we will make certain that our manufacturers produce all components of our product in a responsible manner to minimize the impact on the environment. Parents are able to ensure that their children are accounted for and we will help limit the number of children that go missing every year. Regarding the ethics behind our device, we will establish a very secure system to relay private location information to the parents. We understand that privacy is a huge concern for us and our product relies heavily on strong security in our infrastructure. We will be very transparent with our customers on our data usage policies, particularly only collecting and sharing data that is required for the functionality of our solution. Overall, we constantly look for ways to optimize our workflows by reducing waste and our impact on surrounding environments. An important step we will take as a company is implementing an enforceable standard of behavior to ensure our product is used and developed ethically. Following any legal regulations around data security and customer privacy is crucial for us and we want to maintain the highest level of security within our frameworks. We strive to build trust with our valuable customers in our mission to provide safety.

<u>Actions We Will Take to Stay Ethically Sustainable</u>

- Think deeply in our selection of manufacturers based on their subsequent impacts on the environment and surrounding communities
- Consider the societal consequences of implementing our product publicly
- Create a basic, enforceable standard of behavior that our company follows diligently
- Always stay responsible for our work and apply moral engineering practices
- Act in the public interest → We Sell Safety and Security
- Never release products that are not ready to be publicly used

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Video Presentation

Link: https://youtu.be/dHrfqkqSFZ8

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