Searchable Home



Make Your Home Smarter

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Problem

How many of you have found yourself in this situation? You're on your way out the door with the kids, on time for once, until suddenly you hear the dreaded words "Daddy, I can't find my phone". You look all over and after searching through the entire house, you find the phone is already in their backpack, but by then, you're already behind schedule. You drop off the kids at school 10 minutes late, and then you rush off to work. If you're lucky, no one notices you coming in a little later than usual, or if your luck is running low on this particular day, you get berated for being late to a very important meeting.



According to a survey conducted in 2017 by Pixie, a GPS based object tracking app, on "lost and found" things, misplacing items is a commonplace occurrence. Americans lose 2.5 days per year on average searching for misplaced or lost items and collectively spend a whopping \$2.7B replacing items, many of which are later found. The most commonly misplaced item is the TV remote control followed by cell phones, keys, glasses, shoes, and wallets or purses.



Nearly a quarter of Americans lose their keys twice a week and over half stated that hunting for misplaced items causes them to be late to school or work. About a third argue with a family member when items aren't where they are supposed to be and even more cast blame. Whether you suffer from short term memory loss or are just prone to losing things, it can be a very frustrating experience to look for items you've misplaced. For many, eliminating the sheer frustration or aggravation experienced would be priceless



Solution

Searchable Home leverages the quickly evolving field of computer vision to identify and track the location of all the objects within a home. The product uses cameras positioned around the home to identify objects within, then track their movement from room to room. The cameras stream the images to a central hub within the home. The hub is responsible for detecting objects within the image,



combining it with the camera location, and previous known location of the object to track its movement. The central hub stores every object it's able to identify and its last known location. The central hub stores everything locally and no images leave the central hub, unless the user chooses to share them.



The product comes with an app for locating all the objects within the home. The provides a standard search interface for your items. It can provide the location and the last time an object was seen within the home. The app can thus tell you if an item is still within the home or taken out of the home. The app can also recommend alternatives for what you're looking for based on your intent. If you're looking for an umbrella, it may recommend raincoat as it perceives your intent is staying dry from the rain. Knowing the location of items within the home, it can also guide you directly to them. You can check everything you have in the home from wherever you may be like your office, car, or store.

The cameras can be configured to track items within the entire home, or only in certain areas. An item may go from the living room, to the hallway, and finally to the bathroom. If you have cameras setup in the first two rooms, but not in the last, the product will know that an object has entered the bathroom, It will not however know any additional information until the object leaves the bathroom.



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Technical Solution



Searchable Home technology has three major layers in how the solution is implemented. **Home Intelligence Layer**, **Cloud Intelligence Layer** and **Smart Access Layer**.

Home Intelligence Layer

This layer consists of an array of cameras optimized for **Searchable Home**. This layer also consists of a *Base Station*. The *Base Station* is a powerful device capable of exercising trillions of operations per second. This component is responsible for processing camera images and running state of the art artificial intelligence(AI)/deep neural network(DNN) algorithms for object detection and tracking, on consumer premises. The images never leave the consumer's home unless you want them to. The *Base Station* is also responsible for communicating with our Cloud Intelligence Layer.

Cloud Intelligence Layer

This is a layer which makes sure that consumer devices stay smart and up to date. This layer has many responsibilities but the primary ones are to enable remote access to **Searchable** *Home* via mobile apps, over-the-air updates to your Base Station so Searchable Home benefits

from the latest technological advances and also this layer provides optional data backup solutions which may be very useful in some situations.

Smart Access Layer

This layer enables the consumers to access *Searchable Home* capabilities through an iOS App, Android App or a Searchable Home Website.

Roadmap

Searchable Home's mission is **to make your home truly smart**. With that mission in mind and given the current state of capabilities and our go to market strategy, we have broadly divided the roadmap into three distinct phases.

Inception Phase

In the phase, **Searchable Home**, will focus on detecting and tracking a set of most commonly lost items such as remote controls, keys, scissors, cellphones, wallets, reading glasses etc. During this phase, ongoing focus will be on adding more items to detection algorithms and refining object detection capabilities.

In addition, we will let consumers teach *Searchable Home*, object detection through transfer learning techniques used in AI Neural Networks. This will work via simple show and tell features on our apps. In the future, this data could be leveraged to make *Searchable Home* smarter in both its abilities to detect more objects as well as covering edge cases.

Services Phase

The focus of this phase is to explore other areas and services which are possible now based on the fundamental platform that we would build in the Inception Phase. Here are some of the service areas we think are possible in this phase.

Insurance Claims Assistance Service

About **\$2,000,000,000 (2 billion) USD** worth of home insurance claims are rejected due to lack of sufficient proof. *Searchable Home* can help customers with this problem. It can detect high value objects and automagically build the inventory with a few photographic evidences and maintain it for use in home insurance claim situations. At customer's instructions we would also offer to safekeep this data in the clouds completely encrypted and protected with 2 factor authentication. This might be useful, if the home database is not accessible due to damage or theft.

Replenishment Service

During the shopping experience **Searchable Home** could assist the users; as **Searchable Home** would keep track of the common supplies that are running low. We could also integrate with programmatic shopping websites and provide in-app purchase experience.

Home Safety Services

We could also offer other home safety features, such as calling emergency services on detecting falls, spotting water spills of floors which could be hazardous as well as costly as it can cause water damage, and yet other home safety features such as detecting and alerting that deadbolt is unlocked when its goodnight time.

Platformization Phase

The first two phases of *Searchable Home* are about building business and delivering value to customers. This phase of *Searchable Home* is about the **BIG PICTURE**.

Once we have delivered Services Phase, we would have built a solid foundation.

- 1. **Searchable Home** would have gained significant experience with home object detection, where we ourselves are very good at it and also thousands of customers teach our AI to identify new objects or teach us to identify them in edge case situations.
- 2. Searchable Home would have built foundational platforms

3. **Searchable Home** would have significant research and development capabilities. Essentially, we have a *Tesla Autonomous Car* like situation. The virtuous loop ongoing; customers are helping build our AI and AI delivering more value to the customers.

This will enable us to do a home automation platform which works the way "Humans" approach it. For example, *Searchable Home* can see 10 mins remaining for the dryer to finish. It is not dependent on whether the dryer is smart or what protocols it speaks. This is different from the way clunky Home Automation works today, which are not standardized, to many apps and access points... It is a broken mess.

We would open the **Searchable Home** platform open for innovation, where innovative developers could build smart IFTTT applications based on our platform. This is the app store play for home.

Freedom from buying million smart devices with fragmentation all around. Make your existing home truly smart.

Validation

The data backs up that a healthy market exists for our product. A survey was performed to

evaluate key approaches of the solution including the extensive use of cameras within the home. The survey showed that 70% of users like the idea of knowing where all the items within their home were located, and would be interested in such a product. Of those users, 73% were comfortable with some sort of cameras being in the home to identify and track the items. A majority preferred the images stayed local, but a full 29% of those users were comfortable with the images being shared to help improve the product.





70%



73%

Product Landscape

Searchable Home is a unique entry creating its own market. While there are no direct competitors there are several product areas providing a subset of features.



Inventory Apps

The inventory apps space provides some of the interface elements of Searchable Home. They provide a way to manually input all the items in your home, which can then be searched. A location can be input into the app and some provide QR code scanners to make the manual entry of the items more automated. However, both the entry, tracking, and update of items is fully manual. The search interfaces are not advanced

enough to provide alternative items. Overall, the inventory apps are advanced spreadsheets.

Smart Home Devices

The smart home space provides many single purpose devices. They may help with tasks like locking or unlocking a door with Lockly; knowing who is standing in front of your door with Ring; or adjusting your thermometer with Nest. These are all app integrated devices that can help users with mundane tasks. However, an additional one is needed for every task and many need to be purchased to equip the whole home.



Item Trackers



Per item trackers can locate single items within a range of an individual. Using bluetooth or GPS devices attached to items, they can be found via an app. Tile and Pixie are two players in the space leveraging this technology. They don't allow knowledge of an item if you're away from your home, and only one person at a time connected to the tracker can know its location. They also are bulky and work only for items they can be attached to. A new tracker needs to be purchased for each item and a battery replaced at least every year per tracker.

Cashierless Stores

The closest to what Searchable Home is offering comes from the commercial space in the form of cashierless stores like those widely offered by Amazon Go and under development by companies such as Walmart for their Sam's Club stores. They are designed to follow many users at one time with a preset number of items that are in the inventory of the store. It's important for them to associate items with people to make sure the correct person is charged upon leaving the store. They also leverage scales on shelves to know the weight of items and if they have been removed or replaced.



Market Size

Our product is creating a new market and in the long run tap into different markets. So we defined our TAM by value theory. Our survey shows that 30% of people were ready to pay over 500\$ for our product with 57% ready to pay a 10\$/month subscription for value added services we estimate our TAM for 120 Million US Households as-

• 120 Million x 30% x (500\$ + 57% x 10\$ x12) = 21 Billion USD

We expect to tap into different existing markets which are backed by additional Market research-

- Online market research by pixie in 2017 shows that Americans on an average spend 2.5 Days a year searching for lost items which is equivalent to 60 Billion \$ of time wasted for americans based on the average income of 56,000\$ per year. Additionally on an average people spend 2.7 Billion \$ every year replacing lost/misplaced items.
- 85% of Households in the USA have home insurance with the average house insurance premium hovering around 1100\$/year. This makes the total house insurance market size of 112 Billion \$. Major coverage in house insurance claims is for personal property loss which cannot be claimed without evidence. We plan to roll out a value added service in the future using which our product can help homeowners claim personal property loss.



Pricing

Revenue will be generated through selling the product to consumers, then offering optional subscription services that can be purchased later.

Standard Home	
4 Rooms	\$599
Each Additional Room (Up to 8 Total Rooms)	\$100

The Standard Home product will come on to the market starting with a price of \$599 for a four room configuration. An additional room can be added for \$100, up to 8 rooms. Thus the Standard Home setup can sell for up to \$999 for a full eight room setup.

For those with larger homes, or the desire to track every room within a home, a Large Home product will start \$1099 for a 10 room configuration. An additional room can be added for \$125, up to 20 rooms. Thus a Large Home setup can sell for up to \$2349.

Large Home	
10 Rooms	\$1099
Each Additional Room (Up to 20 Total Rooms)	\$125

Services	Monthly Cost
Home Insurance	\$10
Cloud Backup	\$5
Replenishments	\$5
Home Safety	\$10
Bundle	\$25

While the product itself will sell for a profit, the real margins will come from the ecosystem of services offered as subscription add ons. We'll offer individual services such as Home Insurance integration and tracking, cloud backup, replenishments, and general home safety. For those interested in many services, we'll even provide a bundle option for a flat fee of \$25 to have access to all existing and future services offered.

Product Timeline

Our plan is to build a prototype of a working model in the first 6 months, then complete building of Minimum Viable Product (MVP) by the end of first year.

In the second year our focus would be on building an ecosystem by establishing partnerships with manufacturing, supply chain companies of parts, and white glove service for installation of the product. We would also complete Fulfillment by Amazon (FBA) so that we are ready to sell the product through Amazon.



Targeted audience for our product is Millenial and Gen X. We plan to showcase and demo the product in Trade shows, Tech conferences related to AI, Vision, Big data as people familiar with these technologies would be interested to try their hands on this product.

We plan to work with social media influencers(on FaceBook, Instagram, Youtube) and tech reviewers to get our product reviews as Gen X customers often make their decisions based on these reviews. We would advertise the product online through Youtube and Facebook to reach targeted audiences. We'll also explore opportunities for product placement in shows or movies where key characters would use this product to search for an important object of the story line.

Along with selling the product online through Amazon, we would also consider selling the product through stores like Best Buy, Costco, Home Depot, Lowes where the product can be demonstrated and installation service can be offered through white glove service. We would look for partnerships with other smart home devices like ADT or SimpliSafe for cross promotion. We would also explore opportunities to work with home builders, realtors, and

apartment complex developers to have the system pre-installed in new homes. This would allow us to get into B2B space.

Financials

We are providing a 5 year outlook of our business after our product launch. We target to sell 50,000 units in year 1 which is roughly 4150 units per month which is 0.15% of our TAM . GM is about 29% on each unit we sell and includes a modest 10\$/month subscription revenue due to the value added services which we plan to roll out by year 2. We expect to scale our revenues by 250% in the 2nd and 3rd year by spending aggressively on Marketing and R&D.(25% of our revenues) We expect to add on more employees in this time frame and grow to about 100 total employees by year 4. We expect to control our OPEX to around 25% from year 4 onwards when our product has good market penetration leading to larger sales volume. We expect to turn a positive operating income by year 4 and reach total revenue close to 0.8 Billion \$ by year 5 with a +5% operating income.

Operating Expenses

- Fulfillment By Amazon: FBA online Calculator estimates 50\$/Unit
- Marketing expense ~20% first 2 years to penetrate market
- R&D expense at 5% first 2 years to deploy new services
 - Employee headcount to increase with Revenue growth





Cost of Goods Sold

BOM is 425\$ and including manufacturing, Assembly & Packaging cost of 50\$ we estimate total COGS as 425\$+50\$=475\$ which with a 599\$ unit cost and 10\$ monthly subscription represents a 29% GM.





		MILLIONS \$					
Year	# Unit Sales (Millions)	Revenue	COGS	GM	OPEX	Operating Income	Operating Income %
1	0.05	\$33.45	\$23.75	29%	\$ 17.19	\$ (7.49)	-22%
2	0.12	\$80.28	\$57.00	29%	\$ 38.06	\$ (14.78)	-18%
3	0.30	\$200.70	\$142.50	29%	\$ 62.50	\$ (4.30)	-2%
4	0.60	\$401.40	\$285.00	29%	\$ 106.00	\$ 10.40	3%
5	1.20	\$802.80	\$570.00	29%	\$ 192.00	\$ 40.80	5%

Funding Request

We seek \$500K funding to cover R&D costs to develop the prototype in the first year. Funding will be used to reach the next milestone which is MVP. We expect to raise another \$4 million to reach our product launch milestone.

Questions from the Presentation

Most smart home devices cost under \$300, would people really pay a starting price of almost double that for your product?

While it is true that individual smart home devices are priced below our entry point, smart home device shoppers overall spend much more for smart home devices. On average a household that has a smart home device actually has six such devices^[1], which means they're comfortable spending well over \$1000 to improve their home. We would be offering a much more comprehensive service than a single task device such as Ring doorbell. With services and the platformization that our product offers, the price point is reasonable relative to the market. ^[1]<u>https://www.investors.com/news/technology/click/home-automation-companies-face-challenge -selling-smart-home-devices/</u>

Why now or Tech feasibility?

Advances in Image Recognition

- Computer Vision, in general sense, is clearly far from being a solved problem.
- That being said the technology has gotten fairly good. Both in terms of
 - detecting a finite set of objects.
 - at performance range which makes this use case viable

Example (see besides for an Image that we processed with $\underline{\text{Yolo V3}}$)

Compute Advancement

- Viable compute if available
- For example SoC Nvidia Jetson Xavier NX offers 21 TOPS (INT8) @ \$399
- Price for performance expected to get better in coming years looking at pace of development.



Can you really detect Scissors? What about in low light situations which are typical at home.

We think it's a very good question.

Before we answer it we have included a similar image to one shown above but this time the image was shot at night with no direct light with ambient light from other rooms flowing and from ceiling height as earlier. Detector is still able to detect scissors on the table The reality is, it is a complex problem. It has many layers/factors and a fine balancing act.

- the resolution of the image?
- the image size fed to algo;
- how many splits were fed into algo?
- background elimination to improve focus
- additional night lighting (ir), this we had factored for low light in our cost model.

 specialized Small Object Algos (Feature Pyramid Networks)

Based on our analysis, research and preliminary testing, we think that we can balance various factors for the technology to be effectively utilized; this will only get better with time.



How did you arrive at a market size of \$21 Billion given that people spend only \$2.7 Billion replacing lost items?

Please refer to market size section for details on how we estimated market size based on value theory and using our survey results