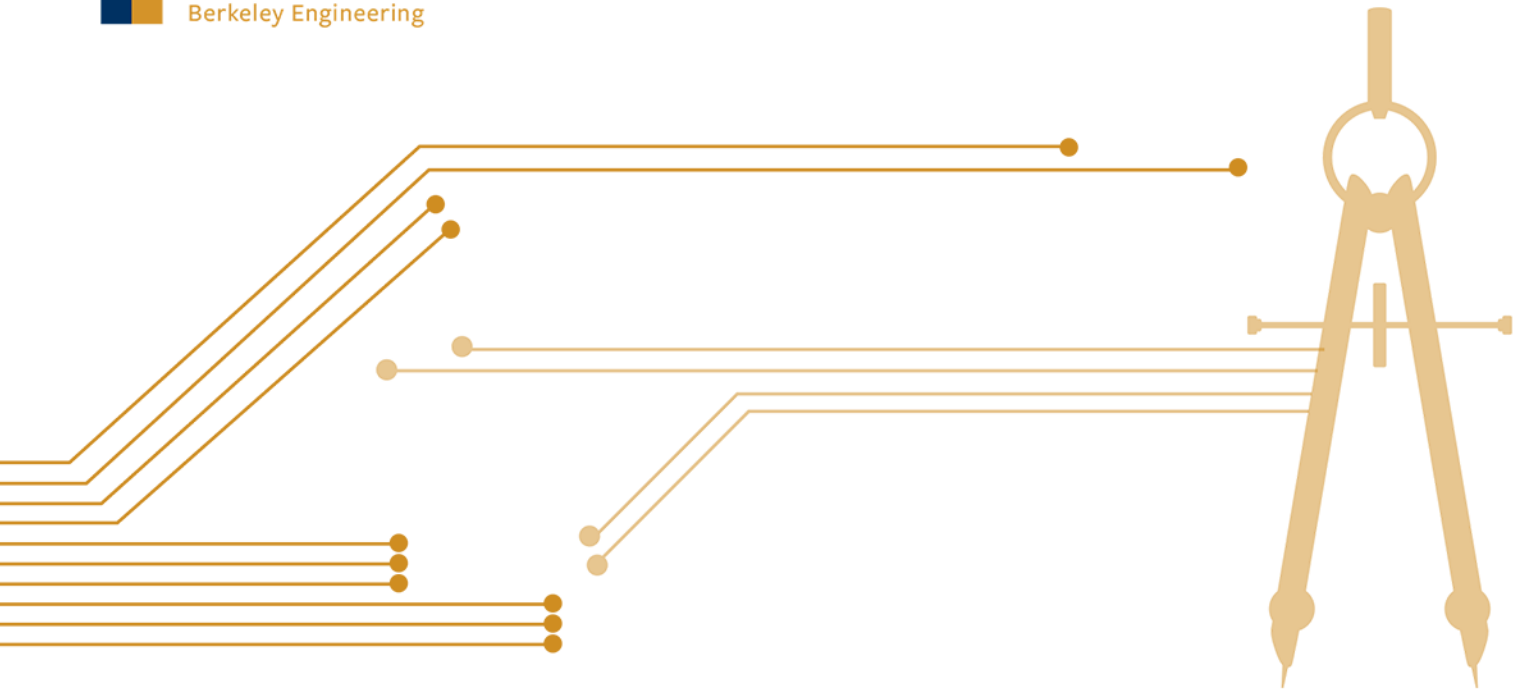




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Berkeley Engineering



Porch Pirate

Fighting Crime One Porch at A Time!

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Overview

When a crime story appears on television or online, we often see a public plea for help identifying the perpetrators. The provided security camera recordings are often of such poor quality that it becomes difficult to take any meaningful action.



In some cases, the recording only provides a partial picture of the crime. While it is possible that other useful information was captured on another camera in the neighborhood, that information may be difficult to access and correlate with the crime. Porch Pirate aims to address these challenges through an innovative combination of hardware and software.

Need

As a result of the COVID-19 pandemic there was an increased demand for no-contact shopping. This in turn, led to a surge in home deliveries and a corresponding increase in package thefts. According to one survey, home deliveries in the United States increased by nearly 40% after one year into the pandemic and 18% of Americans were targeted by thieves during this same time period.[1] Many of these crimes remain unsolved despite the fact that they were captured on home security cameras. Poor image quality is one of the factors preventing crimes from being solved when recordings exist.

The poor-quality images we see online or on television are often the result of an attempt to enlarge an image taken from a security camera that was too far away from the subject.



Camera too far away



Despite the fact that a license plate is one of the most useful pieces of identifying information, it can be challenging to capture in poor lighting especially if the car is moving.



Sometimes this missing link to solving the crime is hidden on a neighbor's camera but the crime victim was unaware the evidence existed.



Approach

Existing security cameras on the market are generally optimized for a specific scene type. For example, a wide-angle security camera covers a wide area but the subjects will appear far away. If the images are later enlarged for a closer look, they will appear grainy. A telephoto camera captures close up images but suffers from the tunnel vision effect where very little area is covered. License plate capture cameras are optimized for recording license plates by using high shutter speeds but will result in very dark images at night.

The Multi-Sensor Difference

Typical non-optimized night results



Tuned for license plate capture



One device, three perspectives

Wide angle for more context



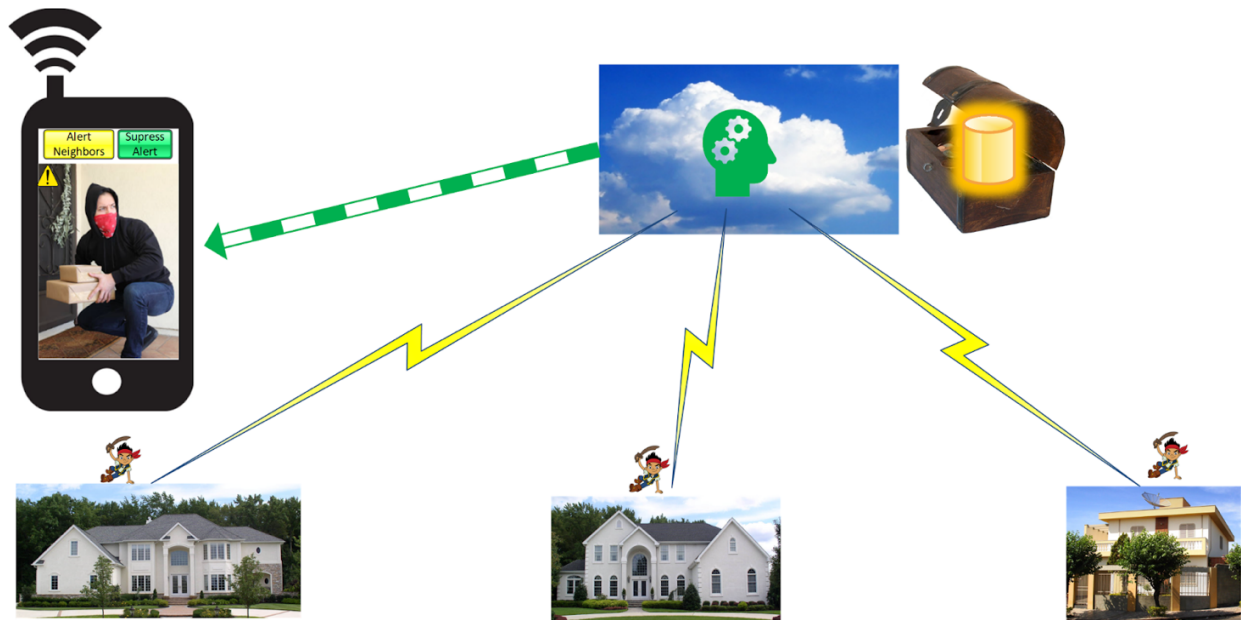
Telephoto for close up detail



Historically, image quality challenges like these were addressed in the professional SLR camera space by leveraging different interchangeable lenses for each scene type. In modern flagship smartphones a similar effect is achieved by having multiple cameras with different lens types incorporated into a single smartphone.

At Porch Pirate, we are on a mission to help solve crimes by maximizing the amount of useful data captured through our security cameras. We feel home owners should not have to choose between wide angle, telephoto or license plate capture optimizations. As a result, our Porch Pirate 3000 camera features 3 independently tuned image sensors paired with 3 separate lenses in a single device. This is similar to the multi-camera set up in a modern smartphone, except we also record 3 independent video streams in parallel. To achieve a similar result with traditional security cameras, 3 separate security cameras would be required.

Connected Neighborhood



To further enhance our solution, we also envision a connected neighborhood where high quality recordings from homes in the neighborhood are sent to the cloud for AI processing. This would enable a number of outcomes that are difficult to achieve with standalone systems. As an example, if a neighbor's camera down the street captures the license plate of the parked getaway car while a camera on another home captures the active crime happening nearby, the AI processing could correlate the two independent recordings to provide more complete evidence to help solve the crime. In another example, homeowners could use their smartphone app to quickly alert nearby neighbors and share images of a crime in progress. The telemetry data could also be valuable in the B2B space.

Market Size

The consumer security camera market is huge and continuing to grow at a rapid pace. According to analysts, the market size in 2020 was \$5.9B globally and is expected to increase threefold in the next 10 years to \$18.3B.[2] The US will make up two-fifths of this global growth.

Opportunity

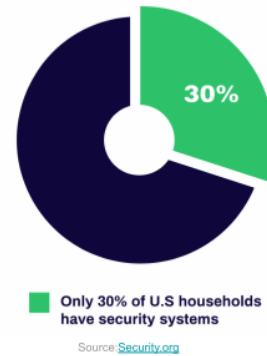


Growth Drivers:

Increasing consumer awareness of security needs.

Growing adoption of smart homes.

Prevalence of property crime.





This growth is driven, in part, by the fact that consumers are increasingly aware of their security needs. According to the FBI, property crimes such as package theft, vandalism and burglaries make up 83% of all crimes in the US.[3] In addition, consumers are rapidly adopting smart home technologies such as Alexa, Google Home and Apple HomeKit. These technologies provide new opportunities for innovative security solutions.

While there are many security cameras already on the market, Security.org reports that 70% of US households do not currently have a security solution installed.[4] This means that approximately 90 million US households are still potential customers.[5]

Competition

For many years, home security companies such as ADT or Brinks were the only way for homeowners to secure their property. In the last decade, new competitors have emerged such as Ring, Nest and Arlo. These products are popular with consumers because of the low barrier to entry and flexibility. They are also relatively inexpensive and do not require professional installation. In addition, many of these products are produced by well-known companies such as Amazon and Google.

Competition

Home Security Products	Multi-Lens Security Cameras
	
<ul style="list-style-type: none">✓ Low cost and easy installation.✓ Established products w/ large market share.✗ Poor image quality.✗ No neighborhood connectivity.	<ul style="list-style-type: none">✓ Great image quality.✗ Expensive and may require professional installation✗ Targeted toward commercial use.

While these “DIY” security products have a lot to offer, they also have some downsides. The camera images are typically low quality and offer a limited field of vision. In addition, none of these products have embraced the full capabilities of AI. While Google Nest does leverage AI it does so only to support the “familiar faces” feature. Finally, none of these solutions are able to share information across households to provide the robust crowdsourced security ecosystem that Porch Pirate aims to provide.

Porch Pirate also faces competition from existing multi-lens security cameras from companies such as Vivotek. While these cameras offer fantastic image fidelity and field of vision, they are typically aimed at commercial use and may require professional installation. This type of equipment is also expensive, for example the Vivotek MS8392-EV (pictured above) costs over \$1K.

While not a competitor exactly, one potential headwind for Porch Pirate is privacy. Porch Pirate relies on collecting and aggregating video feeds across multiple households which some consumers may feel is a breach of privacy. We believe that the type of information we collect as well as the way in which we use it is consistent with other products that consumers have already embraced such as Google Street View and existing home security products.

Business Model

Porch Pirate will use a monthly subscription model to generate a steady revenue stream. We will offer customers two different subscription plans. The first plan will provide the camera for free

but will require a one year minimum commitment in addition to the monthly subscription fee. The one year contract is necessary in order to recoup hardware costs. The second plan will allow the customer to buy the hardware upfront in exchange for a lower monthly fee and no contract.

Business Model

Monthly Subscription

Option 1: Free hardware + monthly subscription. One year minimum commitment.

Option 2: Purchase hardware + lower monthly subscription.

Pilot (2022)

Limited B2C rollout in select areas for product validation.

B2C (2023)

Available nationally and advertised widely.

B2B (2025)

Develop partnerships to boost distribution.



Currently we are running a pilot program in select areas using a direct to consumer model to validate the product. Customers who participate in the pilot program are provided with loaned hardware and free service.

In 2023, we are planning to make the product available direct-to-consumer nationally and plan to gain traction through strategic advertising and word of mouth. (See “Go To Market” for additional details).

During this time, we will also begin developing partnerships with other businesses such as home security companies and real estate developers as a way to substantially boost product distribution and adoption. Partnering with real estate developers should prove to be especially lucrative as the monthly subscription can be transparently bundled into HOA fees and hardware can be installed when new developments are constructed. The goal is to land a B2B partnership no later than 2025.

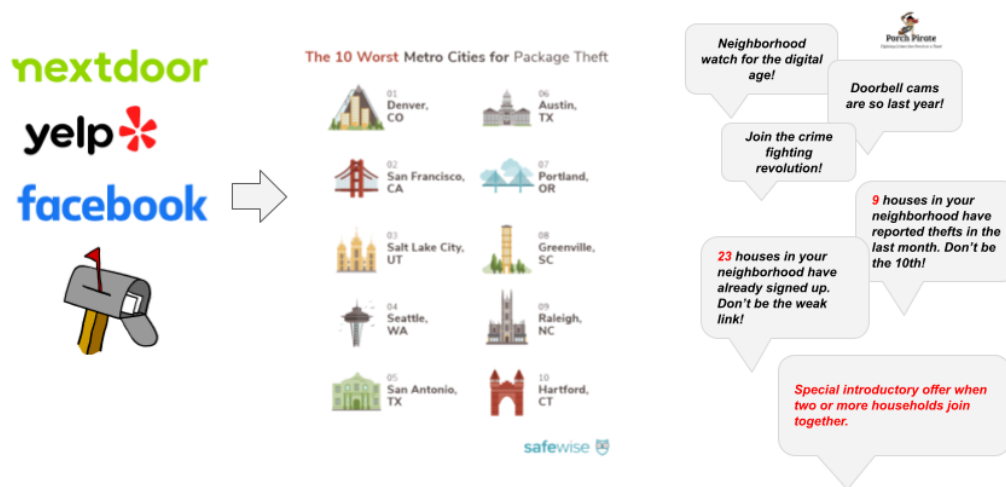
Go To Market Strategy

Following the conclusion of our limited pilot, we will begin marketing nationally directly to consumers. We will advertise on social media platforms such as Nextdoor and Facebook where people go for local information and services and where we can precisely target customers in high

crime areas. Nextdoor will be an especially important platform as one out of every three households are on it and crime is a frequent discussion topic.

We will emphasize that Porch Pirate is technologically superior to basic doorbell cameras and use messaging that targets consumers who consider themselves to be “savvy”. We will also cite hyper-local crime statistics and offer incentives for multiple households in a neighborhood to join together.

Initial Go To Market



Financial Projections

Porch Pirate product is a combination of hardware and software services. For every subscription, two multi-lens cameras are included along with a monthly subscription fee. Additional cameras can be purchased separately. Strategy is to start with a pilot program with the goal of choosing and attracting the first few customers, let them try the product, build confidence and get valuable customer testimonials. Based on our go-to-market strategy we're making our product available to a chosen community/location. Pilot customers are provided with a free monthly subscription for one year.

Once the pilot program is complete, revenue generation is based on a monthly subscription of \$49.99 per subscription. Go-to-market strategy at this point is primarily B2C and we expect to grow to 18,000 customers by the end of 2024. As we build partnerships with indoor security companies and new home constructors we expect to grow our customer base to 1 million.

Financial Projections - Assumptions

Business Model	Revenue	COGS	Fixed Costs
Target 100 Pilot customers.	\$49.99/Month	\$25/hr for Cloud Resources	Start with 7 employees
Freemium - \$0 Annual subscription.	First Camera Free	Move to Colocation/Private Cloud after reaching 100,000 subscribers	7 → 7 → 10 → 12 → 25
Goal is to get customer testimonials and validation.	\$149.99/Addl. Camera	Inventory pipeline costs for hardware	Includes Engineering, Sales & Marketing
			Avg \$150K/empl
			Business Development costs included

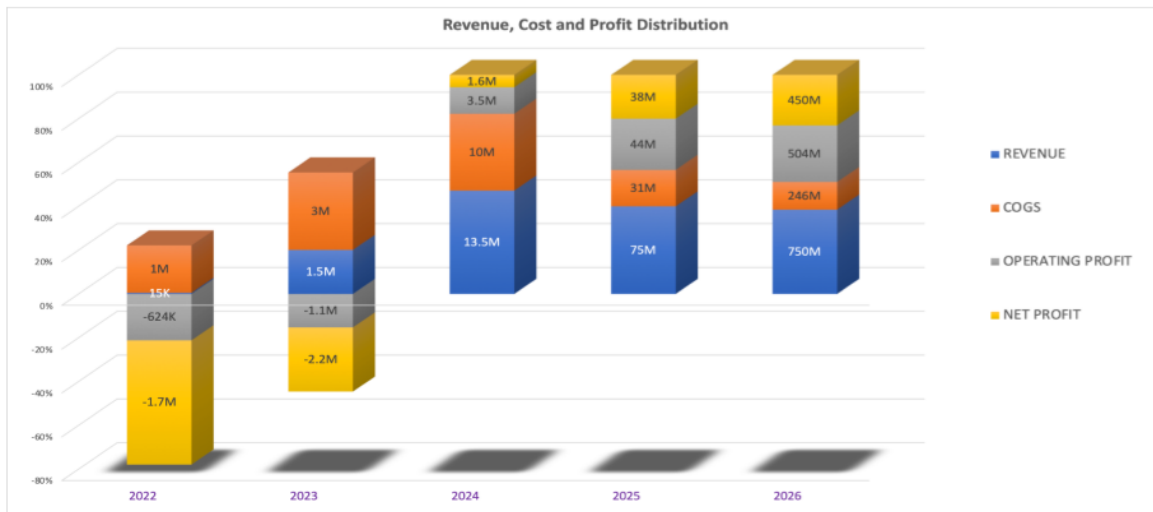
Cost of the goods for Porch Pirate is primarily from camera manufacturing expenses and hardware resources needed to run machine learning software and store customer data. Cost estimate of manufacturing the camera is \$100 per unit. As we need to build the pipeline for the inventory based on our projections for the next few years, the initial hardware cost is going to be higher. As we build the relationship with hardware manufacturers, we expect the annual inventory cost to stabilize by 2024.

Porch Pirate plans to start with cloud resources for running our software services. This model is cost effective especially during the first few years until we gain market traction and increase our customer base. It is estimated to cost \$25/hour for the cloud resource including GPU instances as well as storage resources. As the customer base increases to more than 100,000 customers, the plan is to move to colocation/private cloud environments where cost is expected to scale down with volume.

Fixed costs for Porch Pirate include hiring as well as business development costs. We plan to start with 7 employees and expect to grow to 25 employees by 2026. Hiring will be in sales, marketing and engineering disciplines. We are estimating \$150K per employee. As we start building partnerships with security companies and new home construction businesses, we expect to share a percentage of our operating margins in return to gaining more customer base. We're setting aside 10% of operation profit for this purpose.

Financial projections for the next 5 years, with the plan to become profitable from 2024 is outlined below.

Financial Projections



KEY MILESTONES



	B2C Model (Pilot Program)	B2C		B2C & Partnerships	
FINANCIAL PROJECTIONS	2022	2023	2024	2025	2026
Subscriptions	100	2,000	18,000	100,000	1,000,000
REVENUES	15K	1.5M	13.5M	75M	750M
Subscription/Household (annual)	\$0	\$600	\$600	\$600	\$600
COGS	1M	3M	10M	31M	246M
Material Cost	20K	400K	4M	20M	200M
Cloud Resources (Annual)	219K	438K	4M	9M	44M
Inventory Pipeline Costs	400K	2M	3M	3M	3M
OPERATING PROFIT	-1M	-1M	3M	44M	504M
GROSS MARGIN	-4160%	-76%	26%	58%	67%
FIXED COSTS - Personnel & Business Dev	1.1M	1.1M	1.8M	6.2M	54M
NET PROFIT	-1.7M	-2.2M	1.6M	38M	450M

Porch Pirate Team



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