TRANSPORTATION & LOGISTICS STARTUPS TO WATCH

HOW STARTUPS ARE FACILITATING THE DIGITAL TRANSFORMATIONS OF DELIVERY AND AUTOMOTIVE COMPANIES

August 2018

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BUSINESS INSIDER INTELLIGENCE

KEY POINTS

- **The transportation and logistics industries are on the brink of a massive transformation.** After operating the same way for decades, digital leaps in areas like artificial intelligence (AI) and autonomous technology are poised to transform these industries by cutting costs, optimizing delivery routes, and automating mundane tasks.

- **Startups are the lynchpin of this transformation, pinpointing areas of need that can be tackled by cutting-edge digital solutions.** That's ultimately forcing incumbents to evolve or see their core businesses erode. In this report, we look at how these startups are using new technologies to transform operations in five key areas:

    - **Digital freight startups can help shippers drastically cut down on the time it takes to find carriers.** While legacy companies can take up to two days to even set a price, digital freight players typically offer instantaneous quotes, all through an online or mobile interface.

    - **A crop of warehouse robotics firms are speeding up fulfillment by automating tasks, thereby helping to get packages to consumers faster in the age of two-day shipping.** Their robots scurry around the floors of logistics facilities, snap pictures of inventory, and help transport goods that are eventually loaded onto delivery trucks.

    - **AI is being used by startups to improve supply chain management, enabling companies to determine where to best place their trucks, planes, and other assets.** McKinsey estimates that AI could create as much as $1.3 trillion in economic value in the next 20 years for global supply chains and manufacturing facilities.

    - **Delivery robotics startups are automating the notoriously problematic last mile.** Automating last-mile deliveries through technologies like robotics will provide savings of at least 40% on traditional last-mile delivery methods, assuming courier wages of about $23 per hour, per McKinsey.

    - **And a slew of acquisitions and partnerships have moved the spotlight to startups in the race to put self-driving cars on the road.** The immense cost associated with developing autonomous car technologies is driving legacy automakers to turn to startups that are primarily dedicated to developing the software that gives cars autonomous capabilities.

- **Monitoring these startups offers unique insight into the development of the transportation and logistics industries at large, and how incumbents are adjusting to their new environment.**

Download the charts and associated data in Excel »

INTRODUCTION

The transportation and logistics sectors are on the brink of a massive transformation. After largely operating the same way for decades, digital leaps in areas like AI and autonomous technology are poised to transform these industries by cutting costs, optimizing delivery routes, and automating mundane tasks.

Startups are the lynchpin of this transformation, pinpointing areas of need that can be tackled by cutting-edge digital solutions, including digital freight services, warehouse robotics, AI for supply chain management, delivery robotics, and autonomous driving software. That's ultimately forcing incumbents to evolve or see their core businesses erode. Monitoring these startups thus offers unique insight into the development of the transportation and logistics industries at large, and how incumbents are adjusting to their new environment.

In this report, a compilation of a series of notes, Business Insider Intelligence looks at the top startups disrupting the transportation and logistics industries in five key areas: digital freight services, warehouse robotics, AI for supply chain management, last-mile delivery robotics, and autonomous car software. Startups in this report were selected based on the amount of funding they've received, number of notable investors, the quality and number of their customers, the products or services they offer, and the leadership teams they've assembled.

TOP 5 TRANSPORTATION & LOGISTICS STARTUPS

DIGITAL FREIGHT	WAREHOUSE ROBOTICS	AI FOR SUPPLY CHAIN MANAGEMENT	DELIVERY ROBOTICS	SELF-DRIVING CAR SOFTWARE
Convoy	Bossa Nova Robotics	Transmetrics	Starship	Drive.ai
Flexport	6 River Systems	Shippo	Nuro	Zoox
Full Truck Alliance	Geek+	Clari	Marble	Aurora
Freightos	Locus Robotics	ClearMetal	Robby Technologies	Roadstar.ai
CargoX	GreyOrange Robotics	TradeGecko	Boxbot	Voyage

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DIGITAL FREIGHT: EASING THE SHIPPING BURDEN AMID RISING VOLUME

Freight forwarders organize the movement of goods by finding land-, air-, and sea-based logistics carriers that are willing and able to ship their clients' parcels. These firms sit at the center of the $800 billion global shipping industry, which is set to see volume grow 75% between 2016 and 2026, largely due to explosive growth in e-commerce. That's putting pressure on retailers and shipping companies, which is only compounded by consumers' expectations that their packages arrive in two days or less.

This pressure is leading businesses to turn to digital freight startups, which manage and track all these shipments through an online or mobile interface. While legacy companies can take up to two days to even set a price, digital freight players typically offer instantaneous quotes. Moreover, these upstarts often connect directly to low-power IoT sensors placed on ships and trucks that offer a level of visibility unmatched by incumbents. In addition, the algorithms behind digital freight platforms can synthesize and analyze shipping trends to predict when certain geographies will be particularly busy and adjust shipments accordingly.

TOP 5 DIGITAL FREIGHT STARTUPS

Startup	Total Investment	Notable Investors	Geographies/Markets	Highlights
CONVOY	$80.5 million	• Greylock Partners • Jeff Bezos • Bill Gates	• Semi-truck marketplace exclusively serving North America	• Counts over 300 shipping customers and about 10,000 trucking companies using its app
FLEXPORT	$304 million	• SF Express • Google Ventures • Bloomberg • Founders Fund	• Global digital freight forwarder	• Counts more than 15,000 customers and shipped $3.2 billion worth of goods in the last year
货车帮	<$500 million	• Baidu • Tencent • CapitalG • SoftBank	• App-based freight marketplace exclusively for China	• 5.2 million of China's 7 million trucks offer their services on its platform
FREIGHTOS	$56 million	• GE Ventures	• Global freight marketplace, largest routes are Asia-Pacific to the US	• GE, Sysco Foods, and Hellman Logistics are customers
CX CARGOX	$35 million	• Qualcomm Ventures • Agility Logistics • Goldman Sachs	• Semi-truck marketplace exclusively serving $150 billion Brazilian logistics market	• Routes all of Unilever's domestic shipments in Brazil

Source: News reports, Crunchbase, PwC, company websites

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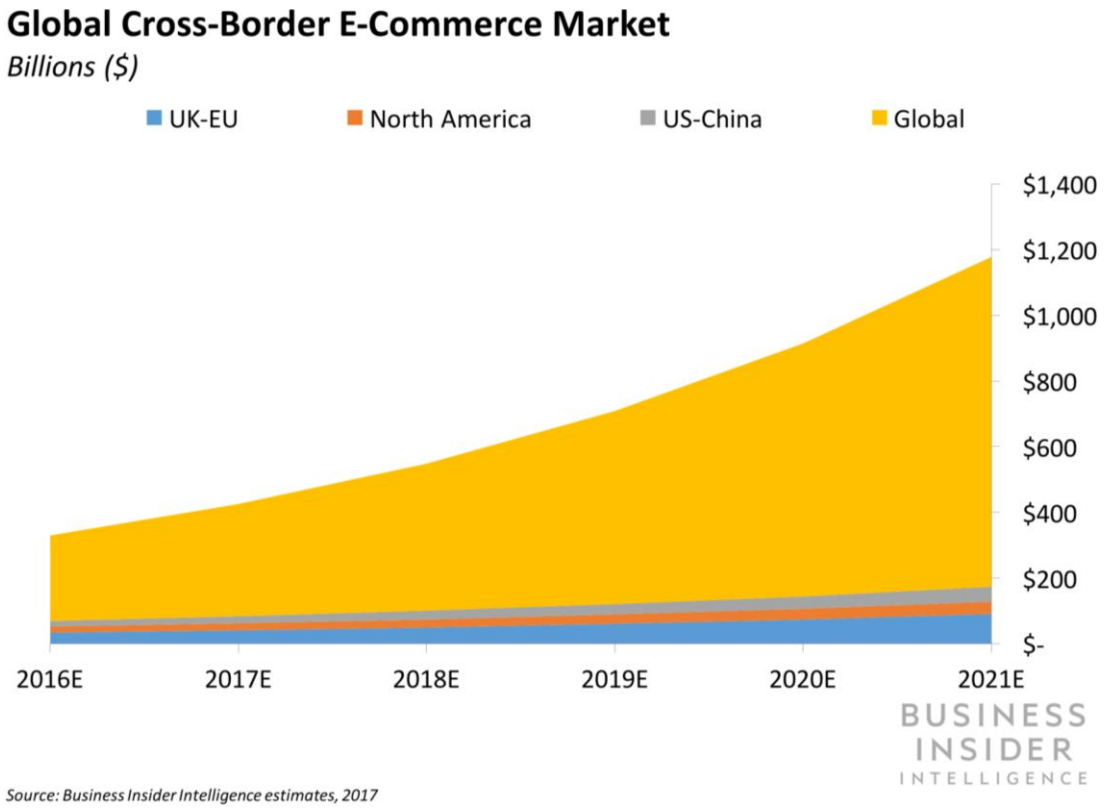
Startup: Convoy

Founded: 2015

Notable investors: Greylock Partners, Jeff Bezos, Bill Gates

Why it's worth watching: Convoy operates a mobile app that connects companies shipping goods with available truckers. The company's ability to constantly introduce new, unique features to its app — it deployed a pair of features back in May to cater to truck owner-operators and small fleet operators — could be why the firm has attracted some impressive funders, board members, and customers. Last November, Convoy signed a multiyear agreement with beverage giant Anheuser-Busch, which shipped a whopping 613 million hectoliters (about 61 billion liters) last year to over 100 countries. Meanwhile, it signed a similar agreement with Unilever — the owner of Lipton tea, Ben & Jerry's ice cream, and Hellmann's mayonnaise — back in November 2016. The company told GeekWire earlier this year that it had north of 400 total customers, including an impressive 20 Fortune 500 companies. Convoy also has partnerships in place with Transflo and KeepTruckin, which give truckers on its platform a 20% discount on federally mandated electronic logging devices, and now give truckers up to 45% off Goodyear tires for their vehicles.

What's next: Convoy will continue to hone its efforts and fend off competitors in the US by attracting more drivers and shippers. After that, it will likely expand into Europe and Asia to try and capture a share of the burgeoning cross-border e-commerce market, which Business Insider Intelligence projects will reach $1.18 trillion in 2021.



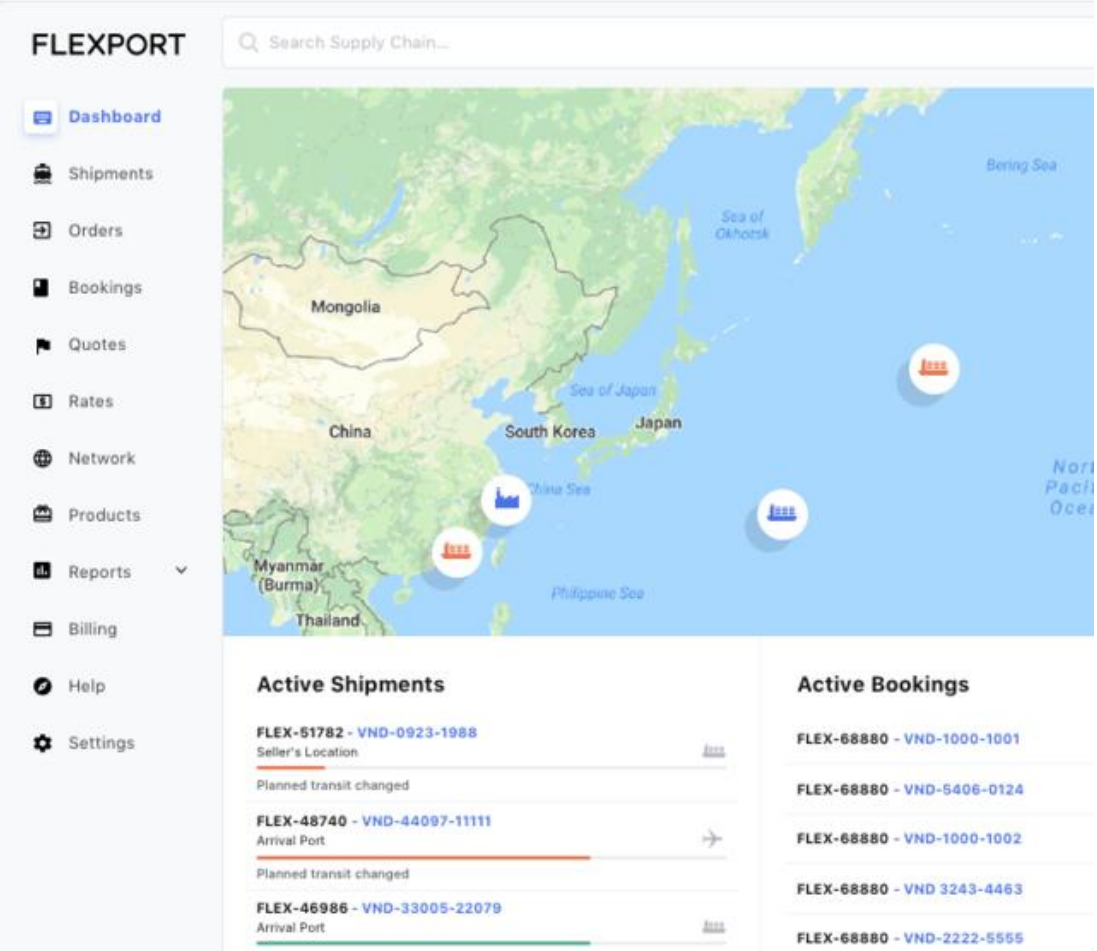
Startup: Flexport

Founded: 2013

Notable investors: SF Express, Google Ventures, Bloomberg, Peter Theil's Founders Fund

Why it's worth watching: Flexport's name has largely become synonymous with disruption in the shipping industry. Whereas other companies that cracked our list offer online or app-based freight marketplaces, Flexport is a full-scale digital freight forwarder that organizes, manages, and tracks customers' freight loads. Flexport captured a crucial early mover advantage in the nascent digital freight space when it launched back in March 2013. But, more importantly, the company has a price advantage — Flexport CEO Ryan Peterson told Forbes in an interview that, on average, the company only takes a 15% cut of what it costs to ship a container, while its competitors typically charge a 25% fee. Its competitive pricing and early mover advantage helped it build out a broader global reach than its digital competition — it operates nine offices across three continents and recently opened new locations in Chicago and Hamburg. Lastly, Flexport operates a handful of warehouses, where it stores customers' goods before they can be grouped with other orders. This helps the company offer lower rates and maximize efficiency by ensuring it only ships full containers.

What's next: The company will continue its international expansion, fortifying existing offices in Shenzhen and Hong Kong while also likely launching new ones throughout the Asia-Pacific Region. This expansion will help it secure a position in a market that includes four of the top five exporting countries in the world. It'll also continue to build out its network of warehouses, helping it maintain a key price advantage as it expands to new geographies.



Startup: Full Truck Alliance (FTA), also known as the Mangbang Group

Founded: 2017 (upon the merger of Huochebang and Yunmanman)

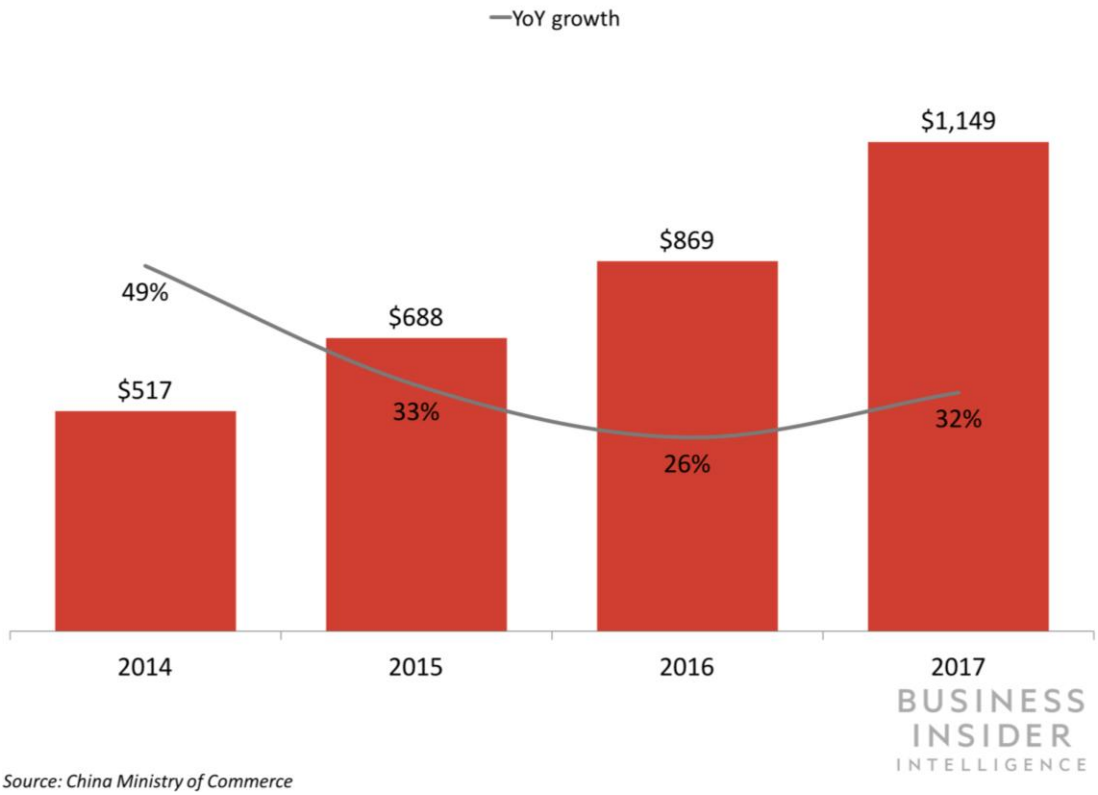
Notable investors: Baidu, Tencent, CapitalG, SoftBank

Why it's worth watching: FTA, which operates an Uber-like app that connects shippers with truck drivers in China, was formed after Huochebang and Yunmanman, the two largest players in the Chinese freight matching space, merged last November. The company's ability to combine the technology and customer data from the two most prominent players in the Chinese digital freight space helped it build a massive reach in its home country — a whopping 5.2 million of the approximately 7 million semi-trucks in China sell their services on the FTA mobile app. In China, logistics spending will grow nearly 7% to reach $43.5 billion in 2018, making the country's logistics market one of the largest in the world. That'll ultimately make FTA one of the most formidable digital freight startups globally, even if it never expands outside of China.

What's next: The company is in the early stages of developing autonomous technologies, and it could introduce a truck with at least semi-autonomous features in the next three to four years. Such a move might allow FTA to gain a crucial price advantage over other freight companies that'll need to buy autonomous trucks or form partnerships to get access to them. It's therefore likely that the company's sky-high valuation — its latest funding round valued it at $6.5 billion, making it the most valuable company to crack our list — will only continue to climb.

China's E-Commerce Sales

Billions ($)



Source: China Ministry of Commerce

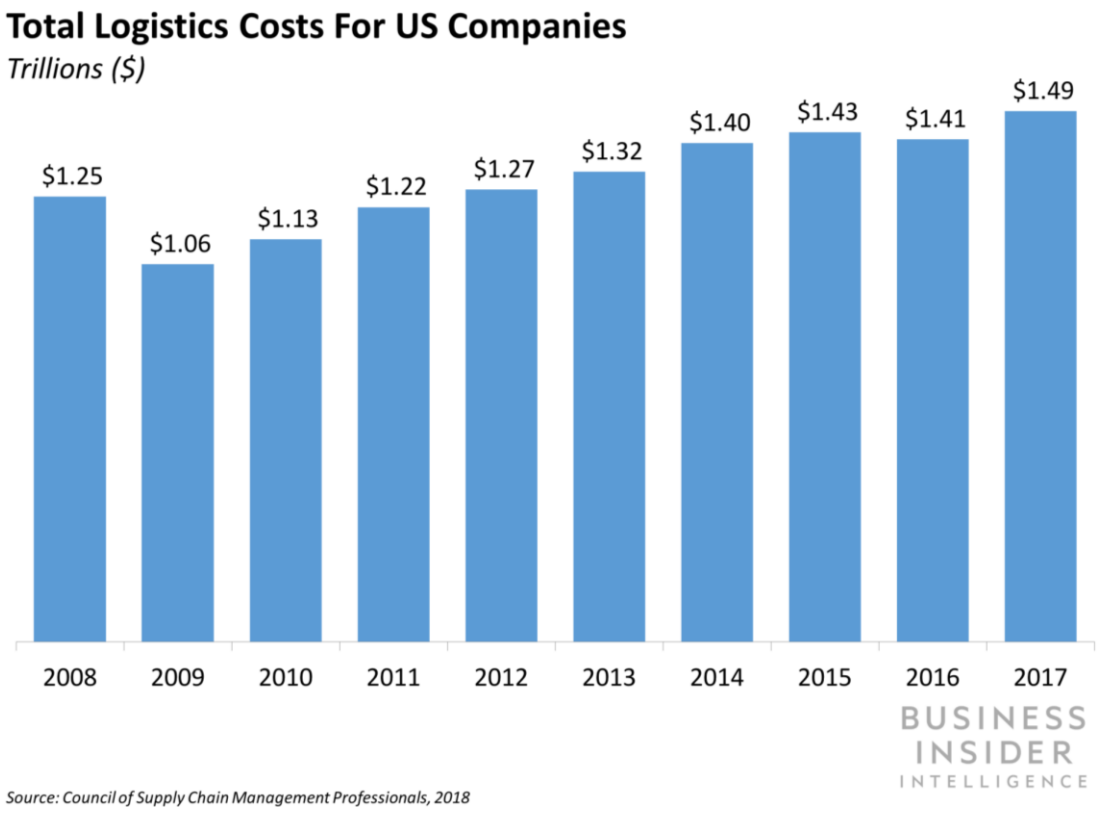
Startup: Freightos

Founded: 2012 (freight marketplace launched in 2016)

Notable investors: GE Ventures

Why it's worth watching: Although Freightos' first product was a Software-as-a-Service (SaaS) solution for supply chain management when it launched back in 2012, it now offers a full-scale online freight marketplace that competes with the other startups that made our list. The marketplace primarily serves companies shipping goods from Asia to North America. Freightos' initial product helped it gain clout in the industry, which enabled it to secure several valuable customers and partners when it launched its freight marketplace two years ago. The company has a partnership with e-commerce fulfillment software company ShipBob to help its customers quickly route their goods, and another with shipping technology giant Pitney Bowes to help it monitor shipments in transit. Meanwhile, it counts both Sysco Foods — which grossed a whopping $55.4 billion in sales last year — and backer GE as customers.

What's next: The Hong Kong-based company has zeroed in on the market for managing shipments traversing the Pacific Ocean from Asia to North America, which includes the five busiest ports in the world by annual volume. However, Freightos will ultimately need to defend against challengers also eyeing this lucrative space. Meanwhile, the company's international ambitions — it only operated in the US, China, and Taiwan as of last fall — will likely grow to include Europe and other lucrative Asian geographies, such as India and Southeast Asia.



Startup: CargoX

Founded: 2013

Notable investors: Qualcomm Ventures, Agility Logistics, Goldman Sachs

Why it's worth watching: CargoX — whose app connects shippers with drivers exclusively in Brazil — was one of the first digital startups to hit the country's massive trucking market, helping it to become one of the top 25 trucking companies in the country. The World Economic Forum estimates that 60% of goods in Brazil are transported via truck, and the country has 2.6 million semi-trucks on its roads, making it the third-largest trucking market globally. CargoX told Forbes in March that it grew its annualized revenue from $115 million to $200 million in the last year. Although this figure is dwarfed by the $26 billion DHL earned globally from freight forwarding last year, it's still impressive for a five-year-old company. This growth has helped it secure the reputation needed for partnerships to explore new, cutting-edge shipping technologies — CargoX partnered with Milsped, one of the largest logistics providers in continental Europe, to trial blockchain to track cargo shipments in transit.

What's next: CargoX has denied any near-term ambitions to expand beyond its home country and says it's relying on the Brazilian market to remain robust for the time being. PagBrazil estimates that the country's e-commerce market is the largest in Latin America and will expand another 12% this year. However, truckers in the country have been on strike since May due to worries about the rising cost of diesel fuel. If the strike lingers much longer, CargoX will need to consider expanding outside Brazil, perhaps to other potentially lucrative Latin America markets like Mexico and Argentina.

WAREHOUSE ROBOTICS: IMPROVING EFFICIENCY IN ORDER FULFILLMENT AS VOLUMES RISE

Warehouse robotics are defined by Business Insider Intelligence as robots that primarily serve to transport, sort, or identify goods within a warehouse, logistics fulfillment center, or brick-and-mortar retail store. They scurry around the floors of logistics facilities, snap pictures of inventory, and help transport goods that are eventually loaded onto delivery trucks.

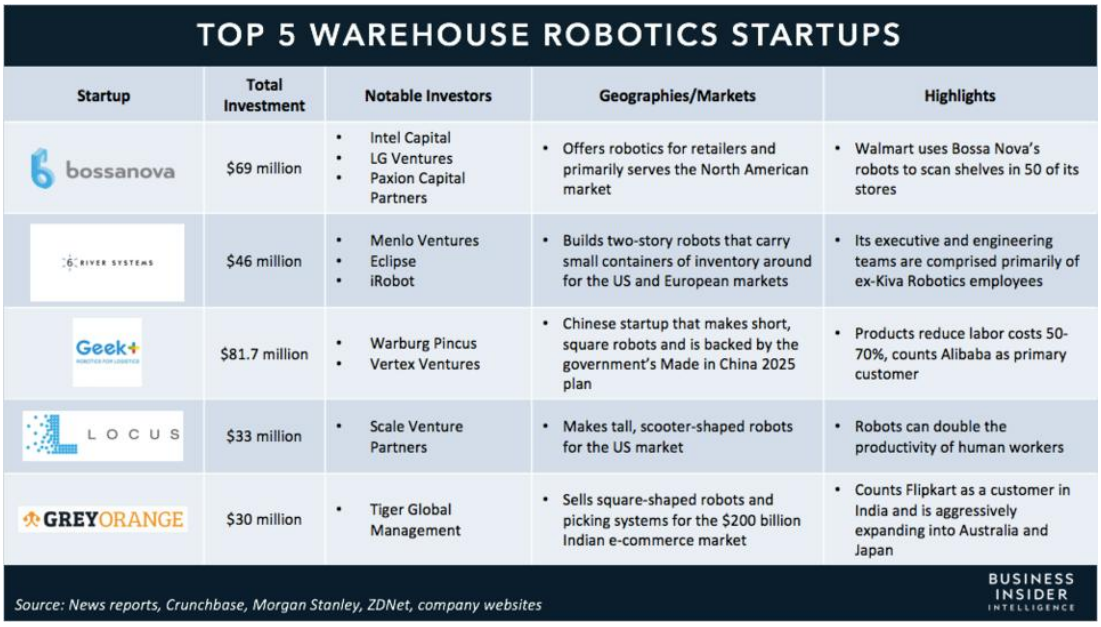
Here's a look at some of the drivers behind the growing adoption of these systems:

- **Package volumes are advancing at a steady clip due to the rise of e-commerce.** Business Insider Intelligence projects annual global e-commerce volume will rise 91% over the next five years, hitting $23 trillion in 2023. Combined with consumers' increasing expectations that their orders arrive in only a few days, this means shippers and retailers need to be more efficient than ever before.

- **Logistics companies and retailers are struggling to expand their existing warehouse space.** Square footage, especially in urban areas, is scarce for warehouses and brick-and-mortar stores alike, meaning companies often can't expand their outdated facilities or build new ones. As a result, they are being forced to find ways to get packages out the door faster.

- **A shrinking labor pool has put warehouse operators in a difficult bind.** The highly publicized truck driver shortage is probably the most well-known issue plaguing the logistics labor market, but it's only part of the problem. Demand for workers generally has increased steadily over the last five years, Nathan Coin, director of divisional operations-commercial division at Aerotek, a national recruiting and agency, recently told Supply Chain Dive. Recruiters and colleges have tried to expand the labor pool through training programs and higher wages, but those efforts haven't yet mitigated the issue.

Meanwhile, Amazon — which accounted for 44% of all US e-commerce sales last year — acquired Kiva Robotics back in 2012 for $775 million, putting the retail and logistics industries on notice. That ignited a race among companies trying to keep pace with the Seattle-based behemoth, ultimately pushing firms to turn to a growing number of startups.



TOP 5 WAREHOUSE ROBOTICS STARTUPS

Startup	Total Investment	Notable Investors	Geographies/Markets	Highlights
bossanova	$69 million	• Intel Capital • LG Ventures • Paxion Capital Partners	• Offers robotics for retailers and primarily serves the North American market	• Walmart uses Bossa Nova's robots to scan shelves in 50 of its stores
6 RIVER SYSTEMS	$46 million	• Menlo Ventures • Eclipse • iRobot	• Builds two-story robots that carry small containers of inventory around for the US and European markets	• Its executive and engineering teams are comprised primarily of ex-Kiva Robotics employees
Geek+	$81.7 million	• Warburg Pincus • Vertex Ventures	• Chinese startup that makes short, square robots and is backed by the government's Made in China 2025 plan	• Products reduce labor costs 50-70%, counts Alibaba as primary customer
LOCUS	$33 million	• Scale Venture Partners	• Makes tall, scooter-shaped robots for the US market	• Robots can double the productivity of human workers
GREYORANGE	$30 million	• Tiger Global Management	• Sells square-shaped robots and picking systems for the $200 billion Indian e-commerce market	• Counts Flipkart as a customer in India and is aggressively expanding into Australia and Japan

Source: News reports, Crunchbase, Morgan Stanley, ZDNet, company websites

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Startup: Bossa Nova Robotics

Founded: 2005

Notable investors: Intel Capital, LG Ventures, Paxion Capital Partners

Why it's worth watching: Bossa Nova Robotics makes 4-foot-tall robots that are primarily designed for scanning shelves in warehouses and brick-and-mortar stores to keep track of inventory. The company was spun out of Carnegie Mellon's Robotics Institute back in 2005, giving it a crucial early mover advantage in the industry. It leveraged this head start to secure a relationship with the largest brick-and-mortar retailer in the US: Walmart uses the company's products to manage inventory in 50 of its stores — the robots scan shelves three times a day to determine which products need to be restocked. In addition, Bossa Nova partnered with Flex, a US-based contract manufacturer, to partially outsource production. That's enabled the company to manufacture more robots and better meet customer demand.

What's next: Bossa Nova intends to increase its workforce by 50% using its recent $29 million funding round, primarily by adding software developers and engineers to help its customers derive more usage data and insights from the robots. Earlier this month, the firm purchased HawXeye, a Pittsburgh-based AI startup that specializes in object recognition technologies. Integrating the startup's software into Bossa Nova's products should allow the robots to recognize more objects, ultimately broadening the settings they can be used in. Meanwhile, the company will also actively seek new use cases for its products, including using its robots to restock shelves in the front of brick-and-mortar retailers and grocery stores.

Startup: 6 River Systems

Founded: 2015

Notable investors: Menlo Ventures, Eclipse, iRobot

Why it's worth watching: 6 River offers a robot called Chuck that has two levels to carry containers of inventory around retail stores, warehouses, and fulfillment centers. A bundle of eight robots costs $250,000, and 6 River charges $50,000 annually for maintenance. The company was founded by a trio of former Kiva Robotics execs back in 2015, affording it unique technological and business insights into the burgeoning space. That's helped the startup secure high-profile customers like XPO Logistics, the largest shipping company in the US by net revenue last year. In addition, the company has a Robotics-as-a-Service offering that allows customers to rent robots for a specified time period, typically around the busy holiday shopping season when package volumes are highest. That's ideal for mid-market e-tailers and 3PLs that can't afford the high upfront costs of its core product, and ultimately allows 6 River to reach a part of the market that its competition currently cannot.

What's next: The startup will gain the necessary regulatory approval to start delivering products to customers in the EU later this year, helping it tap into a market that E-commerce Europe projects will see total sales grow 13% this year to reach $705 billion. 6 River will also likely look to develop new products to help it stay ahead of other startups and incumbents that are developing their own robots in-house.

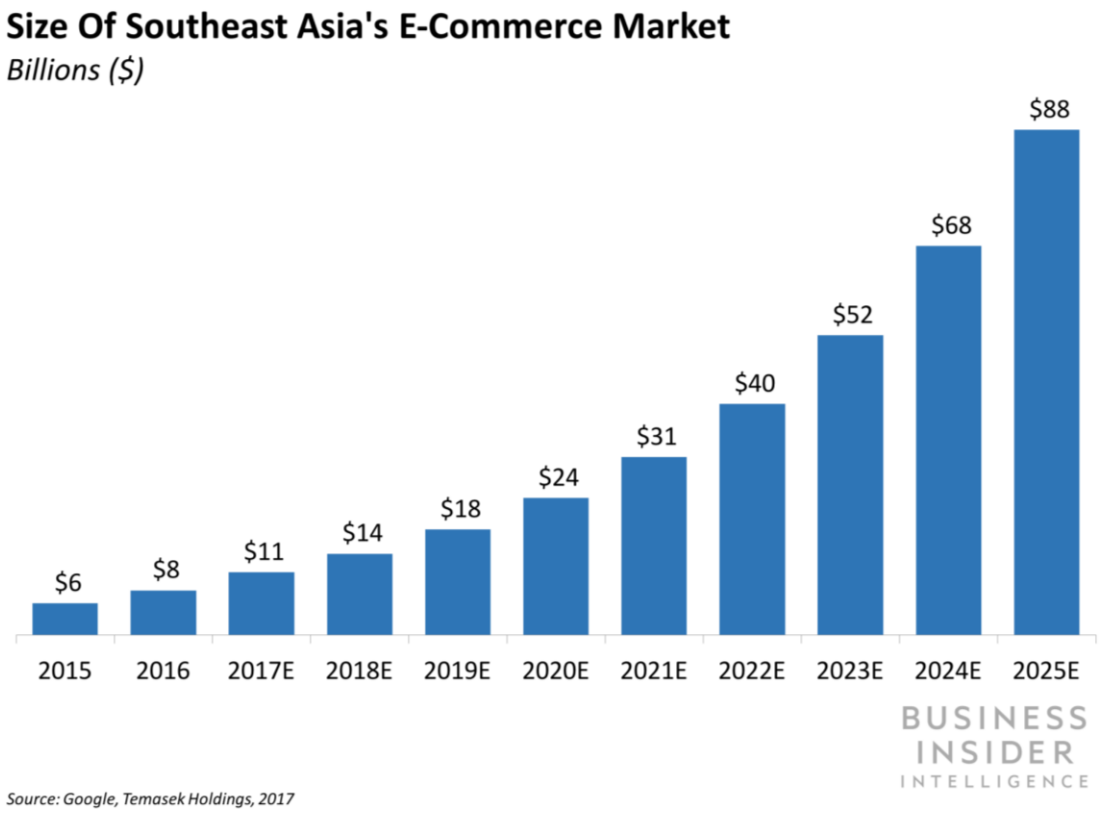
Startup: Geek+

Founded: 2015

Notable investors: Warburg Pincus, Vertex Ventures

Why it's worth watching: Geek+ offers square-shaped robots that carry packages around warehouses for human workers to pick up and put on trucks for delivery. The packages sit on top of the robots to make retrieval easy. The company, which primarily serves online and brick-and-mortar retailers, is backed by the Chinese government's Made in China 2025 plan, which has helped it become the leading warehouse robotics firm in the country's $35 trillion logistics industry. Geek+ has sold more than 3,000 robots to over 20 customers in China, including Alibaba, China's largest e-commerce firm by transactions. The e-commerce behemoth plans to ramp up its logistics network to handle 1 billion packages a day, up from 100 million daily packages, and Geek+ will play a critical role in facilitating that growth.

What's next: Geek+ said earlier this year that it plans to expand to North America in the not-too-distant future. In addition, the company gained CE mark approval from the EU this past February, which certified that its products are safe and reliable enough to be sold within the supranational union. Meanwhile, its primary customer, Alibaba, is rumored to be eyeing several international markets, including Southeast Asia. Geek+ could easily piggyback off of the firm's expansion plans to grow its own footprint.



Startup: Locus Robotics

Founded: 2014

Notable investors: Scale Venture Partners

Why it's worth watching: Locus produces tall, scooter-shaped robots that are designed to carry inventory around warehouses and inventory management facilities for logistics companies. The company was spun out from Quiet Logistics, one of the leading regional 3PLs in New England, back in 2014. That helped it gain some wherewithal among legacy players in the logistics industry and capture a handful of impressive customers and partners. Locus serves DHL and RK Logistics Group, a mid-market 3PL based out of California. Perhaps more importantly, the company's products have proved to be incredibly efficient — Locus said earlier this year that its customers are already seeing doubling or tripling fulfillment speeds with near-100% accuracy, ultimately saving them at least 30% in operating expenses.

What's next: Locus said last fall when it closed its $25 million Series B funding round that it plans to use the capital to build new products, expand into Asia, and bolster its sales and marketing efforts.

Startup: GreyOrange Robotics

Founded: 2011

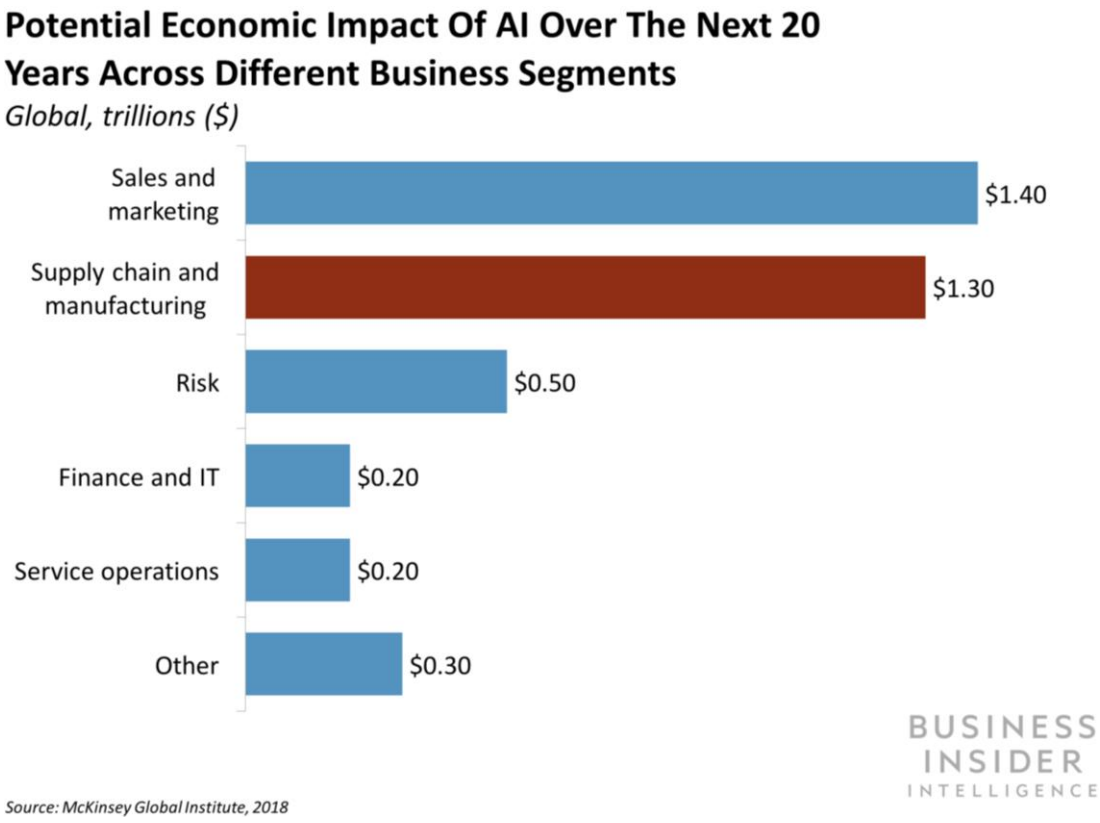
Notable investors: Tiger Global Management

Why it's worth watching: GreyOrange offers square-shaped, 1-foot-tall robots, dubbed Butlers, that hold pallets of inventory on their tops and move them around retailers' and shipping companies' warehouses. The company latched onto the Indian e-commerce market early on, affording it access to a lucrative and growing arena — Morgan Stanley projects the Indian e-commerce market will grow 30% annually to reach $200 billion in 2020. Its focus on India allowed it to secure Flipkart — which brought in $3 billion in revenue last year alone and controls 32% of the Indian e-commerce market — as a customer. From there, GreyOrange was able to leverage its clout to add lucrative customers like Mitsubishi and Mahindra, one of the largest automakers in India by revenue, and expand overseas into Japan and Australia.

What's next: GreyOrange recently revealed its "Butler PickPal" robotic picking system that works with its core Butler robots. The company says the system can manage up to 48 orders at once and reach up to 600 picks per hour. GreyOrange said in March that it plans to start shipping the system to customers in the middle of this year. Meanwhile, the company will likely try to build on its presence in Japan and Australia to expand further outside its home country, potentially to Southeast Asia or China.

AI IN THE SUPPLY CHAIN: CUTTING COSTS BY OPTIMIZING DELIVERIES, INVENTORY MANAGEMENT, AND FLEET UTILIZATION

AI is an umbrella term used to describe technologies that can simulate human intelligence. Business Insider Intelligence is limiting the scope of this report to AI applications within supply chain management software, which we define as any AI-based software algorithms that help optimize the shipments of goods in transit. This includes delivery route optimization, predictive order and return volume algorithms, asset utilization tools, and inventory management tools. Specifically, we will discuss machine learning (ML) as it is applied within the supply chain management space. ML, which finds patterns in data and gets better at doing so over time, is the most commonly referenced technology by shipping companies that discuss AI.



McKinsey estimates that AI will create at least $1.3 trillion worth of economic value over the next 20 years in the global supply chain and manufacturing business functions. That puts it in second place when it comes to potential for AI use of all the segments McKinsey profiled, after only sales and marketing applications. This value created by AI will help drive down logistics costs by at least 5% over the next 10 years and add $25 billion in potential profits to the global logistics industry, according to Goldman Sachs estimates cited by The Economist. Although the logistics industry is still in the early stages of AI use, a handful of startups that burst onto the scene about five years ago are driving the implementation of these nascent technologies forward. That's pushing incumbent logistics firms to add AI to their arsenals in the hope that they'll cut costs, bolster efficiency, and speed up deliveries. Today, the largest shipping companies in the world — including UPS, DHL, FedEx, and XPO Logistics — all use various types of AI in-house.

TOP 5 AI FOR SUPPLY CHAIN MANAGEMENT STARTUPS

Startup	Total Investment	Notable Investors	Geographies/Markets	Highlights
Transmetrics	<$1.9 million	• LaunchHub Ventures	• Bulgarian startup that offers data cleansing and operates globally	• Can reduce shipping costs up to 9%
shippo	$29 million	• Union Square Ventures • Bessemer Venture Partners	• Offers an all-in-one, ML-based shipping and returns platform primarily for the US market	• Counts over 15,000 customers, including eBay, Martha Stewart, Ipsy
clari	$61 million	• Bain Capital Ventures • Sequoia Capital	• ML-based forecasting tool that primarily serves the US market	• Algorithm leads to a 93% increase in forecast accuracy
clearmetal	$12 million	• New Enterprise Associates • Eric Schmidt's Innovation Endeavors	• ML platform for global maritime shipping companies and retailers	• Counts paper goods giant Georgia-Pacific and Swiss logistics provider Panalpina as customers
tradegecko	$18 million	• TNB Ventures • Openspace Ventures • Jungle Ventures	• Inventory management solution serving global companies	• Has over 17,000 customers in about 90 countries

Source: News reports, Crunchbase, company websites

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Startup: Transmetrics

Founded: 2013

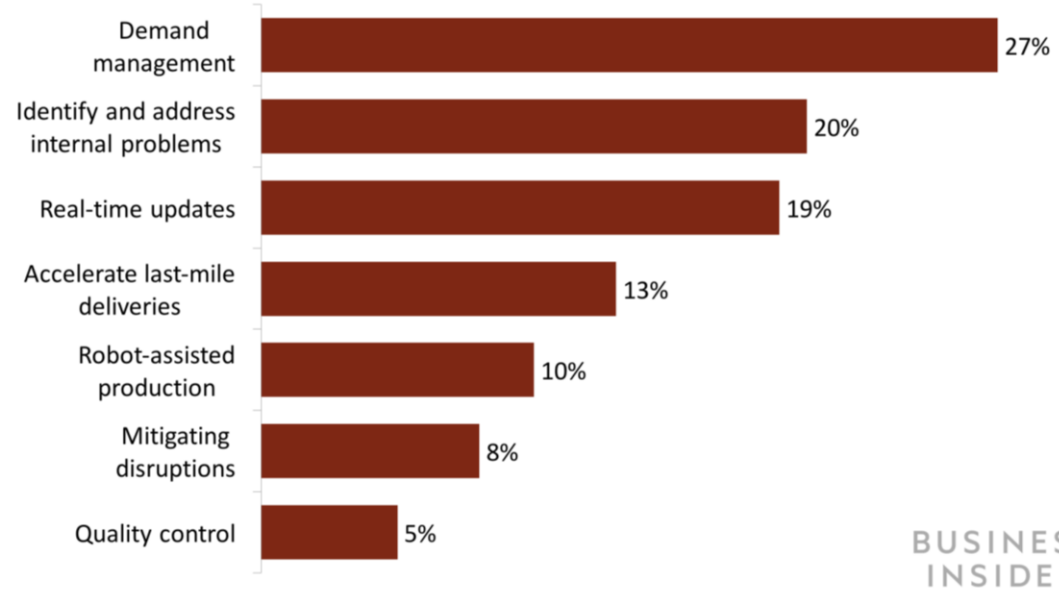
Notable investors: LauncHub Ventures

Why it's worth watching: Transmetrics has built a predictive ML algorithm to help delivery companies better utilize their mobile assets, including trucks, planes, and rail cars. Although it hasn't raised nearly as much capital as the other startups on our list, the cost and time savings it has delivered to customers thus far is impressive. The firm's algorithm analyzes a customer's transportation management system to predict, usually with above 90% accuracy, its product demand and vehicle supply over the next couple weeks. That, in turn, helps supply chain managers understand when and where they'll need their fleet. This ultimately helps maximize fleet capacity, a top pain point for players across the logistics industry. In the trucking industry, for instance, only 50% of a fleet's total hauling capacity is used at any given time. Speedy, a European delivery courier, increased its fleet utilization rate from 72% to 82% by working with Transmetrics, reducing Speedy's total costs about 7-9%. These impressive results have helped Transmetrics grab customers like DHL and Agility Logistics.

What's next: Transmetrics told Business Insider Intelligence that it's in the early stages of diversifying beyond utilization of movable assets like trucks and into helping customers make better use of their fixed assets like containers and forklifts. Look for these efforts to accelerate in the next year, and for the company to expand its relationships with existing customers.

How AI Will Impact Retailers' Supply Chains And Logistics

Q: Where will AI have the most impact in the next 5 years?



Note: Values don't total to 100% because respondents could choose up to three answers.
Source: IBM and RetailWire, n=179 executives from retailers and retail vendors, 2017

BUSINESS INSIDER INTELLIGENCE

Startup: Shippo

Founded: 2013

Notable investors: Union Square Ventures, Bessemer Venture Partners

Why it's worth watching: Shippo offers an all-in-one, ML-based software platform that enables merchants to track and manage their shipments and returns. It includes rate comparisons across different parcel carriers depending on where and when the package needs to be delivered or returned, helping to streamline a process that's usually tedious and manual. The National Retail Federation estimates that US consumers returned $351 billion worth of merchandise last year — or 10% of total retail sales, up from 8% of total sales in 2015 — and retailers can lose up to 20% of their profits from returned goods. Shippo's platform can streamline that process by tracking and routing returned products as they move from the consumer back to the merchant. Moreover, although not part of its AI capabilities, the company's platform can automate paperwork and label printing, slashing time from the shipping process. These capabilities have helped Shippo capture over 15,000 customers — including eBay, Martha Stewart, and Ipsy.

What's next: Shippo, which currently only operates in the US, has hinted at international expansion several times in the last 18 months. We expect the company will move into a lucrative e-commerce market like Europe in the near future.

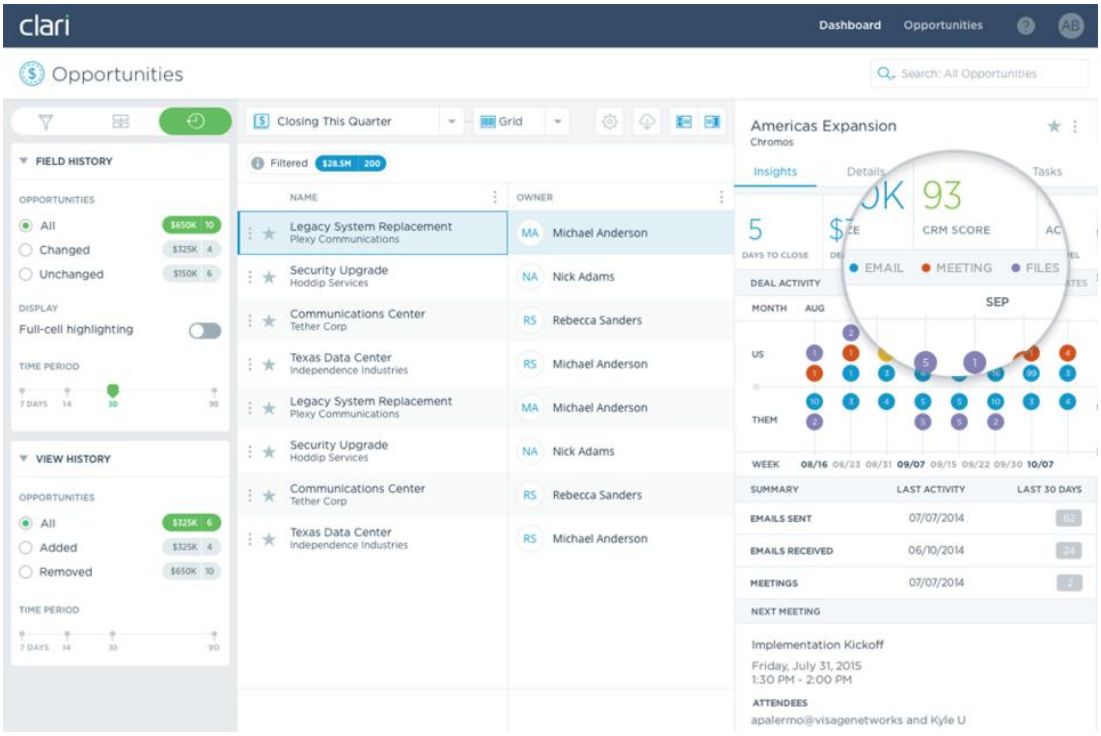
Startup: Clari

Founded: 2012

Notable investors: Bain Capital Ventures, Sequoia Capital

Why it's worth watching: Clari offers a set of forecasting algorithms that can predict demand for products or services based on past trends and patterns. Although applicable across a broad set of industries today — including freight and parcel delivery — it originally caught on with salesforces around the US. In its first few years, the firm captured impressive customers like Audi, Symantec, Intel, Adobe, and Hewlett Packard Enterprise. Its algorithms have helped these customers achieve a 93% increase in forecast accuracy for their products or services. That performance enabled Clari to triple its customer base between February 2017 and 2018. When it closed its Series C funding round in March, the company revealed plans to tweak its core algorithms and move into the supply chain management space. Its extensive list of impressive customers and strong core product have enabled it to successfully make this transition. CEO Andy Byrne told Business Insider Intelligence that the company's customers are already using its AI predictions and recommendations to drive better supply chain and demand planning decisions.

What's next: Clari will likely need to make hires on the engineering and product side of its business as it moves further into the supply chain management space.



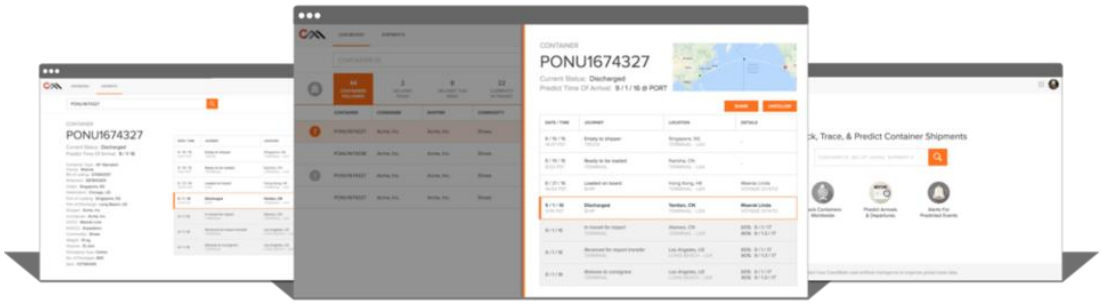
Startup: ClearMetal

Founded: 2014

Notable investors: New Enterprise Associates, Eric Schmidt's Innovation Endeavors

Why it's worth watching: ClearMetal offers an end-to-end SaaS ML platform that helps retailers and maritime shipping companies route and track their ships and containers, which is typically a cumbersome process. The company's algorithms can also analyze data on currency rates, commodity trends, past shipping trends, and even weather patterns to predict delays. From there, ocean freight carriers can reroute their ships to avoid delays, saving time and money. The global logistics industry experiences over 500 million booking revisions — when a ship or truck doesn't arrive on time — annually, according to IHS Markit estimates. Targeting this colossal problem helped ClearMetal grab an investment from long-time Alphabet chairman Eric Schmidt's venture firm, which led the company's Series A funding round last fall. That may have helped it capture its over two dozen customers, including high-volume firms like Swiss logistics provider Panalpina — which earned $5.5 billion in total revenue last year — and paper goods behemoth Georgia-Pacific.

What's next: ClearMetal told Business Insider Intelligence that it hopes to fortify its European presence over the next year and add about a dozen new workers on top of the 28 people it currently employs.



Startup: TradeGecko

Founded: 2012

Notable investors: TNB Ventures, Openspace Ventures, Jungle Ventures

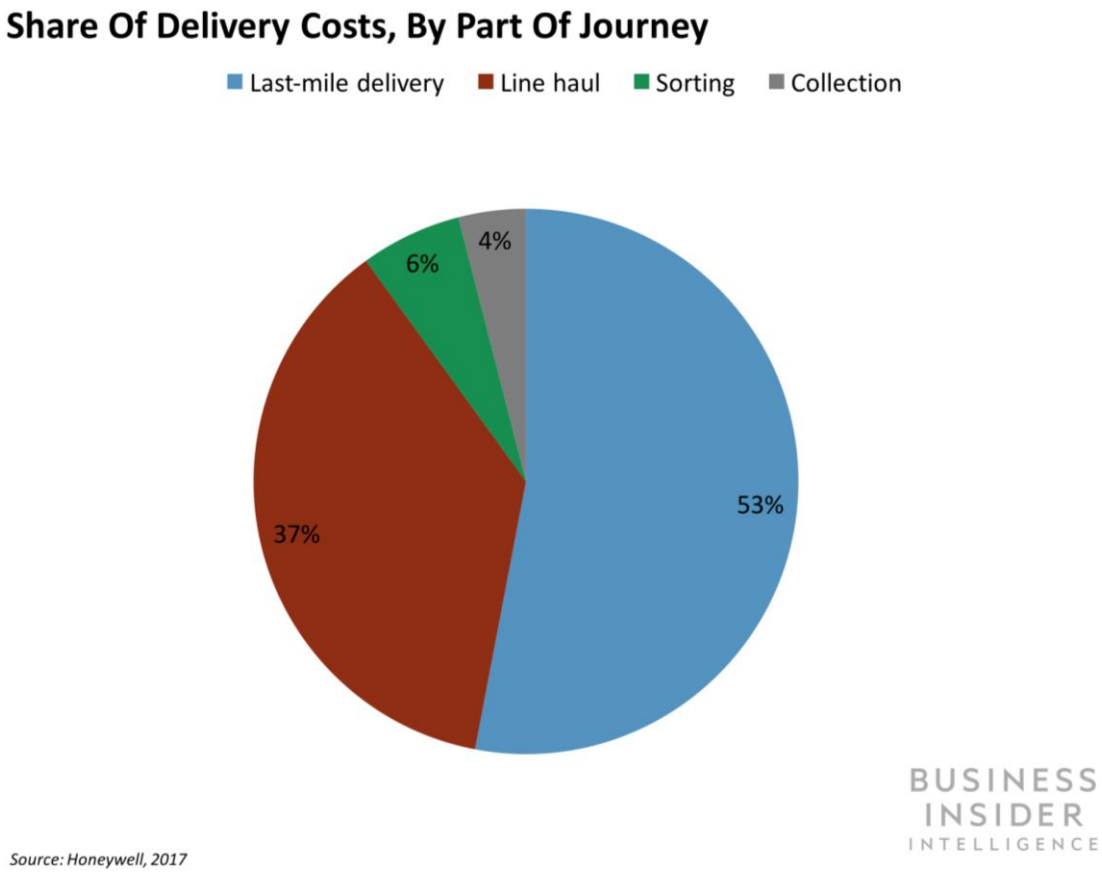
Why it's worth watching: TradeGecko, which is based in Singapore but operates globally, offers an AI-based inventory management solution designed for small- to medium-sized online and brick-and-mortar retailers. Global retailers lose over $1 trillion annually due to their inability to align inventory with customer demand. TradeGecko's solution helps customers streamline the process of getting inventory out of their warehouses and on the way to customers. Its focus on smaller retailers — many of which don't have the cash to afford expensive tools offered by leading 3PLs — has helped it secure over 17,000 customers in a whopping 90 countries. These include Dead Studios, Brooklyn Bicycle Company, Maui and Sons, and Paula's Choice Skincare.

What's next: TradeGecko is the only startup on our list that's already exploring an initial public offering (IPO), which could occur as soon as next March. The company is looking to raise $19 million in pre-IPO funding through convertible notes, according to The Asian Financial Review. It's telling investors that it plans to use the capital for new hires — specifically in sales and marketing — and to expand into the UK and the western US.

DELIVERY ROBOTICS: AUTOMATING THE PROBLEMATIC LAST MILE AS PACKAGE VOLUMES GROW

Retailers, logistics companies, and delivery startups are all rushing to find ways to improve the last mile of delivery, or the final stage of the delivery process when the package arrives at the customer's door. Automating the delivery process through robots is at the center of these efforts; other technologies, like drones and autonomous cars, will be held back for a few years by regulatory barriers and technological limitations. Business Insider Intelligence defines a delivery robot as any ground-based robot that's used to deliver packages, groceries, or prepared meals from one point to another.

Last-mile deliveries are notoriously difficult to conduct, and rising e-commerce volume is making the problem worse. Honeywell estimates that the last mile comprises 53% of the entire cost of delivering a package. And with package volumes on the rise, these costs are skyrocketing. Worse yet, with 63% of US internet users expecting their package within three days of their order, according to Kibo Commerce data, retailers and their logistics partners must handle surging package volume quicker than ever before. This means demand for automated solutions like delivery robots, which cannot only reduce the cost of last-mile delivery but also speed up the process, is high and growing.



A McKinsey study found that automating last-mile deliveries through technologies like robotics will provide savings of at least 40% on traditional last-mile delivery methods, assuming courier wages of about $23 per hour. The promise of such large cost-savings has prompted the rise of a slew of delivery robotics startups over the last half-decade. These companies' robots typically scurry around the sidewalks bringing products to customers. Once the robot arrives at the customer's location, the customer receives a text with the code they can enter into the robot to open it and pick up their order.

TOP 5 DELIVERY ROBOTICS STARTUPS

Startup	Total Investment	Notable Investors	Geographies/Markets	Highlights
STARSHIP	$42 million	• Daimler • Matrix Partners • Shasta Ventures	• London-based company that makes food and package delivery robots for US and European markets	• Delivering packages for Postmates and DoorDash in California and Washington, DC
nuro	$92 million	• Greylock Capital Partners • Gaorong Capital	• San Francisco-based firm that offers 2-foot-tall robots for the US	• Focused on the online grocery space, which will be worth nearly $100 billion by 2022
marble	$10 million	• Tencent • Maven Ventures • Kyle Vogt (CEO Cruise Automation)	• California startup that manufactures 3- and 4-foot-tall robots for the US	• Delivering food for Grubhub, the largest food delivery company in the US by market share
robby	$2.1 million	• Sinovation Ventures • Yunqi Partners • Y Combinator	• San Francisco company that makes foot-tall robots for the US	• Robots have traveled over 4,000 miles delivering items for customers
boxbot	$9 million	• Toyota AI Ventures • Artiman Ventures	• Oakland-based company working on 4-foot-tall robots that can carry up to 80 lb. payloads	• Recently added a former Amazon Flex exec to lead business development team

Source: News reports, Crunchbase, FMI and Nielsen, TechCrunch, company websites

BUSINESS INSIDER INTELLIGENCE

Startup: Starship Technologies

Founded: 2014

Notable investors: Daimler, Matrix Partners, Shasta Ventures

Why it's worth watching: Starship Technologies is arguably the most well-known startup in the delivery robotics space. It's based in London and makes 1-foot-tall robots designed to deliver up to 40 pounds of goods over 2 miles. The company was founded by a pair of former Skype executives in 2014, making it the oldest startup to crack our list. This early start allowed Starship's engineering team to design and produce hundreds of robots before many others entered the market. More importantly, it allowed the company to develop a strong brand image, which has helped it secure partnerships with Postmates and DoorDash, the third and fourth largest companies in the US crowdsourced delivery space by market share (15% and 9%, respectively). These partnerships involve Starship robots picking up orders at restaurants in Redwood City, California and Washington, DC using Postmates' and DoorDash's mobile apps, respectively. Today, Starship's robots have driven over 100,000 km (about 62,000 miles) in total in eight major metro areas in the US and Europe.

What's next: When the company completed its most recent funding round in June, it said it planned to use the money to grow its fleet from only a few hundred robots to over 1,000 by the end of this year. Starship could thus expand its relationships with Postmates and DoorDash to new geographies as it manufacturers hundreds of more robots over the coming months. In addition, Starship has built an innovative enough brand that it could conceivably launch its own proprietary delivery service.

Startup: Nuro

Founded: 2016

Notable investors: Greylock Capital Partners, Gaorong Capital

Why it's worth watching: Although Nuro got a later start than rivals like Starship, it's quickly emerged as a leading player in the delivery robotics space. The company was founded by Jiajun Zhu, who was one of the first engineers at Alphabet's autonomous car spinoff Waymo. Nuro's products are slightly larger than Starship's, and can thus fit more goods. That could be why it was able to nab a partnership with US grocer Kroger, which grossed a whopping $122 billion in sales last year. Grocery orders are often bigger than prepared food orders, meaning larger robots are more ideal for delivering these goods. Although Nuro is currently only working on deploying about six robots in the Silicon Valley area, it's the most well-capitalized startup on our list — having recently announced a $92 million Series A — showing it could expand its fleet in the near future.

What's next: If Nuro is intent on honing in on the grocery delivery space, it'll likely seek more partnerships with online grocers to better compete in this massive market; Nielsen estimates that 70% of US consumers will try an online grocery service by as early as 2022, up from only 26% in 2016.

Startup: Marble

Founded: 2015

Notable investors: Tencent, Maven Ventures, Kyle Vogt (CEO of Cruise Automation)

Why it's worth watching: Marble's primary product is a 3-foot-tall robot designed to deliver prepared food and groceries over distances fewer than 5 miles. The company emerged in early 2015 — shortly after rival Starship but ahead of most of the other startups we've chosen to highlight. Marble is the only company on our list that has two different sized robots — the firm unveiled a larger, 4-foot-tall robot in April. Additionally, Marble's robots have a modular cargo bay inside that can be swapped out based on load size. This unique versatility — Marble is the only startup on our list with robots designed this way — likely helped it secure partnerships with Grubhub, the largest food delivery company in the US by market share, and DoorDash. Both partnerships involve Marble's smaller robots picking up orders placed through Grubhub's and DoorDash's websites or mobile apps and delivering them to consumers.

What's next: When Marble completed its $10 million Series A funding round this past April, it said it's hoping to move into the parcel delivery space over the next 18 months. Additionally, in a call with Business Insider Intelligence, CEO Matthew Delaney said it planned to hire at least another dozen engineers by the end of 2018. Marble was granted permission to test its robots in Arlington, Texas in late June, and more expansions could be coming soon.

Startup: Robby Technologies

Founded: 2016

Notable investors: Sinovation Ventures, Yunqi Partners, Y Combinator

Why it's worth watching: Robby Technologies — which was founded by a pair of MIT engineers and makes a 2-and-a-half-foot-tall, four-wheeled robot — launched in 2016 but has quickly emerged as a powerful player in the delivery robotics space. That's likely due to its product and engineering teams' ability to continually develop new products. Robby is the only company on our list that has already deployed the second generation of its robot; it released the product back in June 2018. Moreover, it allows partners to put their logos on the outside of its robots, a unique value-add that most startups on our list don't offer. That's enabled the firm to grab partnerships with DoorDash, Instacart, and Postmates to deliver parcels and prepared food in the San Francisco area. Robby's robots pick up and deliver food or packages from restaurants or retailers operating on these marketplaces. As of this past June, Robby's robots had traveled 4,000 miles delivering food and parcels to customers.

What's next: Robby's relationships with DoorDash, Instacart, and Postmates could be expanded to new geographies in the near future, especially given the massive reach of these crowdsourced delivery companies. Postmates operates in 235 US cities, while Instacart has a presence in about 150. Meanwhile, Robby poached an Apple exec back in April to lead its sales and marketing teams, so we could see it adding to these teams in the coming months.

Startup: Boxbot

Founded: 2016

Notable investors: Toyota AI Ventures, Artiman Ventures

Why it's worth watching: Boxbot, which got the latest start of any of the startups on our list, was founded by two autonomous driving engineers, Austin Oehlerking and Mark Godwin, who previously worked for Tesla and Uber, respectively. The company's robots are about 4 feet tall and can fit up to 80 pounds of goods, making them the largest of any product developed by a company on our list. That makes them more ideal for large grocery orders and parcels, and also gives the company a unique value proposition among the startups we've discussed. This, coupled with the expertise of its founders, could be why the startup has managed to land impressive backers like Toyota AI Ventures. Boxbot wants to operate a delivery network that local retailers, restaurants, and other small businesses can use to deliver their products. In exchange, Boxbot will take a percentage of the revenue earned from each delivery.

What's next: Boxbot will seek partners and customers for its services in the grocery and parcel delivery spaces. Meanwhile, Toyota's investment in the company could be a sign that the Japanese auto giant is interested in using its products long term, perhaps either in its own warehouses or for a stand-alone delivery service.

SELF-DRIVING CAR SOFTWARE: ENABLING THE SHIFT TO AUTONOMY IN THE AUTOMOTIVE SPACE

Self-driving technologies are undoubtedly the future of the automotive industry. A 2017 survey of 80 auto industry executives conducted by advisory firm Foley & Lardner LLP found that 23% expect semi- and fully-autonomous cars to account for at least 20% of their companies' sales by 2025. And Business Insider Intelligence expects that nearly 1 in 7 vehicles shipped in 2023 will have at least some self-driving features. We also project that self-driving cars used for Uber-like mobility services will account for 16% of the total miles driven in the US in 2023.

However, developing autonomous driving technologies is incredibly expensive and time-consuming, and often requires a massive transformation of companies' existing business structures. General Motors (GM) raised $2.25 billion from Japanese telco SoftBank earlier this year to advance its self-driving efforts, while Ford plans to invest $4 billion in self-driving car development through 2023. In total, legacy auto companies have spent between $40 billion and $50 billion developing autonomous and semi-autonomous car technologies, according to a Reuters analysis conducted last fall. Meanwhile, Daimler divided itself into three segments to better prepare for autonomy, and last fall auto supplier Aptiv (formerly known as Delphi) underwent a similar reshuffling to transform its business around autonomous cars and other emerging, disruptive technologies.

Because of the immense cost associated with developing autonomous car technologies, many legacy automakers are turning to startups that are primarily dedicated to developing the software that gives cars autonomous capabilities. GM became one of the earliest to take this route when it bought Cruise Automation for north of $1 billion back in early 2016. More recently, legacy auto supplier Delphi purchased nuTonomy for $450 million, and Volkswagen partnered with Aurora, a two-year-old startup, earlier this year. These acquisitions and partnerships have moved the spotlight to startups in the industry, as the race to operate an autonomous mobility service at scale intensifies.

TOP 5 SELF-DRIVING CAR SOFTWARE STARTUPS

Startup	Total Investment	Notable Investors	Geographies/Markets	Highlights
drive.ai	$77 million	• Northern Light Venture Capital • New Enterprise Associates	• Silicon Valley-based firm developing a software kit to give vehicles Level 4 autonomy for the North American market	• Currently operating ride-hailing service in Texas, logged third most miles of any company in California in 2017
ZOOX	$790 million	• Lux Capital • Blackbird Ventures • AID Partners Capital	• California-based company working on its own car design and self-driving technology stack for the US market	• Logged 2,244 test miles in California last year and plans to launch autonomous ride-hailing service by 2020
aurora INNOVATION	$90 million	• Greylock Partners • Index Ventures	• Silicon Valley startup developing software-centric technologies to give cars fully autonomous capabilities	• Founded by former heads of Tesla, Waymo autonomous tech groups, has partnerships with Volkswagen and Hyundai
ROADSTAR.AI	$138 million	• Shenzhen Capital • Wu Capital • Yunqi Partners	• China-based company working on a hardware and software kit that gives cars Level 4 autonomy	• Currently testing cars in China and California, will have 1,500+ cars on the road in China by 2020
VOYAGE	$15 million	• InMotion Ventures • Khosla Ventures • SV Angel	• California-based firm working on a software stack that gives cars Level 4 autonomy	• Trialing a ride-hailing service in a retirement community in Florida

Source: News reports, Crunchbase, California Department of Motor Vehicles, company websites

BUSINESS INSIDER INTELLIGENCE

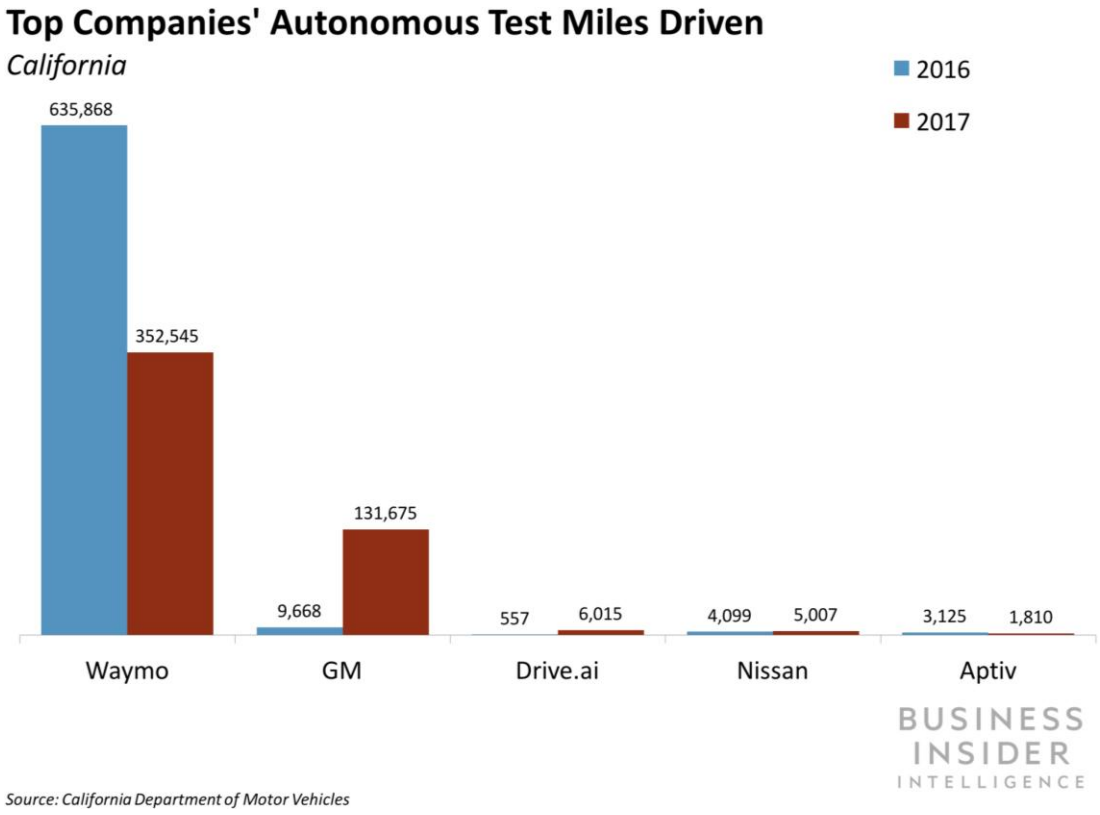
Startup: Drive.ai

Founded: 2015

Notable investors: Northern Light Venture Capital, New Enterprise Associates

Why it's worth watching: Drive.ai is building a kit, which includes AI-based software and a computing platform, that's designed to give any vehicle fully autonomous capabilities. The company secured approval from the California Department of Motor Vehicles (DMV) to test cars equipped with these technologies in early 2016, and its 11 cars have now logged 6,572 miles on the state's roads. That's the most extensive testing of any company on our list, and its 2017 mileage totals are the third most of any company, after only Alphabet's Waymo and GM. These tests have allowed Drive.ai to fine-tune its technologies and gain clout in the industry. That helped it secure a partnership with Lyft last fall to deploy its autonomous cars to the public on the ride-hailing company's open platform in the San Francisco area, as well as partnerships with several undisclosed legacy automakers. Most importantly, Drive.ai started a free, publicly available, six-month-long trial of a ride-hailing service using a handful of specially modified Nissan vans in a geofenced area in Frisco, Texas earlier this month.

What's next: After Drive.ai gets its proprietary ride-hailing service in Texas up and running, it'll likely expand it to new geographies, potentially including California. At that point, it'll likely need to hire in its business strategy and operations departments. In addition, cofounder and CEO Sameep Tandon told VentureBeat that Drive.ai eventually wants to release additional versions of its self-driving kit that are designed for different settings and vehicle types.



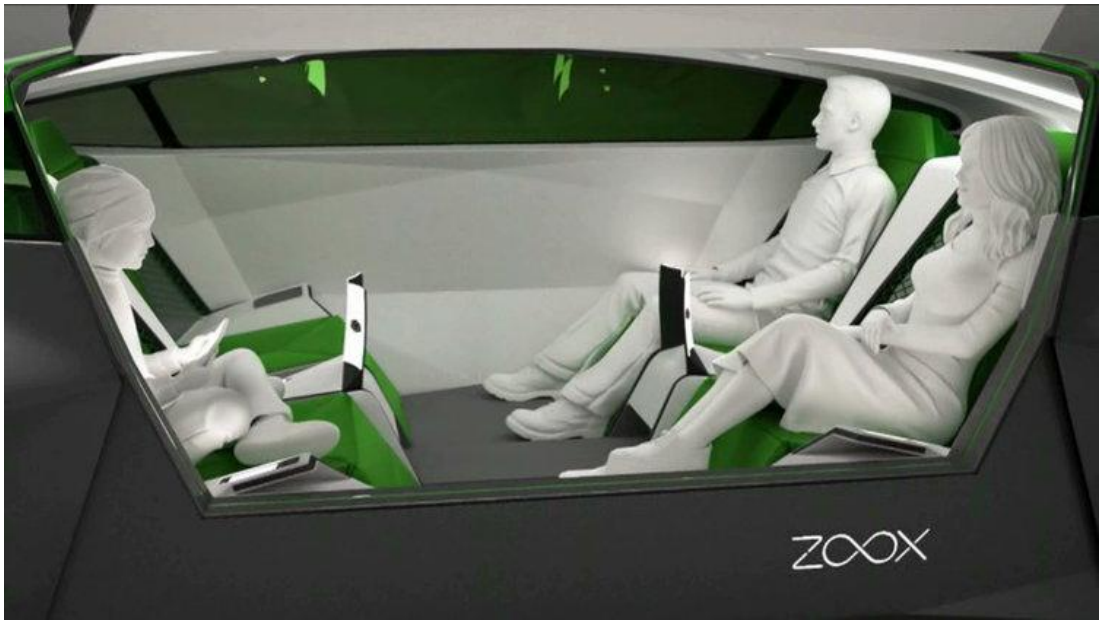
Startup: Zoox

Founded: 2014

Notable investors: Lux Capital, Blackbird Ventures, AID Partners Capital

Why it's worth watching: Zoox is developing a vertically integrated network of fully autonomous, electric cars that it plans to use as part of a ride-hailing service. It's built everything from the LiDAR sensor hardware and the AI software to the car itself, and most importantly, boasts a proprietary connected in-car design. Although the firm has not specified the full details of this design, it could give the company a unique opportunity to gobble up a share of the additional 900 million minutes US consumers will spend in cars every day by 2025. Zoox's early start on this massive undertaking — it's the oldest startup on our list — helped it quickly advance its technologies and start preparing to use the cars to generate revenue. At the end of 2017, Zoox's test cars had driven 2,244 miles on California roads (95% of which were in San Francisco). These factors have helped Zoox achieve an extraordinary valuation — its most recent funding round valued the company at $3.2 billion.

What's next: Zoox said last month that it plans to launch a commercial ride-hailing service using its vehicles in the US in 2020, though it declined to specify a geography. In addition, in a call with Business Insider Intelligence, Zoox's head of corporate and regulatory affairs, Bert Kaufman, emphasized the expensive nature of its business model. As such, even though the firm just completed a $500 million funding round last month, it could still raise additional capital, especially as it inches closer to launching its ride-hailing service.



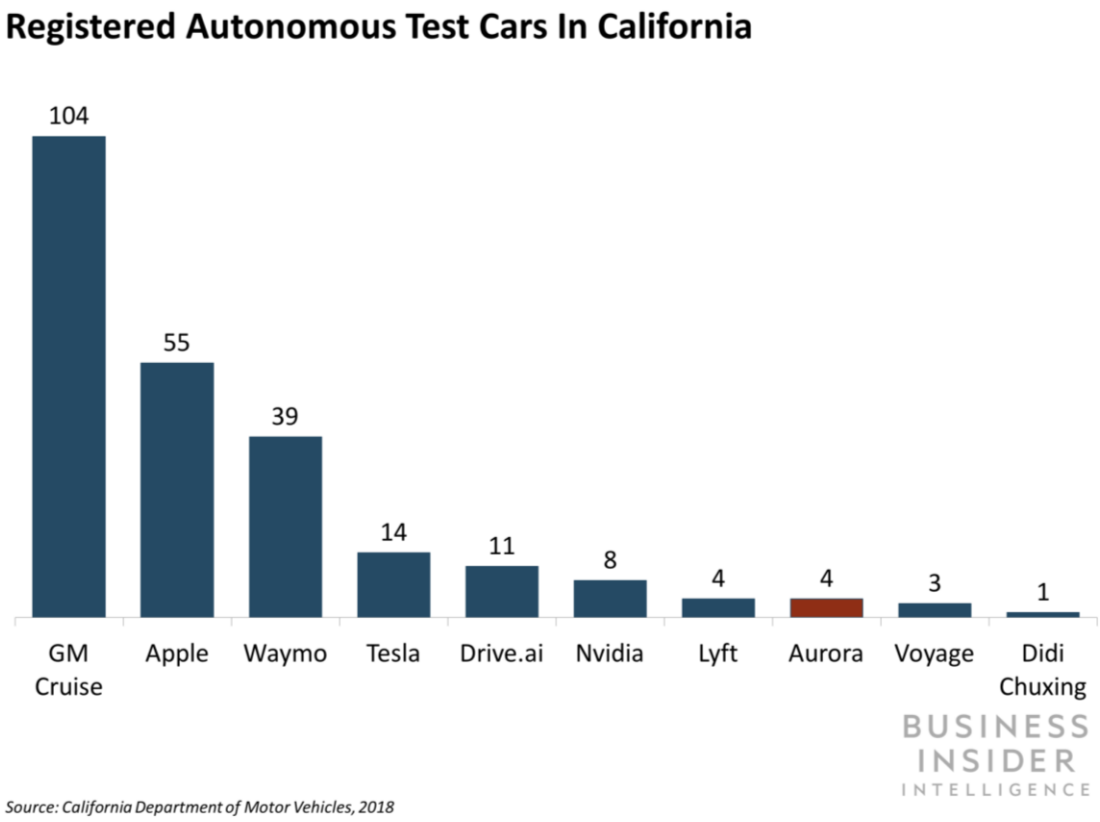
Startup: Aurora

Founded: 2016

Notable investors: Greylock Partners, Index Ventures

Why it's worth watching: Aurora, which is developing ML software that enables cars to drive themselves, immediately grabbed headlines due to its experienced leadership team when it emerged from stealth mode last year. The two-year-old company was founded by Chris Umson, an early engineer on Google's self-driving car project; Sterling Anderson, a former Tesla Autopilot exec; and Andrew Bagnell, a former assistant professor of engineering at Carnegie Mellon University. Moreover, the company added LinkedIn cofounder Reid Hoffman to its board of directors earlier this year. This impressive leadership team, coupled with the fact that it's been testing four cars with its software on California roads since early 2018, has helped the company secure an impressive set of customers, including Hyundai, Volkswagen, and Chinese electric car startup Byton.

What's next: When Aurora closed its Series A funding round back in February, the company said hiring — it had over 50 open positions at the time — was its top priority for the rest of this year.



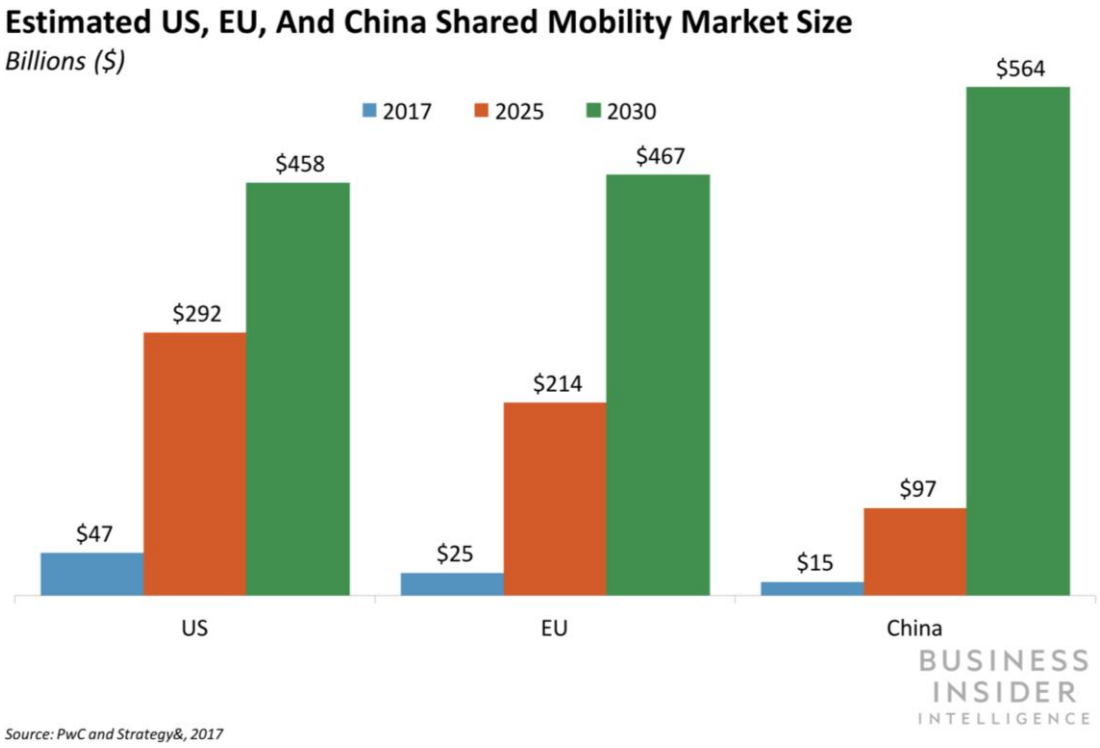
Startup: Roadstar.ai

Founded: 2015

Notable investors: Shenzhen Capital, Wu Capital, Yunqi Partners

Why it's worth watching: Roadstar.ai is based in Shenzhen, China and is developing a technology stack — including LiDAR sensors, cameras, and ML algorithms — that gives vehicles Level 4 autonomy. The company, which was founded by a trio of engineers who previously worked at well-known companies including Apple, Nvidia, Waymo, and Baidu, wants to operate a ride-hailing service with fully electric cars powered by its stack. Roadstar has been testing cars with its technology stack in both California and Shenzhen since September 2017, and plans to deploy another 50 in China by the end of the year. Roadstar's cars have the unique opportunity to collect data from two disparate locations, which could help advance its core tech faster than any other startup on our list. As such, Roadstar has a strong chance to grab a share of the Chinese autonomous car market, which McKinsey projects will be the largest in the world by 2030.

What's next: Roadstar said earlier this year that it planned to expand its ride-hailing fleet in Shenzhen to 200 by next year. Additionally, the company will expand that fleet to 1,500 cars by 2020, and says the cars will be deployed in the core districts of four of China's "first-tier cities."



Startup: Voyage

Founded: 2017

Notable investors: InMotion Ventures, Khosla Ventures, SV Angel

Why it's worth watching: Voyage is developing ML software designed to give vehicles Level 4 autonomy. It's specifically looking to deploy a ride-hailing service using cars with its technology stack in closed settings before expanding to public roads. Specifically, the company started trialing a ride-hailing service using about 12 cars in a Florida retirement community home to about 150,000 people last year. This approach could allow Voyage to scale its services very rapidly, since it could circumvent often stringent state and local regulations that are only applicable to public roads. These early tests and its ability to attract talented, experienced leaders — it poached the former head of Uber's flying car division earlier this year and brought in a former Tesla and Uber engineer as its CTO last month — have helped it nab a partnership with Enterprise Rent-A-Car.

What's next: Voyage CEO Oliver Cameron told Business Insider Intelligence that it plans to bring its ride-hailing service to new geographies in the not-too-distant future, though he declined to specify a time frame or name any specific locations.

THE BOTTOM LINE

- Digital leaps in areas like AI and autonomous technology are poised to transform the transportation and logistics industries by cutting costs, optimizing delivery routes, and automating mundane tasks.
- Startups are the lynchpin of this transformation, pinpointing areas of need that can be tackled by cutting-edge digital solutions.
    - Digital freight startups can help shippers drastically cut down on the time it takes to find carriers.
    - A crop of warehouse robotics firms are speeding up fulfillment by automating tasks, thereby helping to get packages to consumers faster in the age of two-day shipping.
    - AI is being used by startups to improve supply chain management, enabling companies to determine where to best place their trucks, planes, and other assets.
    - Delivery robotics startups are automating the notoriously problematic last mile, which is the most expensive part of the purchase journey.
    - And a slew of acquisitions and partnerships have moved the spotlight to startups in the race to put self-driving cars on the road.
- Monitoring these startups offers unique insight into the development of the transportation and logistics industries at large, and how incumbents are adjusting to their new environment.

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