



# Autonomous vehicle solutions for industrial and commercial enterprises

# Cautionary Note on Forward-looking Statements

This presentation of Cyngn, Inc. ("the Company") contains "forward-looking statements" within the meaning of the Private Securities Litigation Reform Act and other securities law.

Words such as "**expects**," "**intends**," "**plans**," "**believes**," "**seeks**," "**estimates**," and similar expressions or variations of such words are intended to identify forward-looking statements. For example, the Company is using forward-looking statements when it discusses its vision, the potential of its product, its strategy, market potential for its product(s), its paradigm, commercialization of its product(s), the benefits and use of its product(s), its product roadmap and anticipated adoption of its solutions by customers, anticipated pricing, the development of its solutions and product(s) in the manner and schedule anticipated by management, its product launches and corresponding revenue generation, its ability to attract and retain customers, competition and its future growth.

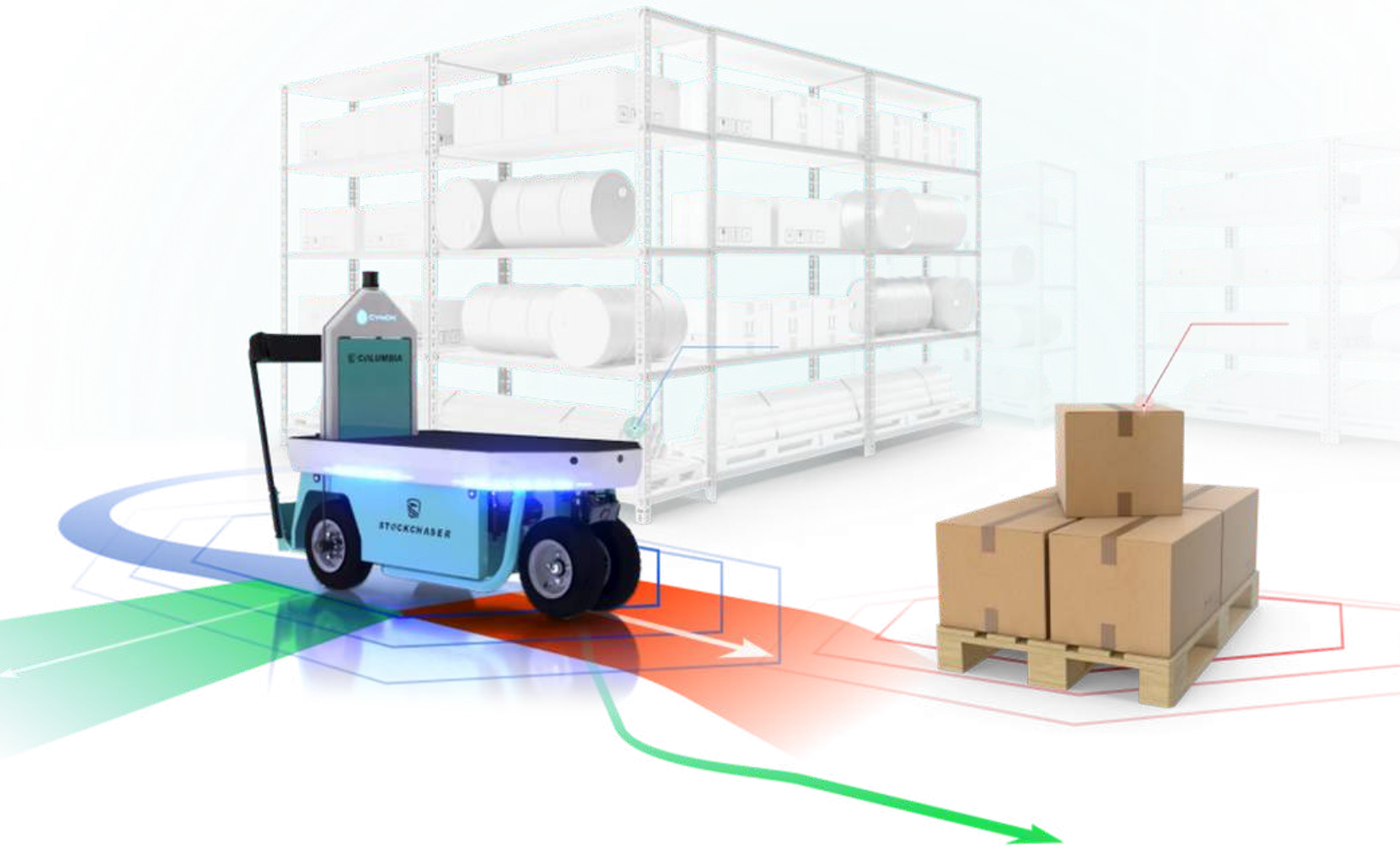
Forward-looking statements are not historical facts, and are based upon management's current expectations, beliefs and projections, many of which, by their nature, are inherently uncertain.

There can be no assurance that management's expectations, beliefs and projections will be achieved, and actual results may differ materially from what is expressed or indicated by the forward-looking statements. Forward-looking statements are subject to risks and uncertainties that could cause actual performance or results to differ materially from those expressed in the forward-looking statements. For a more detailed description of the risks and uncertainties affecting the Company, reference is made to the Company's reports filed from time to time with the Securities and Exchange Commission (the "SEC"), including, but not limited to, the Company's Annual Report on Form 10-K for the year ended December 31, 2021, and any subsequent quarterly filings on Form 10-Q.

Forward-looking statements speak only as of the date the statements are made. The Company undertakes no obligation to update forward-looking statements to reflect actual results, subsequent events or circumstances, changes in assumptions or changes in other factors affecting forward-looking information except to the extent required by applicable securities laws.

# Company Overview

**Cyngn** is an autonomous vehicle technology company focused on addressing industrial uses for autonomous vehicles.



Symbol:  
Nasdaq: CYN



52 Week Range  
\$0.70 - \$6.70  
(As of 11/18/2022)



Shares Outstanding:  
33.7 Million  
(As of 11/9/2022)



Market Cap:  
\$27.3 Million  
(at \$0.81 per share)  
(As of 11/18/2022)



Headquarters:  
Menlo Park, California



Employees:  
62  
(As of 7/31/2022)



Website:  
[www.cyngn.com](http://www.cyngn.com)

# Company Highlights

1. ABI Research Whitepaper: "Trends In Supporting And Scaling Modern Automation"
2. Bureau of Labor Statistics: "Employer Costs For Employee Compensation June 2021". and management estimates



## Proprietary Industry 4.0 solutions for industrial autonomous vehicles

- Cyngn's EAS is a proprietary, full-stack software solution for operating fleets of autonomous vehicles in various industrial applications and delivering real-time industrial intelligence insights.
- Cyngn's technology can operate a wide range of vehicle types, creating unique opportunities for productivity and scalability across sites.



## Large opportunity fueled by global macro trends

- Labor shortage, increase in labor cost and supply chain disruptions accelerate the demand for automated solutions.
- **883,000** material handling vehicles shipped by the top 10 manufacturers in 2019.<sup>1</sup> The labor cost to drive these vehicles for two shifts per day is **>\$119B.**<sup>2</sup>



## Recent Milestones

- Cyngn signs a contract with U.S. Continental, a leading manufacturer of quality leather and fabric care products, to provide self-driving stockchasers ([link](#)).
- Cyngn signs a multi-phase contract with a global building materials manufacturer, expanding DriveMod to electric forklifts ([link](#)).
- Cyngn selects a U.S.-based manufacturing partner to scale production and reduce costs of DriveMod Kit. ([link](#)).

## Industrial Vehicles Move the World

All major industries, from manufacturing, fulfillment, and logistics to mining and construction, rely on their industrial vehicle fleets to operate.

Vehicles do the hard work, moving heavier loads at higher speeds than humans can. With the growth of ecommerce, the demand for skilled labor to operate these vehicles has accelerated. Vehicles have never been able to do this work without a human operator.

Until now...



# Manual Labor Comes at a Very High Cost

1. Bureau of Labor Statistics: "Employer Costs For Employee Compensation – June 2021"
2. Statista: "Number of Warehouses in U.S."
3. MHI Deloitte industry report
4. National Safety Council: "Work Injury Costs - Injury Facts"
5. Bureau of Labor Statistics: "Warehousing and Storage: NAICS 493"

## Ever increasing cost of labor

- 900,000 material handlers, stock pickers, and industrial vehicle drivers in the United States.<sup>1</sup>
- Estimated \$140 billion spent on human labor across 20,000 warehouses in the US alone.<sup>2</sup>

## Widespread labor shortages<sup>3</sup>

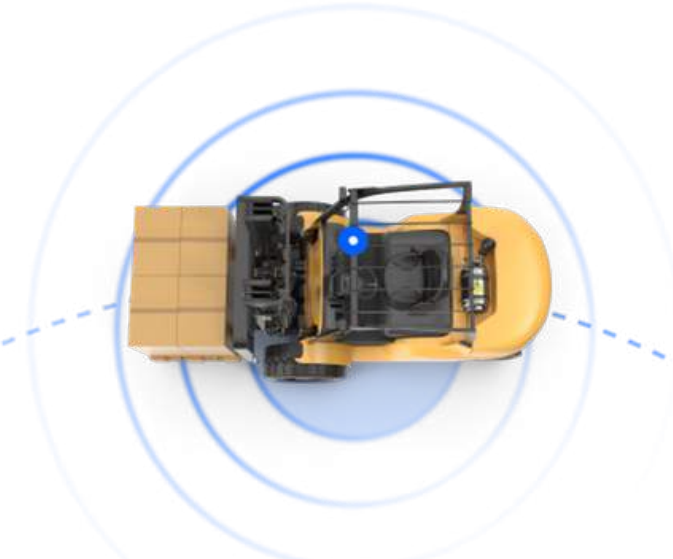
- Over 50% of supply chain & manufacturing leaders rated hiring and employee retention as their biggest challenge.
- 73% said it takes 30+ days to fill open positions.
- By 2030, the impact of unfilled manufacturing jobs could cost the US economy more than \$1 trillion.

## Losses due to accidents

- An industrial vehicle accident, on average, costs \$42,000, not including cost due to lost production.<sup>4</sup>
- The average American warehouse experiences 9 accidents per year.<sup>5</sup>
- The total cost of preventable workplace injuries in the US in 2019 was \$171 billion.<sup>4</sup>

## The Solution is Automation

Forward-looking enterprises that harness automation benefit from:



Lower Variability and  
Cost of Labor



Increased  
Safety



Increased  
Productivity



Reduced Dependence  
on Labor

Automation enables new forms of competitive advantage  
Evolve or be disrupted

## This is Where Cyngn Comes In

We develop autonomous driving software, built to serve a broad spectrum of industrial applications, from logistics to mining.

Billions of dollars in funding and long years of research have focused on robotaxis, trucking, and highway automation, which are not being built to address industrial needs.

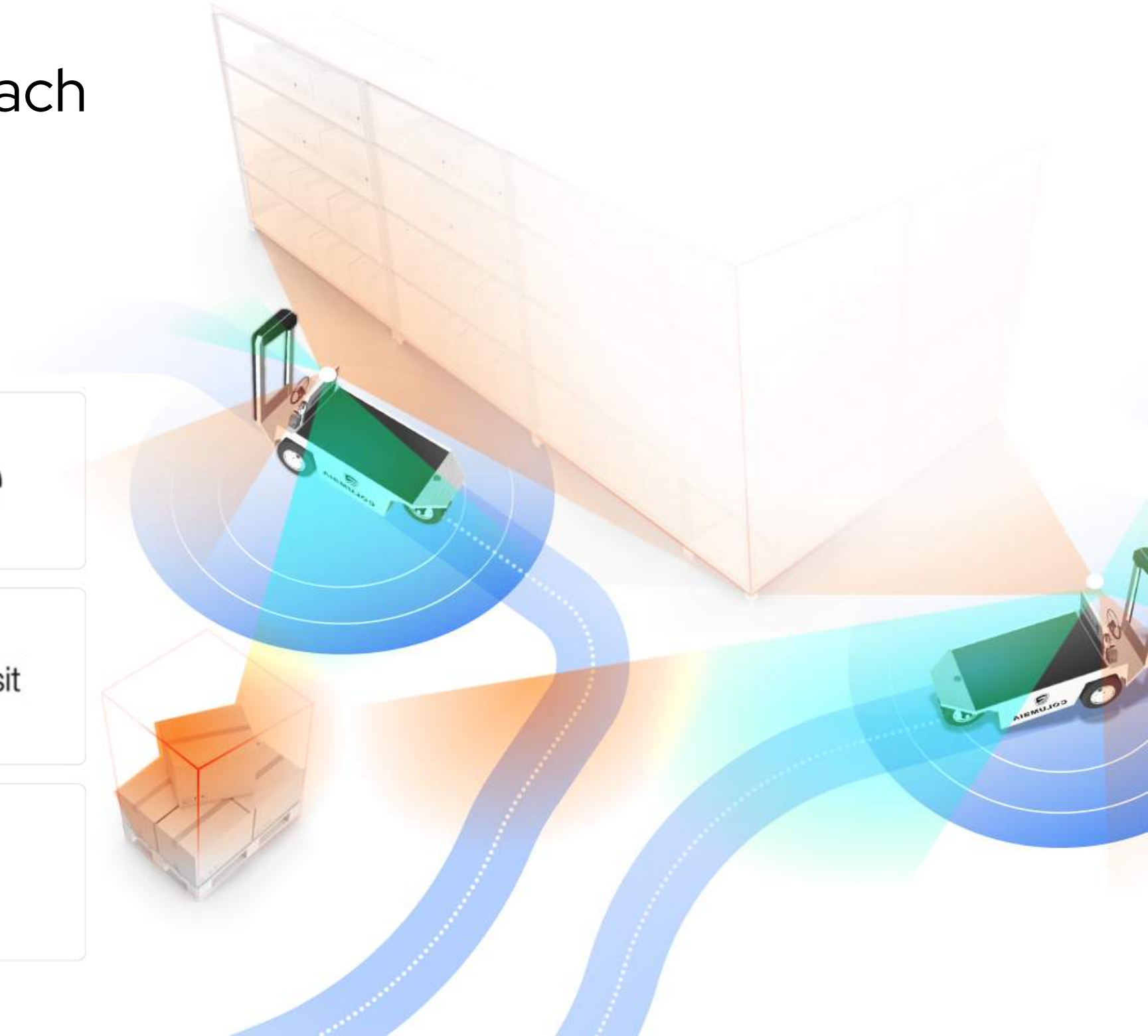
Our AV software stack brings robotaxi capabilities to industrial domains.

**360° perception that is capable of detecting hundreds of people and vehicles per second at centimeter-level accuracy while never getting distracted.**



## We Bring a Collaborative Approach

An ecosystem designed to support scaled, high-quality autonomous fleet deployments



# Cyngn's Enterprise Autonomy Suite (EAS)

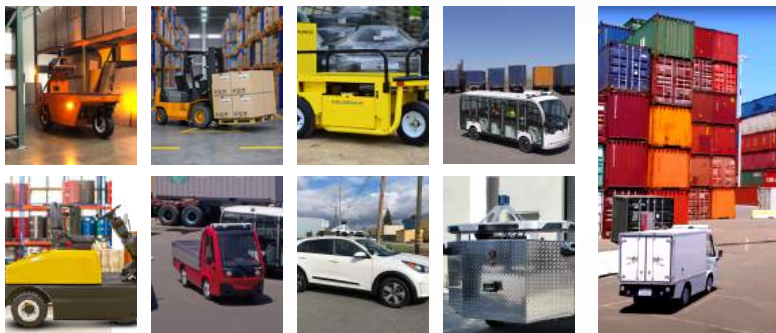
## Customer-Facing Products

## Internal Toolkit



### DriveMod

Full-Stack  
Autonomous Driving  
Software System



Successfully tested on multiple different vehicle types



### Cyngn Insight

Intelligent Control  
Center

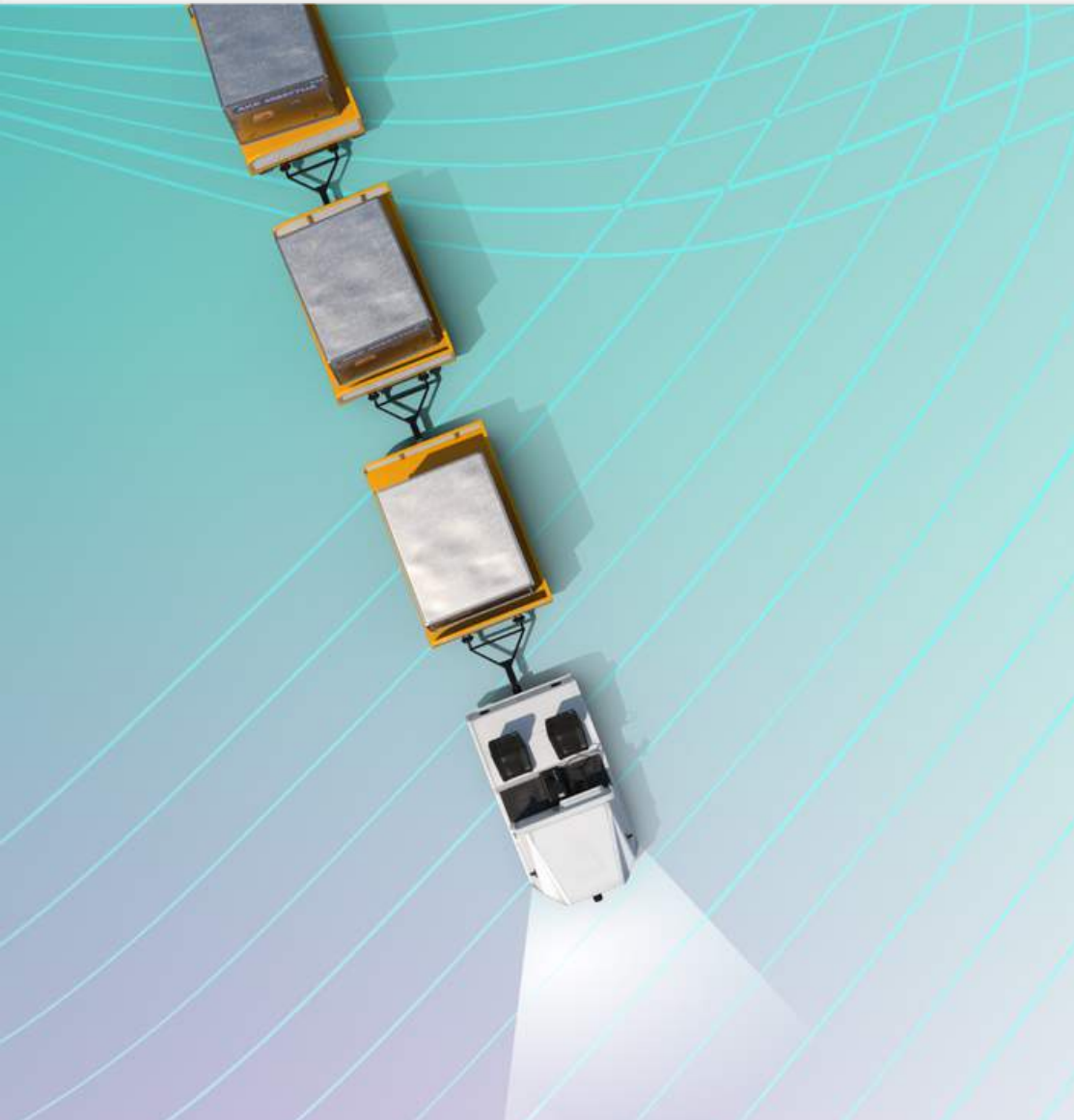
- Fleet management system
- Human-machine interfaces: web, mobile, on-vehicle
- Operational analytics
- Teleoperation
- Real-time diagnostics
- Asset tracking



### Cyngn Evolve

Data Optimization  
Tools

- Data pipeline
- Performance analytics
- Simulation
- Machine learning infrastructure



## EAS is Offered as a Subscription License per Vehicle

### Pricing Factors



Target Vehicle



Utilization

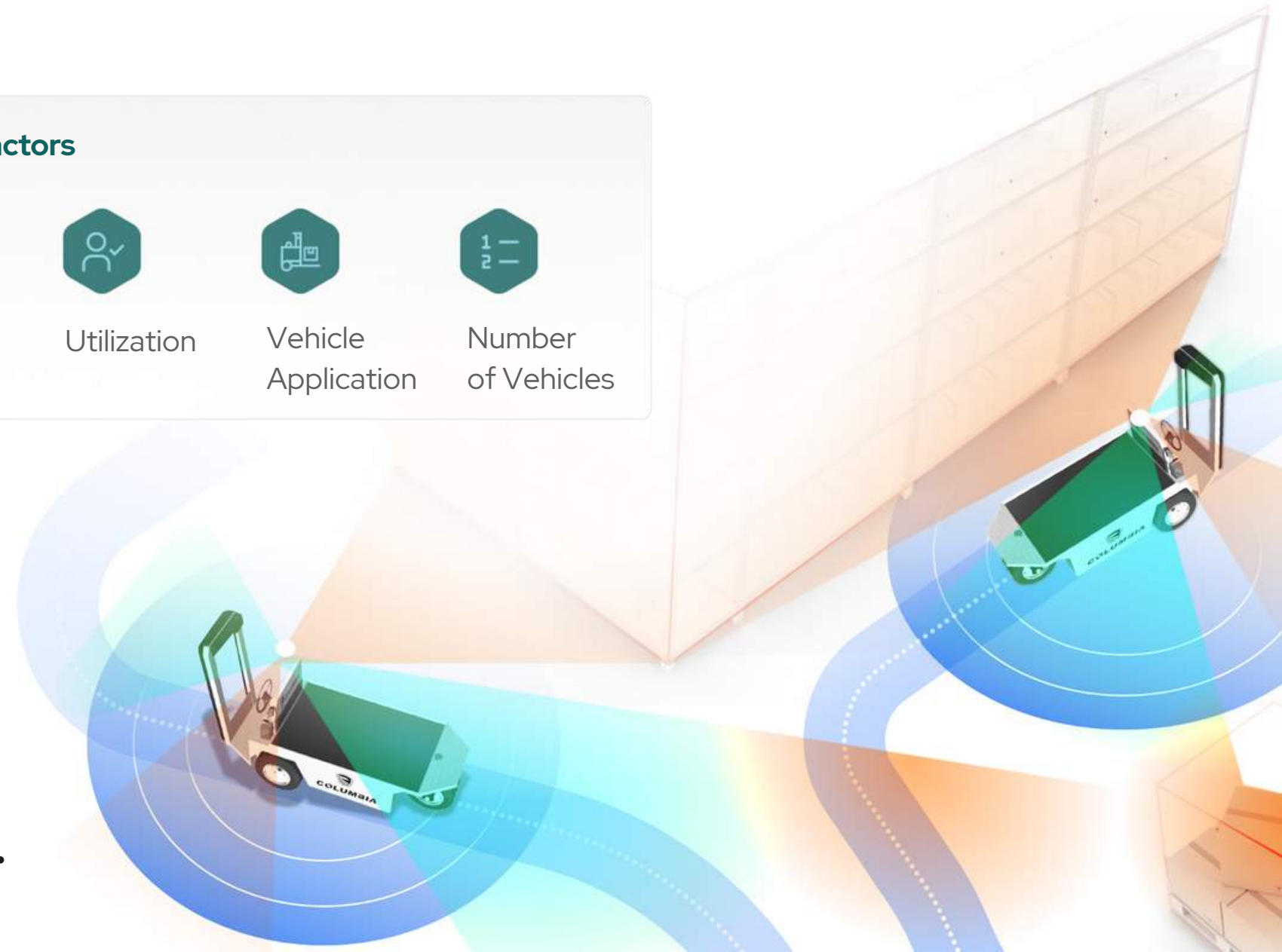


Vehicle Application



Number of Vehicles

**The top 10 material handling vehicle manufacturers shipped 883,000 units in 2019.**



# Cyngn's Opportunity Today

# \$119+ BILLION<sup>1</sup>

annual driver labor costs for material handling vehicles



883,000

units shipped in 2019 by the top 10 material handling vehicle manufacturers<sup>2</sup>



\$32

average cost per hour for transportation and material moving employees in the US<sup>3</sup>



4,174

hours a vehicle is used per year, based on typical two-shift per day operation

1. 883,000 vehicles x 4,174 hours/yr x \$32.34/hr=\$119B
2. ABI research whitepaper: "Trends in supporting and scaling modern automation"
3. Bureau of Labor statistics: "Employer costs for employee compensation -June 2021"




**EVERYTHING THAT MOVES WILL BECOME AUTONOMOUS**


— Nvidia CEO, Jensen Huang





# Wide Adoption of Autonomous Vehicles Starts with Industrial Applications


Compared to open road uses (robotaxi & trucking), industrial applications involve:


- 


More structured operation
- 

Less complex routes
- 

Lower speed requirements
- 

Lower regulatory hurdles
- 

More commonality from site to site
- 

Predictable workflows
- 

Controlled interactions with trained humans

# Material Handling Is Just the Beginning

Industrial and commercial autonomous applications share fundamental technological building blocks.

Cyngn developed these building blocks and integrates them across diverse autonomous driving solutions.

1. Management estimate from Bureau of Labor Statistics data. See slide 12.



Our current focus



**\$119B<sup>1</sup>**

Annual driver costs for vehicles sold by the top 10 material handling OEMs



Our technology



Our technology already applies to additional industrial applications



In the future



In the future, we can expand our offering to public roadways



# Land & Expand

Our vehicle-agnostic AV capability opens more opportunities and creates competitive moats



# Ahead of Our Expansion Timeline

Ahead of schedule in executing our growth strategy when it comes to the key areas of:

## 1. Deployments & partnerships



### Phase 1

2022

- 1 Site → **At Multiple Sites**
  - GL&F | Las Vegas, NV
  - Columbia Vehicle Group | WI
  - Flambeau | Columbus, IN
- 1 Vehicle Type → **2 Vehicle Types**
  - Stockchaser + Forklift (in progress)

## 2. Recruiting

Cyngn has more than doubled the size of its workforce since 2021, with a particular focus on building its engineering team.



**29 employees 2021**

- 16 new hires

**62 employees 2022**

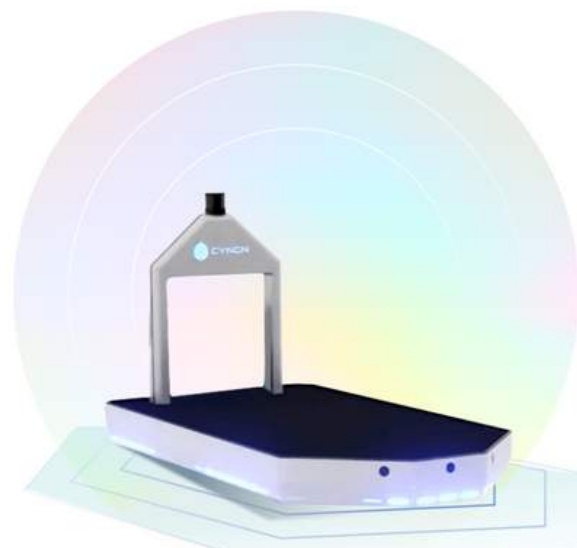
- 36 new hires as of 7.31.22
- Continued growth expected

## Technical Milestones



### Launch of EAS 8.0

- This latest release of EAS includes 138 new features, a 33% reduction in component complexity, and a 75% reduction in cloud computing costs ([link](#)).



### Launch of DriveMod Kit

- Cyngn begins to build patent-pending sensor module, DriveMod Kit, designed to retrofit existing vehicles or integrate onto newly manufactured ones ([link](#)).



### Building with an OEM

- Columbia Vehicle Group announces it is building a fleet of autonomous industrial vehicles that use Cyngn's AV technology ([link](#)).

## Commercial Milestones



### Contract Win to Deploy Industrial AVs

- Cyngn signs a contract with U.S. Continental, a leading manufacturer of quality leather and fabric care products, to provide self-driving stockchasers ([link](#)).



### Contract Win and Expansion to Forklifts

- Cyngn signs a multi-phase contract with a global building materials manufacturer, expanding DriveMod to electric forklifts ([link](#)).



### Scale Production of DriveMod Kit

- Cyngn selects a U.S.-based manufacturing partner to scale production and reduce costs of DriveMod Kit for autonomous stockchasers. ([link](#)).

## Case Study: Increased Productivity for Global Logistics and Fulfillment (GL&F)

Cyngn's research found that the deployment of a DriveMod-enabled Autonomous Stockchaser at a Las Vegas 3PL facility led to an immediate increase in efficiency.

64%

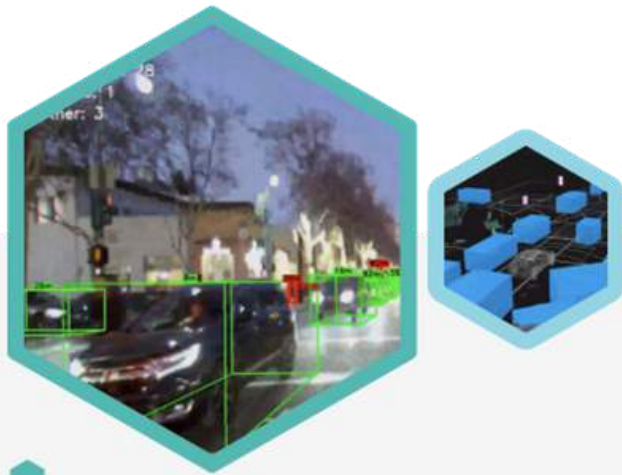
A 64% reduction in human labor costs when using Cyngn's Autonomous Stockchaser vs. using a forklift.

33%

A 33% increase in efficiency when using Cyngn's Autonomous Stockchaser vs. using an electric pallet jack ([link](#)).



# Our Competitive Advantages



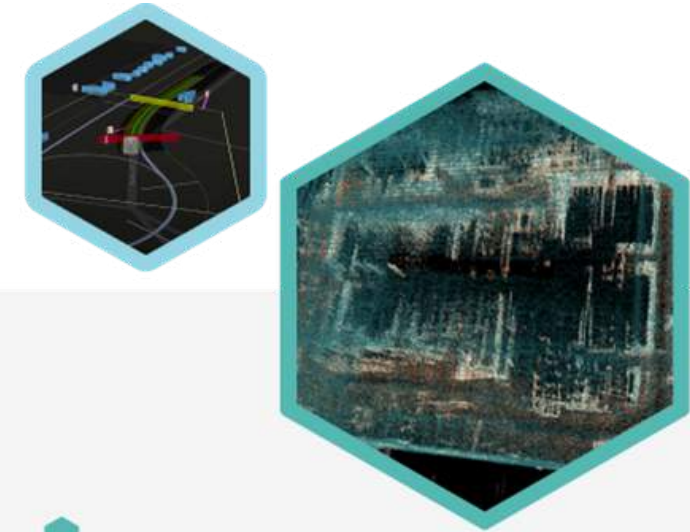
## Advanced autonomy

- Developed for robotaxi capability by using leading technology like AI, sensor fusion, and abstract decision making.
- Takes advantage of sensor and computing advancements that are driven by high-volume, high-quality automotive industry.



## Multiple applications

- DriveMod can be deployed on a wide range of vehicles, creating a unique offering to support multiple applications across sites.
- EAS collects data that can expand capabilities within the application and grow into adjacent applications.



## Your vehicle powered by our software

- DriveMod can be retrofitted onto existing vehicles to accelerate adoption, and vehicles can still be driven manually.
- We partner with vehicle manufacturers that are trusted incumbents.
- Customers can take advantage of established distribution and support networks.

# Key Takeaways

## \$119 Billion Market

An opportunity to invest in a company focused on practical applications in the growing automation market that addresses the very real problem of dependence on a human workforce, particularly in an ongoing pandemic environment

## Differentiated Technology and Approach

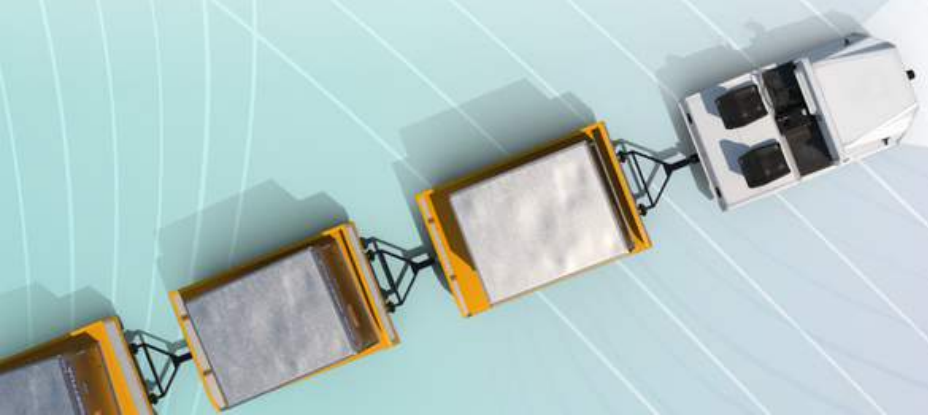
Proprietary, innovative technologies for operating various industrial vehicles autonomously within a flexible, scalable framework

## Key Strategic Partnerships

Product and go-to-market strategies supported by partnerships with reputable global firms in mobility, logistics, and industrial markets

## Winning Team

Experienced leadership backed by best-in-class R&D team



# Thank You!



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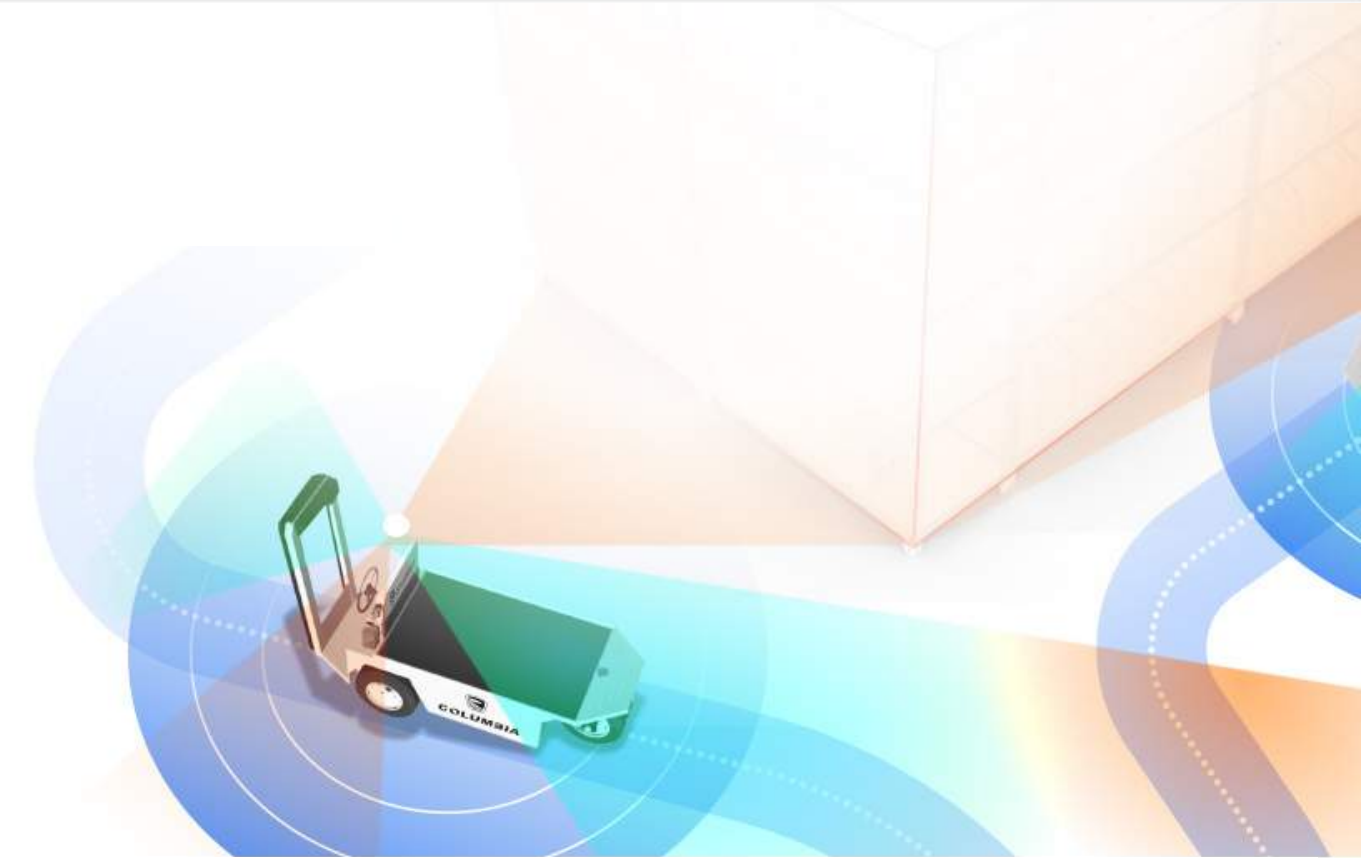
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# Appendix



# CynGN's EAS Underpins Three Industry 4.0 Pillars

- Human-machine interaction: robotics and automation
- Connectivity, data, computational power: sensors and IoT
- Analytics and intelligence: advanced analytics, machine learning and AI



**The role of Industry 4.0 becomes even more critical in the backdrop of a crisis such as COVID-19. Players utilizing digital solutions are better-positioned to weather the storm, having moved faster and further than their peers during the crisis.**

– McKinsey&Company

<https://www.mckinsey.com/business-functions/operations/our-insights/industry-40-reimagining-manufacturing-operations-after-covid-19>

# Autonomous Vehicles Drive ESG Impact



## Productivity

### Centre for Economic Performance study found:

- Investment in robots contributed 10% of growth in GDP per capita in OECD countries from 1993 to 2016.<sup>1</sup>
- The impact of adding robots to industrial productivity is assessed to be higher than introducing steam technology was in the 19th century.<sup>2</sup>



## Sustainability

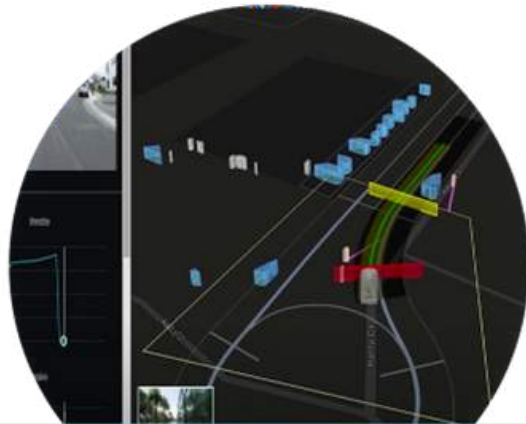
- Our fleet is comprised of all electric vehicles
- Autonomous vehicles can be programmed to drive with more conservative throttling and braking

1. Information Technology & Innovation Foundation: "Robotics and the Future of Production and Work"
2. Centre for Economic Performance: "Robots at Work"



## Train Hard, Drive Easy

Stress tested under extreme conditions to ensure commercial readiness



### 2016

- Began developing AV solutions in complex mixed traffic to overshoot the requirements of industrial sites.



### 2017

- Autonomous electric utility vehicles at an International Container Terminals Services (ICTSI) container port in the Philippines.



### 2019

- Autonomous electric shuttle buses at the Loblaw corporate headquarters in Canada.

# DriveMod

## Robotaxi brain for industrial vehicles

The result is superhuman capability:

360° perception around the vehicle

Detect hundreds of objects/obstacles per second

Calculate hundreds of candidate paths per second

Navigate optimal detailed path



### See

- Multi-modal sensor fusion
- AI/ML powered perception
- Existence-based virtual bumper
- High-definition semantic maps
- Laser-accurate localization



### Decide

- Abstracted behavioral decision framework
- Context-aware prediction
- Hundreds of candidate paths proposed per second
- Dynamic routing and motion planning



### Act

- Adaptive, intelligent control that can operate a wide range of vehicle types and sizes

## Cyngn Insight

Fleet monitoring and management to maximize asset utilization:  
operate, observe, and analyze



Remote Support and Teleoperation



Business and Operational Insight



Fleet Management and Diagnostics



Infitracker - Asset Tracking



# Cyngn Evolve

How Cyngn expands its autonomous vehicle capabilities



Hybrid simulation & automatic grading frameworks



Machine learning infrastructure & data pipeline



Autonomous vehicle performance analytics



# Balance Sheet Highlights



	📅 12.31.21	📅 9.30.22
Cash & Short-term Investments	\$21.9m	\$27.7m
Working Capital	\$22.1m	\$27.3m
Total Stockholders' Equity	\$22.2m	\$28.8m