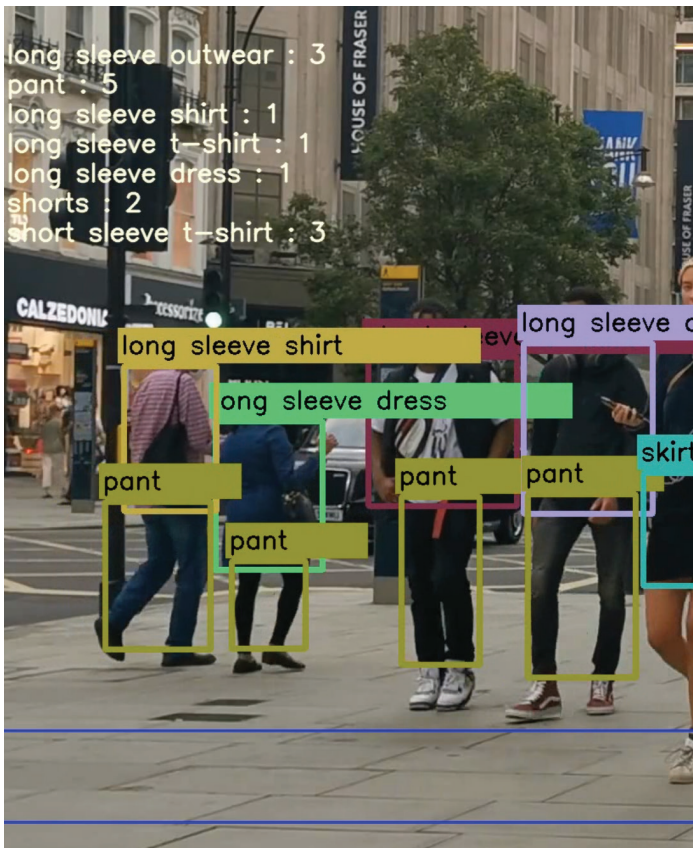


A Guide to Computer Vision for Your Business Spaces

How banks, manufacturers, retailers, and others get the greatest value from their physical data with NaViSense solutions



Is Computer Vision Your Missing Piece?

Physical commercial spaces produce vast amounts of visible environmental data—whether the banks, retailers, and other organizations that operate them realize this or not. However, few of these organizations are leveraging data from physical activity to improve operations, logistics, customer experiences, and sales.

Computer vision makes those improvements possible. As *Forbes* describes, computer vision “allows computers to perceive elements of the physical world and interpret them” in much the same way human beings see physical stimuli and make decisions based on what they see. “Most tasks that involve recognizing or analyzing visual data can be automated using computer vision, and computer vision solutions are becoming more powerful all the time due to rapid advances in deep learning.”

Increasingly, companies in retail, banking, manufacturing, and other industries need computer algorithms that can visually detect patterns in objects, then provide output for data analysis. Combined with **edge computing**—computing that is done on-site or near a particular data source—purpose-built computer vision solutions can produce insights and even carry out decisions, such as making recommendations or displaying personalized content to in-store customers, in near-real time.

Fortunately, computer vision, advanced analytics, and the technologies and teams that support them are now less costly, more accessible, and more effective than at any point in their history. Companies can also begin leveraging computer vision without complex changes to their existing operations.

In this report, we discuss the challenges, opportunities, use cases, and best practices for new computer vision technologies in these industries. You will discover:

- Problems and challenges with traditional video tools
- Use cases for computer vision and supporting partner ecosystems
- Details about how computer vision technologies in these environments work
- The deep value companies stand to gain for their businesses

A Digital Step Forward for Live Business

Companies that operate physical spaces frequented by employees or customers have unique and growing challenges. Recent supply chain disruptions and competitive digital alternatives mean they need to do more to engage customers, personalize experiences, and optimize operations such as inventory management.

Acquiring and acting on in-depth, real-time customer data—especially through automation and intelligence analysis—are now critical capabilities for these companies. But leveraging these capabilities in meaningful ways requires AI, partner ecosystems, and interactive tools that help these companies make strategic decisions and even automate aspects of their physical environments.

With past computer vision solutions, data has to be sent to the cloud for processing, with potential concerns for latency and high data processing costs. But when computer vision output is analyzed at the edge, companies can make critical decisions in a matter of minutes. They can also optimize and even automate key aspects of their operations.

"AI that's embedded at the core of everything from architecture to operations [can] bridge the business-to-customer divide," describes [Forrester](#), highlighting computer vision as a key part of this trend. "In 2022, we expect traditional businesses to adopt this AI-first approach [and] shrink the latency between insights, decisions, and results."

What's more, companies can aggregate data from multiple spaces and apply insights for broader corporate strategies. Computer vision, therefore, has applications both at the edge within a single store or facility and at executive decision-making levels where leaders can visualize all their physical operations.

Introducing NaViSense

NaViSense is a cost-effective, easy-to-use solution that combines computer vision, edge computing, and analytics to gather key, environmental data points and drive business insights in near-real time. With computer vision, NaViSense can "see" the world, analyze visual data, and then make decisions, providing companies with a deep understanding of information and activity in their physical spaces.

Paired with baseline compute capabilities that run at the edge, NaViSense enables companies in these industries to use existing camera equipment and data dashboards—such as Tableau, Grafana, Power BI, and others—and export data with an open REST API using the JSON data format. With the support of its partner ecosystem, NaViSense can adapt to any variety of use cases in these environments.



Video Intelligence, Evolved

Past solutions featured centralized server and cloud architectures with smart cameras, and sometimes with proprietary hardware and dashboards. With NaViSense, Sharp/NEC Display Solutions (Sharp/NEC) and its ecosystem of partners are ushering in a new era of low-cost, easy-to-use computer vision solutions using edge-computing, open architecture, and off the shelf cameras. Additionally, Sharp/NEC displays can function as the data gathering and edge-processing IoT devices.

With the support of its partners, Sharp/NEC defines all data points and provides the NaViSense technology to make intelligent data collection and analysis possible. Sharp/NEC works with integrators to build a business around its services, including installation, provisioning of an API for companies' existing dashboards, and both installation and integration with companies' preferred technologies. Even better, NaViSense's Raspberry Pi4 compute module integrates with off-the-shelf cameras and displays, so no specialized hardware is required.

Partnerships to Help Make Data Actionable

Companies that use NaViSense must establish goals for their data and determine which aspects of their video they will use for their analyses. Fortunately, NaViSense provides active human intelligence through its partner ecosystem as part of its solution, helping companies identify trends and act upon them in ways that drive meaningful business results.

Case Study: Improving Customer Experiences in Retail Banking

A retail bank used NaViSense and its analytics partners to focus on customer insights within their physical branches. The bank knew a great deal about its customers based on their transactions, but it wanted to know more about customers' habits and relevant details. For example:

- customer demographics within branches at certain times of day
- the times at which branches were busiest
- the average wait times within branches at certain times of day
- the types of cars customers drive and brands of clothing they wear

NaViSense and its partners helped the bank identify opportunities based on customer details, habits, and timing. As a result, they optimized how they engaged customers in their retail banking environments.

How the Technology Works

In practice, this ecosystem of partners and technologies facilitates the flow of information, to analytics, to action, from physical spaces through the lens of computer vision and into user dashboards to inform smarter business decisions. An external device, such as an off-the-shelf USB/IP camera or cameras, captures activity in one or more physical commercial spaces. This activity is then processed within an rPi4, SDM, or other computing device using a variety of sophisticated machine learning algorithms. The output is made available through a REST API in an easily consumable JSON format.

What the Technology Looks Like

Despite its range of capabilities, leveraging NaViSense requires very little in terms of hardware. As indicated, NaViSense and its partners can integrate off-the-shelf camera and display solutions, and its REST API enables teams to continue using their preferred dashboards for analysis as well.

- **Compute:** A Raspberry Pi4 compute module, external Pi, or SDM integrated with a display device
- **Display:** ME/M/MA/P Series, projectors, or LED, if needed
- **Camera:** Compatible with a variety of digital, USB, Raspberry Pi, and IP cameras
- **Software:** Analytics for a variety of physical data: customer attributes, people count, logo detection, wait times, vehicle classification, clothing detection, object color detection, and other customer attributes
- **Database:** A NoSQL or integrator-provided database supporting the user's choice of integrator-provided dashboards or an API export to the user's existing dashboards, such as Tableau, Grafana, or Power BI.

In these ways, NaViSense and its partners provide any company with the “building blocks” for their own personalized computer vision solution. No matter their model of choice, companies enjoy low costs with minimal additional hardware required.

How NaViSense is Different

As computer vision solutions become more popular, NaViSense will remain the most advantageous option due to its cost effectiveness, power, flexibility, and partner support. Here are just a few ways NaViSense and its partner ecosystem stand out in the field:

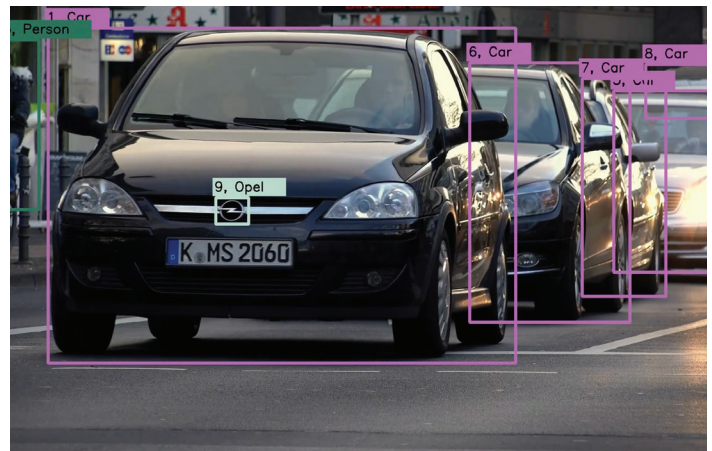
- **A partner ecosystem that adds real value.** NaViSense’s data analytics partners provide supplemental services to ensure you get the most from your analytics with actionable results. NaViSense’s ecosystem of integration partners ensures you have the most cost-effective use of your hardware as well.
- **Simple implementation and API availability.** Most other computer vision projects require dramatic changes in terms of both hardware adoption and employee usability. They may also require costly investments in consultant work. NaViSense and its partners do the heavy lifting so that companies can begin very easily.
- **Dozens of attributes for measuring.** Companies can set up a “field of view” that includes all their predefined attributes of interest—including traffic, logos, time of day, and others. NaViSense’s AI gathers data and makes decisions based on those attributes, ensuring the best possible analytics output.
- **Data, analysis, and result in near-real time.** In most cases, it’s difficult to acquire data from physical spaces in a cost-effective and meaningful way. NaViSense at the edge is so powerful that retailers have the potential to push contextually relevant content on their in-store customer-facing displays based on the attributes of customers nearby.
- **Actionable visualizations.** Whether they use their own dashboards or adopt new ones as part of their solution with NaViSense, companies’ users get the greatest possible value and usability in their analytics-driven visualizations.

Potential Use Case:

A Sporting Goods Retailer Personalizes In-Store, Customer-Facing Displays

For retailers, determining which content to display on in-store devices presents a challenge. Static options may not be the most effective use of their display devices, and it’s difficult to anticipate what varieties of content will resonate with customers at any given time.

Imagine a sporting goods retailer queuing up video content based on age, gender, and what logos customers are wearing once they walk into the store. Perhaps the retailer can display contextually relevant content when a customer picks up an item as well. NaViSense provides additional valuable insights by gathering anonymous customer attributes to help inform content development, advertising, and even merchandise assortment.



Achieve Deep Value from Your Computer Vision Solution

The future of computer vision isn’t new hardware and software alone. “Implementing computer vision is not purely a technology project; it also needs business and interpersonal talent,” as *Forbes* describes.

It is end-to-end services, made possible by robust partner ecosystems, that ensure you achieve the greatest value from your computer vision investment. Start discussing computer vision opportunities with your internal stakeholders, and develop your own unique goals and interests as you begin.

Start a Conversation with Sharp/NEC

NaViSense solutions from Sharp/NEC are purpose-built for your business, with minimal cost and operational disruptions. Investing in solutions with NaViSense ensures you benefit from the ongoing support of our robust partner ecosystem as well. For a free demonstration, [contact Sharp/NEC today](#).

Sharp NEC Display Solutions of America, Inc. is the leading global provider of professional and commercial visual technology and digital signage solutions, owned jointly by Sharp Electronics Corporation and NEC Corporation. Serving a wide variety of markets, the organization’s expertise spans education, digital signage, graphics, healthcare, restaurants, retail, enterprise, entertainment, transportation, and more. For additional information, visit <https://www.sharpnecdisplays.us/>.