

# GRIDSMART Supports Safe Traffic Intersections with Advanced Video Analytics from CVEDIA ITS Solutions.

**CVEDIA helped GRIDSMART improve safety at traffic intersections with their cutting-edge AI solution powered by Intel processors and optimized with the Intel® Distribution of OpenVINO™ toolkit.**

## The Obstacle of Successful AI: Resources, Expertise, and Accuracy

In today's environment, companies recognize that they need to find ways to stand out from the competition, and many are turning to AI to gain that competitive edge. In 2023, 35% of companies will use AI, and 44% of private sector companies plan to invest in it within the year.<sup>1</sup> However, AI is only as effective as its deep learning models, and many companies don't have the expertise or resources to create effective and accurate models that empower them to make the most out of their data. Whether companies lack the data science expertise or funds to develop their own machine learning models, or experience difficulty finding answers to unforeseen scenarios in their AI models, implementing AI can seem impossible. CVEDIA offers a solution to help enterprises overcome common AI challenges and shift the narrative from AI is impossible to AI is accessible for anyone with the right tools.

## The GRIDSMART Challenge

GRIDSMART, an intelligent traffic system provider, was searching for a solution that would help them solve a common problem in the AI industry: false positives and false negatives. With cameras installed at thousands of traffic intersections across the world, GRIDSMART needed to train its AI algorithms to perform multiple traffic management functions, including accurately detecting vulnerable road users, particularly cyclists, in highly variable scenarios and environments.

False detections of cyclists or vehicles make the traffic signal actuation lag, which results in an inefficient system that slows the flow of traffic and causes traffic congestion. Detection failures can result in lengthy wait times at lights for vehicles, pedestrians, or even cyclist and pedestrian injuries. To combat these scenarios, GRIDSMART needed to protect its AI algorithms from being fooled by different variables in the environment.



**"Safety is the most fundamental need for all drivers and vulnerable road users traveling through intersections.**

**CVEDIA's AI and synthetic data expertise allow us to both augment our existing AI models and rapidly iterate for new applications."**

**—Jeff Price**

**Vice President and General Manager of GRIDSMART's ITS Unit**

These variables range from dust or mud impacting an intersection camera's vision, rendering false positives, to shadows or occlusions causing the AI solution to misread the scene of the intersection at different times of day and night.

However, to train the AI algorithms to recognize these variables in different environments, GRIDSMART needed to feed the AI algorithms with imagery data on cyclists in each possible scenario— data that is highly impractical to find or replicate before deployment. GRIDSMART turned to CVEDIA to create this data that would train their AI models to be accurate in all anticipated scenarios.

### The Solution: CVEDIA's Video Analytics and Computer Vision Solutions

CVEDIA is a next-generation AI solution provider for data-limited devices. Committed to removing the burden of difficult and expensive AI, CVEDIA's unique inference engine, CVEDIA-RT, offers dozens of pre-installed video analytics solutions. From crowd estimation to vehicle detection and more, all solutions provide an intuitive modular design that makes them easy to customize and deploy with any Intel® Edge hardware.

What further differentiates CVEDIA's ready-to-use AI solutions is their superior machine learning algorithms. CVEDIA's AI solutions are trained using an advanced combination of synthetic data, 3D design, and data science that outperforms traditional AI models. This innovative technology also enables CVEDIA to help companies create data they don't have or don't want to wait to capture for the risk of the solution having negative consequences, such as a cyclist getting injured. This capability made CVEDIA GRIDSMART's ideal partner to train and improve the performance of their AI algorithms.

CVEDIA created synthetic data of cyclists crossing the intersections, expertly simulating the fisheye camera lens and aerial view of GRIDSMART's intersection cameras to replicate situations that would be highly impractical, or even dangerous, to collect from real-world scenarios. This allowed GRIDSMART to access the exact data they needed to train their AI models for their traffic lights without risking the safety of real cyclists, motorists, and pedestrians during the process.

With this synthetic data, GRIDSMART was able to train their solution to recognize cyclists crossing the intersection. What's more, GRIDSMART discovered that the synthetic data outperformed real-world data while helping them remove two common barriers within AI product development: AI data collection and deployment.



Above you can see CVEDIA's computer vision solution detecting which lanes vehicles are driving in to support GRIDSMART's traffic management solution.



Estimate crowd size: 347



## CVEDIA Accelerates and Improves AI Data Collection

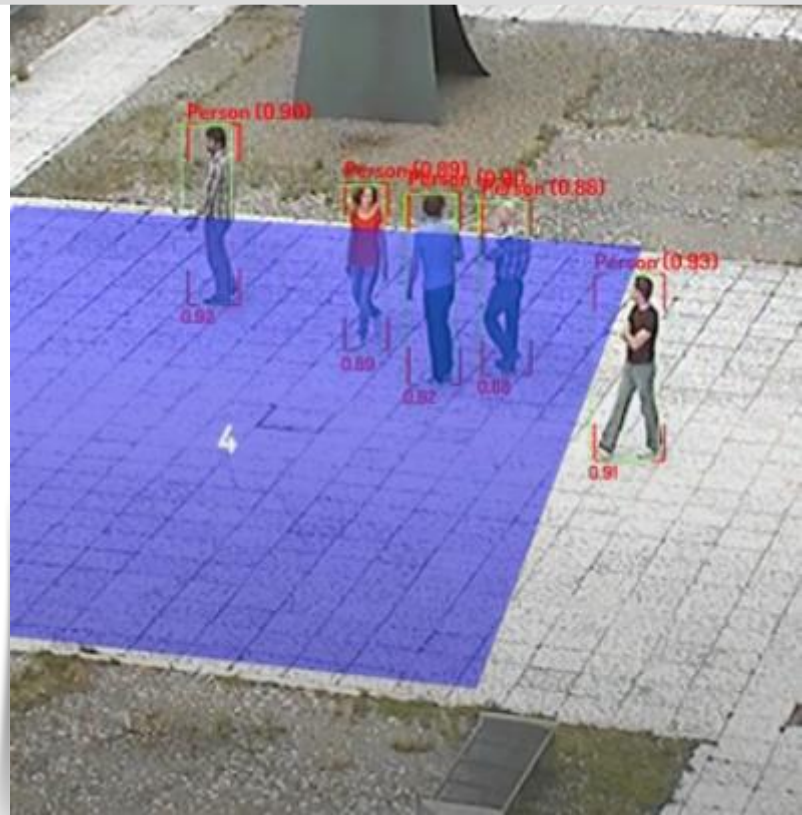
CVEDIA removed GRIDSMART's AI data collection barrier because their ITS solutions eliminate the need for GRIDSMART to collect natural imagery from their traffic lights to train the AI models. Instead, CVEDIA created synthetic data to deliver GRIDSMART new, more accurate AI models in days, as opposed to the months and years that would otherwise be required to collect a large enough sample of natural data. In fact, CVEDIA uses synthetic data internally to build CVEDIA-RT's ready-to-use AI solutions. Doing this enables system integrators and technology product companies like GRIDSMART to build or expand their video analytics capabilities for a wide range of video inputs while bypassing the AI data collection.

This rapid turnaround in AI training enables CVEDIA's customers to reduce time spent in pre-production and achieve faster go-to-market without sacrificing AI effectiveness. This advantage is critical in helping products like GRIDSMART's intelligent traffic solution achieve its smart city initiatives faster and proactively operate safer traffic intersections. It also enables CVEDIA to be more affordable than other video analytics providers on the market. The synthetic data itself can replicate and run on a range of niche AI solutions, from fisheye camera lens to thermal AI solutions, and is compatible with all Intel® Edge hardware. This versatility makes CVEDIA easy to adapt to product technology companies like GRIDSMART that use a fisheye camera lens to manage traffic intersections.



## A Smarter Way to Deploy AI

Another major way CVEDIA helped GRIDSMART accelerate and improve AI training was by providing a more efficient approach to deployment. Many companies train their AI models in a cloud environment. If the solution is going to run in a hybrid operation or on an embedded device, this creates many challenges. It requires the company to port a heavy AI algorithm in a power-constrained embedded device that may not have the compute power to run the model.



If this occurs, the company is left with the tedious task of quantizing and pruning the AI model to fit the device's computational requirements, which often lowers the solution's speed and performance.

CVEDIA provides a superior customer experience by developing AI models for the specific device they will be running on. In every engagement, the first question CVEDIA asks their customer is where the AI solution will be deployed. Based on this answer, CVEDIA aligns the training and deployment methodology so that customers like GRIDSMART receive a highly optimized AI model for that power-constrained device and take advantage of all the device's computing capabilities from the outset. This deployment method is highly beneficial in the long run as customers may discover a new use case or experience "model drift," an inevitable phenomenon where the AI model encounters a new object and needs to be re-trained to recognize it. For instance, the introduction of electric scooter sharing in metropolitan areas was a prime example of new transportation designs that could impact the AI model's performance and be mistakenly detected as something else. When this happens, CVEDIA can quickly iterate and redeploy the solution for the device.



In the case of GRIDSMART’s deployment, the inference had to take place at the intersection. To accommodate this, CVEDIA ran the inference onsite with edge devices powered by Intel® Core™ i3 processors and Core™ i5 processors and models optimized for this hardware with the Intel® Distribution of OpenVINO™ toolkit. Intel® Core™ processors enable powerful computing at the edge, a requirement for running intensive on-premises inferencing in real-time, and by optimizing models with OpenVINO™ CVEDIA ensured GRIDSMART was getting the best AI acceleration and inferencing performance out of their hardware. In addition, this combination of hardware and software enables CVEDIA to offer GRIDSMART regular OpenVINO™ updates that help improve performance and compute efficiency so they can continue accessing the most optimized environment for their AI models.

Across thousands of intersections in the US and Europe, this process optimization gives GRIDSMART’s AI models more compute power, making them faster, more accurate, and more energy efficient. Enabling CPU capacity is especially beneficial when an intersection camera has large compute requirements, such as if there is heavy traffic at the intersection. By offering GRIDSMART the most optimized AI software for their hardware architecture, CVEDIA is ensuring that the solution is working at full performance to create safe intersections and protect all crossing pedestrians and vulnerable road users.

## Intel technology optimizes the performance of CVEDIA ITS Solutions for Edge

### Intel® Core™ Processors:

24/7 AI-based computer vision for smart city solutions like GRIDSMART’s intelligent traffic system can be power-intensive, expensive, and have significant consequences when not effective. CVEDIA optimizes all solutions for Intel CPUs to provide their customers with high processing power and performance at an affordable price. With Intel® Core™ Processors, CVEDIA’s customers can develop and deploy AI models on accessible hardware that optimizes the accuracy and speed of their AI models.






### Intel® Distribution of OpenVINO™ toolkit:

The Intel® Distribution of OpenVINO™ toolkit further optimizes the platform by increasing the accuracy and reliability of the AI engine. With the help of Intel’s software optimization platform, CVEDIA was able to deliver GRIDSMART AI video analytics that were faster and more accurate than their original solution.



## GRIDSMART Realizes the Full Business Value of AI with CVEDIA

GRIDSMART’s engagement with CVEDIA enabled them to make AI more:

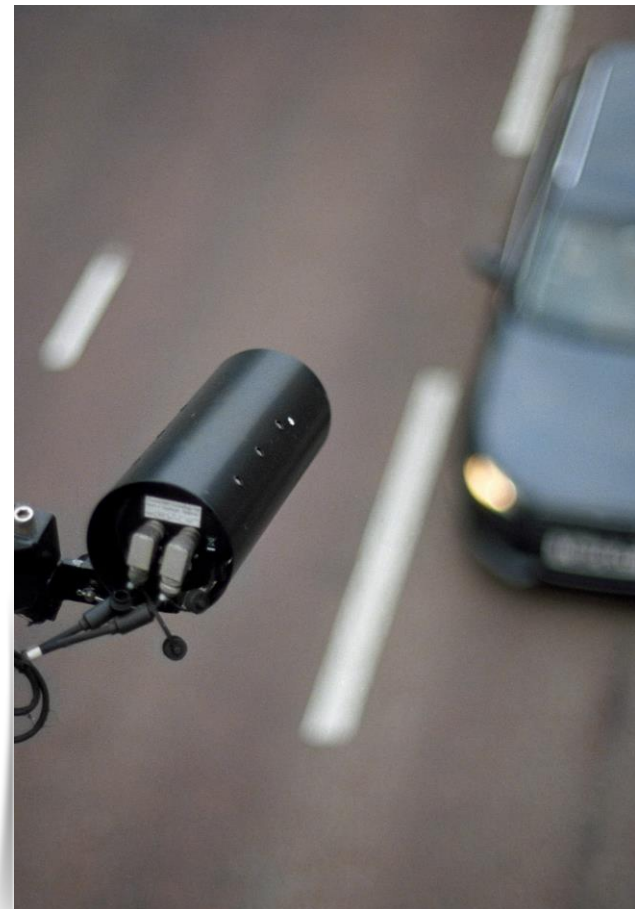
 <h3>Affordable</h3> <p>CVEDIA’s synthetic data models enable GRIDSMART to eliminate expensive data collection and training, image annotations, and vendor partnerships, helping them realize significant financial savings.</p>	 <h3>Easier to Harness</h3> <p>GRIDSMART improved their intelligent traffic system’s performance by 33% through CVEDIA’s engagement and with the use of Intel hardware.<sup>2</sup></p>	 <h3>Accurate</h3> <p>The ability to train AI models with synthetic data for every scenario enabled GRIDSMART’s AI models to commit 2.2 times less errors than previous models, increasing the accuracy rate from 89% to 95%.<sup>3</sup></p>
 <h3>Profitable</h3> <p>With pre-built, custom AI solutions, CVEDIA was able to deliver GRIDSMART a better product with fast time to market—enabling sustainable, accelerated profitability.</p>	 <h3>Faster</h3> <p>By optimizing AI deep learning for Edge devices, CVEDIA creates AI models that are 800% faster than other AI-based video analytics providers.<sup>4</sup></p>	

## Proven Success Leads to More Deployments

Within GRIDSMART’s engagement, CVEDIA’s purpose was to lift the massive resource burden of AI so GRIDSMART could focus on their commercial product, the intelligent traffic solution, and its greater purpose of creating a safer, better world. CVEDIA’s computer vision expertise helped GRIDSMART leverage analytics that are more accurate, faster, and affordable compared to traditional solutions. Based on these successes and more, GRIDSMART deployed CVEDIA’s AI solutions across their intersection cameras placed all over the world. Additionally, GRIDSMART enjoyed the benefits of CVEDIA’s AI solutions so much that they expanded the engagement to deploy AI models for additional use cases.

CVEDIA’s engagement was expanded to provide the following additional AI models:

Vehicle, Pedestrian, Bicycle, and Animal Object Detection	Vehicle Classification	Vehicle Route Direction
Vulnerable Road User Detection	Pedestrian vs. Bicycle Detection	3D Intersection Mapping



## CVEDIA Meets Your Business Where You Are

CVEDIA was born out of the idea that AI doesn't have to be hard, expensive, or take a long time to be productive. That's why CVEDIA offers holistic AI solutions that leverage synthetic data to minimize AI model errors and enable customers to customize the AI solutions to their video feeds, hardware, use case, and industry. CVEDIA offers two types of engagements that apply to a wide range of customers, whether they've been employing AI for years or are just starting now. [Click here](#) to schedule a consultation with CVEDIA's team.

### 1 Existing AI-Infrastructure Engagement

Firstly, CVEDIA partners with product companies that are mature in their AI product development to help them solve their unique challenges with AI computer vision. CVEDIA's services include but are not limited to providing a CVEDIA-RT pre-built AI solution, correcting false positives and false negatives, training AI models for new use cases, and supporting onsite AI deployments with software maintenance and updates. In these engagements, CVEDIA improves the performance of an existing AI-based camera solution or helps the customer expand their current product offerings to remain competitive. CVEDIA can do this in two ways: by expanding the solution's next-generation features or by assisting the customer in capturing market share in an entirely new vertical.

### 2 Civic Engagement

The second type of engagement is for companies that are in the early stages of product development or evaluating the use of AI to become more competitive. In these engagements, CVEDIA can assess if AI is the right solution for their business and help them implement a CVEDIA-RT AI solution. In the case that the business is seeking an AI model yet to be available in CVEDIA-RT's inference engine, CVEDIA can also act as an outsourced machine learning team to create and integrate a new AI model into their product. In the CIVIC engagement, CVEDIA manages end-to-end AI development and deployment to provide maximum business value.

### Royalty Licensing

In all engagements, CVEDIA offers royalty licensing to show their commitment to their customers. CVEDIA realizes that AI production is a heavy resource burden, which is why their business model is performance-based to ensure their customers realize optimal value from their AI operations. CVEDIA charges a small upfront cost depending on the solutions the customer needs and the business problems they are trying to solve and invests in the customer's business, helping them create a commercial product that generates revenue. Once the product is commercialized, CVEDIA and its customer will profit together and can expand the next-generation AI features to continue growing their partnership.





CVEDIA is a next-generation AI solution provider that develops machine learning algorithms for data-limited apps using synthetic data, 3D design, and data science. CVEDIA's synthetic algorithms outperform traditional ones and lead to safer, quicker market releases. Implemented by over 30 top companies, CVEDIA's technology is GDPR- and CCPA-compliant to provide superior business intelligence and data privacy.

## Learn More

[CVEDIA Website](#)

[CVEDIA and GRIDSMART Partnership Press Release](#)

[Intel® Core™ Processors Product Page](#)

[Intel® Distribution of OpenVINO™ Toolkit Product Page](#)



The single-camera GRIDSMART System gathers and interprets important traffic data to enable real-time monitoring and visual assessment, and to help traffic engineers adjust signal timing and traffic flow strategies. GRIDSMART's solutions improve safety, minimize congestion, enhance roadway planning, and provide real-time and historical performance analytics.



## Sources

1. CompTIA, [30+ Artificial Intelligence Statistics and Facts for 2023](#), 2023.
2. Internal test results of CVEDIA. Test Configuration: Intel® Core™ i7-9700F CPU @ 3.00GHz, SKU=700. Test conducted on December 3, 2021.
3. Internal test results of CVEDIA. Test Configuration: Intel® Core™ i7-9700F CPU @ 3.00GHz, SKU=700. Intel does not control or audit third-party data. Test conducted on September 8, 2021.
4. Internal test results of CVEDIA. Test Configuration: Intel® Core™ i7-9700F CPU @ 3.00GHz, SKU=700. Intel does not control or audit third-party data. Test conducted on September 8, 2021.

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