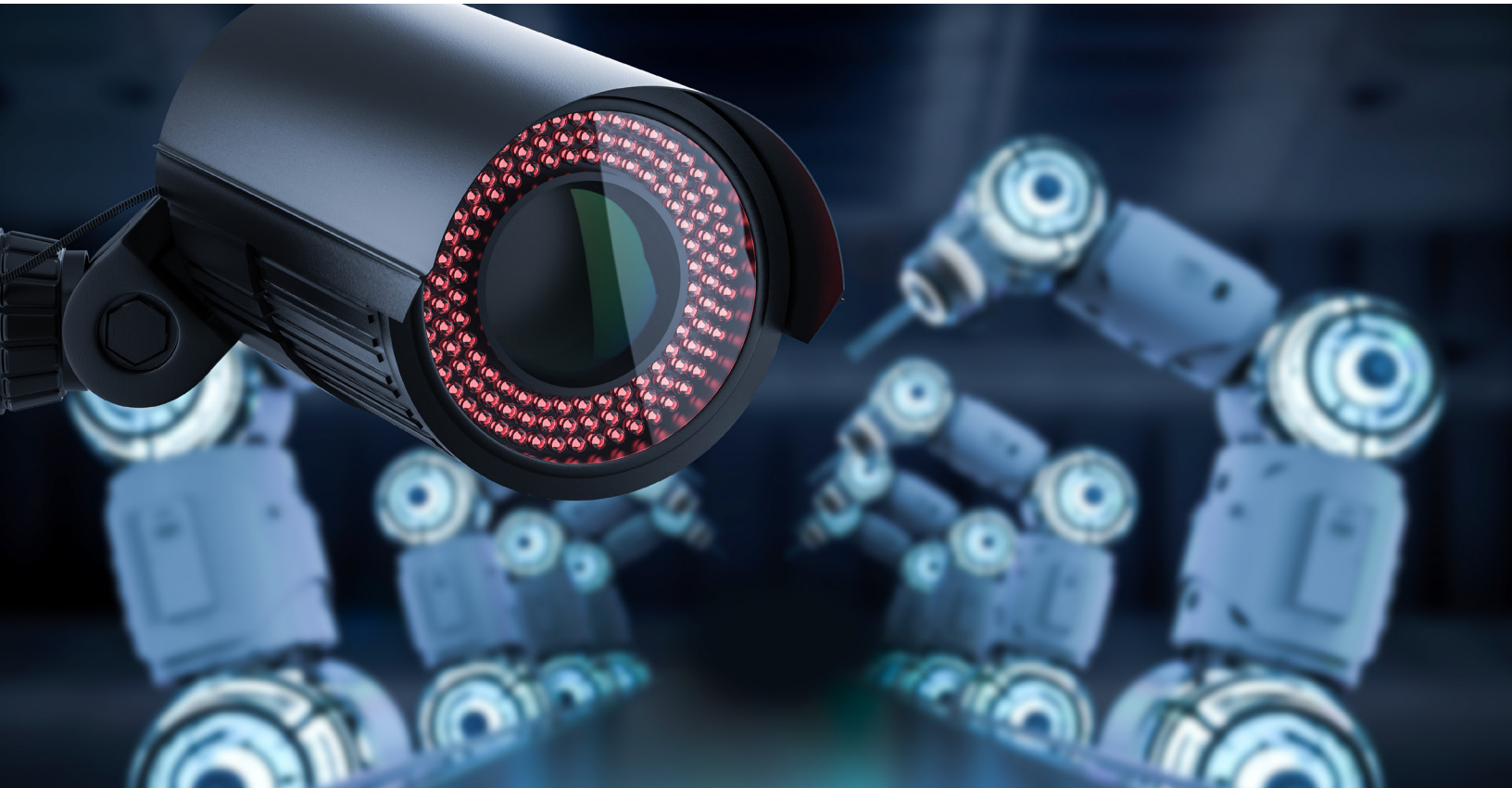


Uncover New Business Insights through Computer Vision & Video Analytics at the Edge



// The true value of video does not lie solely in the data from the video feed, but when you combine that data with all of the other real-time sensors and control data in the enterprise. That's when you discover hidden problems and create new business insights. //

SASTRY MALLADI
CTO, FOGHORN

Video analytics and computer vision based machine learning (ML) play an important role in the commercial and industrial internet of things. Cloud computing and its virtually limitless computational power and vast storage capabilities have enabled deep neural networks to mine volumes of historical data to effectively model many real-world video applications. However, cloud-based vision analytics is not an option in the commercial and industrial IoT sector due to connectivity, bandwidth, security and latency issues. Industries such as oil & gas, manufacturing, automotive, and agriculture would all want to tap into the power of machine vision and video analytics to transform video data into business insights.

While the applications of video are endless, executing these deep learning models at the edge is a challenge. The hardware requirements for local compute and processing can be impractical and costly due to constrained environments.

FogHorn Lightning™ Edge Computing Platform was designed to bring the data science capabilities of the cloud down to the edge, where data is generated, and decisions need to be made. FogHorn Lightning Edge is a hyper-efficient engine to execute machine learning and deep learning models in memory, with streaming data, using common Intel x86 or Arm-based systems. While the cloud uses batch data for analysis, an effective low-to-no latency edge solution needs to work with live streaming data.



Streamification of Video Data

Central to FogHorn Lightning Edge is our VEL® Complex Event Processing (CEP) engine. It delivers comprehensive data enrichment and real-time analytics on high volumes, varieties and velocities of streaming video, digital sensor and asset data. Featuring many FogHorn native optimizations as well as support for industry standards like Intel® OpenVino™ toolkit, VEL CEP is optimized for constrained compute footprints and limited connectivity and allows for the broadest implementation of video analytics and machine learning throughout industries.

Edgification of Deep Learning Models

FogHorn's EdgeML® edgifies ML and deep learning models to execute efficiently at the edge. Since FogHorn's VEL CEP engine provides data pre and post processing required for the models, model size, layers and memory needed for execution is often reduced by 10X or more. This enables fast and hyper-efficient model execution in resource-constrained devices. EdgeML also enables streamification to the model, binding it to live data, as opposed to static data as in a cloud, from many sources. The cloud is critical for model training, but once trained, models can be edgified, streamified and pushed to the edge with FogHorn featuring the same analytics as the cloud but with the lowest latency and more accurate results.

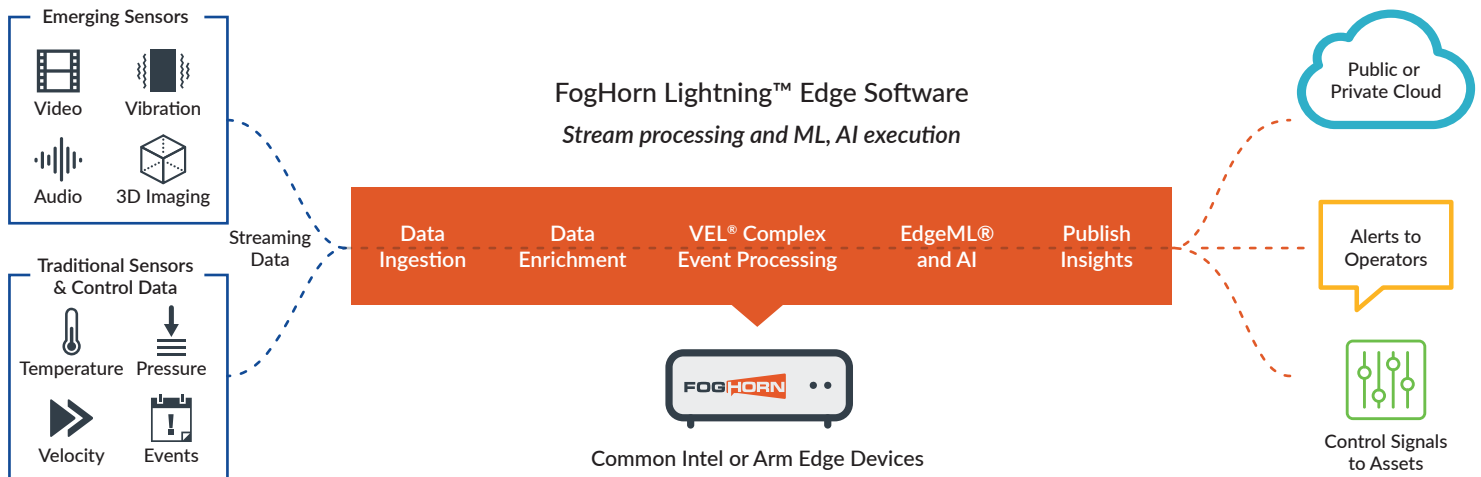
Sensor Fusion and New Business Insights

Processing and analyzing data from a video feed opens up new insights to the enterprise. But to truly understand the subtle, unseen nuances of operations, organizations need to supplement that single data point with all relevant data available, a capability that is lacking in off-the-shelf vision tools. FogHorn Lightning Edge uniquely enables this sensor fusion in real-time. It has the ability to bind multiple video streams with a wide array of control system data, vibration, acoustic, and other reference data to develop a holistic view of operations that can help you more accurately predict and prescribe remedies to improve operations.

// The FogHorn Edge solution has three key differentiating factors that its competitors lack. First it can be deployed in a tiny computing memory footprint... Secondly, the solution is operational technology (OT) friendly... The third factor is that the solution is on-premise centric and cloud agnostic. //

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System Architecture – Edge AI Using Video & Sensor Fusion Technology



Use Case: Flare Stack Monitoring



In this example, sensor fusion technology is employed to monitor flare stacks in oil refining. Live video streams of flares are combined with audio and vibration data and analyzed with deep learning models at the edge.

A holistic view of operations is uncovered and issues such as compressor health or environmental compliance issues are identified.

Industrial Edge-based Video Use Cases



Facial Recognition

Facial recognition is a highly sought-after application. A manufacturer is using FogHorn Lightning to bolster security in highly restricted zones leveraging video. Their solution needs to work at the edge in remote locations and be able to detect facial spoofing.

EdgeML with deep learning models is employed at the edge and combined with contextual data from their HR systems such as shift data and security clearance. Video and infrared cameras are used to provide a robust system that recognizes employees and also monitors skin temperature to detect spoofing.

As a result, security systems can now ascertain when and where employees are allowed within certain Geo-fenced zones in the company. Sensor fusion capabilities augment the video-based results to detect and alert unauthorized access to restricted areas in the company.

Finished Goods Inspection

A manufacturing company used FogHorn Lightning to create a defect alert system. Like many other manufacturers, finished goods inspection was largely a manual process. Defects in manufacturing were found too late in production and ended up resulting in increased scrap and lower yield. First forays into automated inspections had low accuracy with a very high number of false positives.

Video-based inspection of goods was introduced using advanced deep learning models implemented through FogHorn EdgeML. The system was designed to alert operators early in the process to pause production, provide operators guidance about the defect area, and allow for further investigation.

Defects are now identified earlier in the process, lowering the cost to address the defect and ultimately increase yield and reduce scrap. Defect detection accuracy shot up to 99.9%.

Oil Pump Safety & Pollution Control

A leader in oil drilling implemented video analytics with deep learning to increase safety and further enhance environmental protections. Oil rig operators would manually monitor drilling positions of their equipment. Any delays in intervention or improper execution could result in serious safety and environmental incidents.

Multiple cameras were installed with several vantage points over the equipment and were processed by FogHorn EdgeML using deep learning models.

Operators are now alerted to issues in a timely manner. Use cases include blow out prevention monitoring and monitoring of cracks in drilling machinery. Operational efficiencies resulted in cost savings but more importantly, major oil spills and environmental catastrophes are being minimized.

About FogHorn Systems

FogHorn is a leading developer of “edge intelligence” software for industrial and commercial IoT application solutions. FogHorn's software platform brings the power of advanced analytics and machine learning to the on-premises edge environment enabling a new class of applications for advanced monitoring and diagnostics, machine performance optimization, proactive maintenance and operational intelligence use cases. FogHorn's technology is ideally suited for OEMs, systems integrators and end customers in manufacturing, power and water, oil and gas, renewable energy, mining, transportation, healthcare, retail, as well as smart grid, smart city, smart building and connected vehicle applications.