Solution Brief

AI Vision/Deep Learning
Situational Monitoring

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Vulcan AI Uses AI Vision and Deep Learning to Create Safer Workplaces

The enterprise AI solution provider helps protect against workplace hazards and the spread of infectious diseases by extending inference and deep learning capabilities to the edge.

VULCAN AI
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"Intel® tools and technologies helped us offer customers reliable, outstanding performance on cost-efficient edge hardware. The optimization we achieved ensures that WorkSafe can rapidly identify hazards and help keep our customers' workforces safe."

— Kamal Mannar, PhD
Head of Applied Intelligence, Vulcan AI

3 to 5x
throughput increase[1]
using the Intel® Distribution of OpenVINO™ toolkit
See backup for workloads and configurations. Results may vary.

OpenVINO™

For all companies, employees are critical assets. And keeping them safe is a top priority for business leaders. Many organizations are seeking new ways to protect their team and more effectively address workplace hazards and health concerns. With the right tools, they can help ensure the well-being of their workforce while also preventing downtime, maximizing productivity, and enhancing business results.

To help businesses accomplish their workplace safety goals, Vulcan AI created WorkSafe, an innovative solution for identifying employee safety issues such as spills, near misses, slips, falls, trips, and health risks in near-real time. It's a forward-thinking application of AI vision at the edge that constantly assesses video feeds to identify hazards and incidents. As issues are detected, the system prompts users to take preventive and corrective measures.

The WorkSafe solution also monitors behavior such as social distancing and mask wearing to reduce the risk of infectious disease spread. When issues are identified, the system nudges employees through visual cues and notifications that prompt them to realign with proper protocols.

Common incidents are identified almost instantaneously. Facilities managers and safety management officers gain visibility of risk hotspots alongside precise location insights. Alerts and information can be accessed at any time through a web-based portal. And managers receive daily risk assessment reports that highlight high-risk areas.

WorkSafe leverages stereo vision and AI pipeline technology to detect hazards and compliance with workplace safety protocols for infectious diseases. The solution also leverages wearable AI to pinpoint safety risks that are not within view of cameras. Multisensory inputs provide more-complete coverage that enables early and accurate risk detection.

Challenge: Capturing and analyzing workplace hazard data at the edge in real time

Workplace accidents and hazards require immediate on-site intervention. Video of these events is sensitive and private, which requires the WorkSafe solution to process data at the edge. To keep pace, WorkSafe requires low latency and optimized performance from the edge hardware it runs on. The solution needs to perform excellently on cost-efficient CPU- and VPU-based configurations to keep customer expenses manageable.

To enable the required inference and incident identification, Vulcan AI worked extensively to generate the required data sets. Faced with a lack of data, particularly in the industrial sector, the team used simulations to create a custom database of normal activities, hazards, near issues, and incidents. They were then able to create robust models for accurate detection.

Figure 1. The Vulcan AI WorkSafe solution uses video data from workspace cameras and CCTV systems to identify safety hazards. Integrated notification, alerting, and logging features disseminate the right information to the right people as issues occur, empowering them to quickly take action to remediate the issue.

Solution: Intel® solutions help Vulcan AI ensure performance at the edge

To solve the critical challenges of AI vision at the edge, Vulcan AI relied on the Intel® Distribution of OpenVINO™ toolkit alongside Intel® DevCloud for the Edge. Together, these solutions helped ensure that the WorkSafe application and pipeline perform optimally in a wide range of customer environments with varying needs.

Optimizing models for the edge with the Intel Distribution of OpenVINO toolkit

WorkSafe requires several AI models to generate the necessary insights. The models need to perform optimally on low-power, cost-effective edge hardware. To achieve the necessary optimization, Vulcan AI turned to the Intel Distribution of OpenVINO toolkit—a developer tool designed to enable inference at the edge and accelerate deployments.

The realities of edge deployment demand that the Vulcan AI models are optimized post-training. To accomplish this, Vulcan AI uses the Intel Distribution of OpenVINO toolkit to optimize models on a single device then deploy the model across other devices. Performance is more predictable because the optimization process is hardware independent. With this approach, Vulcan AI eliminates the need to customize, optimize, and convert models for devices with different compute capabilities.

"Our experience with the Intel Distribution of OpenVINO toolkit has been excellent," says Kamal Mannar, PhD, head of applied intelligence at Vulcan AI. "Model optimization and deployment have been easier, compared to other platforms."

Using the toolkit, Vulcan AI also converted select models in the pipeline to FP16 precision, increasing the overall throughput by 3 to 5x, depending on the type of models.[1]

Finding the ideal hardware with Intel DevCloud for the Edge

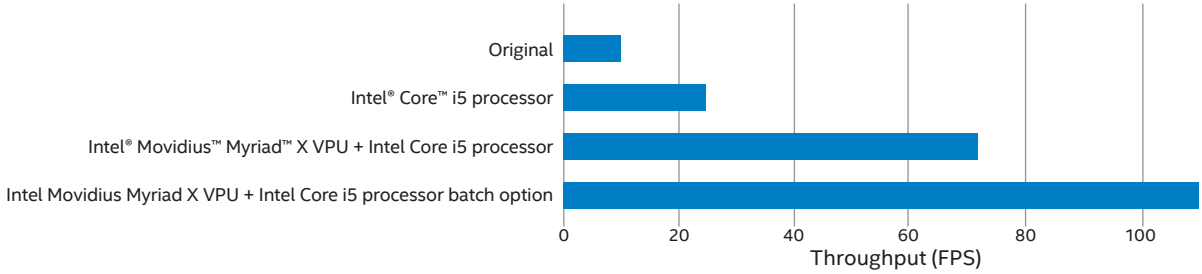
Vulcan AI leveraged Intel DevCloud for the Edge to ensure optimal performance across the varying numbers of cameras in customer facilities. Their goal was to understand the appropriate hardware configuration needed for deploying the solution during the pilot phase for different clients.

"Intel DevCloud for the Edge provided confidence that our solution will be able to accommodate the number of cameras that customers have in their environment," says Mannar. "And it helped remove guesswork from the pilot process."

Hardware configuration testing included CPU only, CPU with GPU, and GPU with VPU. The team also tested several different options such as running certain models asynchronously and assigning them to different compute options on various devices.

Ultimately, Mannar and the team determined that the optimal configuration for the company was a cost-effective approach involving CPUs alongside Intel® Movidius™ Myriad™ X VPUs for inference. Additionally, the company identified the pipeline configuration that provided higher throughput based on asynchronous batching of some AI models in the pipeline.

Optimization achieved via the Intel® Distribution of OpenVINO™ toolkit



See backup for workloads and configurations. Results may vary.

Key benefits of the solution

Leveraging the powerful Intel® tools, Vulcan AI was able to deliver a flexible and dependable AI vision solution that helps keep workforces safe.

Optimization across varying customer environments

WorkSafe allows customers to implement innovative workplace safety solutions that leverage existing camera assets. It's a cost-effective way to help keep employees safe, respond effectively to issues, and proactively prevent future incidents.

Low-latency identification and remediation of workplace hazards

With optimized performance achieved via Intel tools, WorkSafe delivers nearly instantaneous identification of common workplace hazards and infectious-disease protocol violations. When employee safety is on the line, reacting quickly and accurately is critical.

Cost efficiency

Through optimization, WorkSafe achieves excellent performance on cost-efficient edge hardware that's based primarily on VPU and CPU configurations.

Conclusion: Safer workplaces made possible

With flexible high-performance technologies, the Vulcan AI WorkSafe solution provides a forward-thinking approach to identifying and addressing workplace safety issues in real time. Proven Intel® solutions for AI optimization and testing ensure rapid and reliable performance on cost-efficient edge hardware. Together, the two companies make safer workplaces possible.

Learn more

Intel Distribution of OpenVINO toolkit

This toolkit gives developers easy-to-access libraries, frameworks, and pretrained AI models to achieve faster time to market for AI vision solutions.

Learn more ›

Intel DevCloud for the Edge

Intel DevCloud for the Edge is a cloud-hosted sandbox that helps developers refine their solutions, innovate, and accelerate time to market.

Learn more ›

Intel Movidius Myriad X VPUs

The Intel Movidius Myriad X VPU delivers enhanced AI vision acceleration for edge-level devices and is programmable with the Intel Distribution of OpenVINO toolkit.

Learn more ›

About Vulcan AI

Vulcan AI is an AI service provider that helps enterprise organizations solve problems and unlock value from AI on a commercial scale.

vulcan-ai.com

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1. Results based on Vulcan's internal testing data.

System configuration: Intel® Core™ i5 6500TE; 8 GB memory; Intel® HD Graphics 530; Intel® Movidius™ Myriad™ X-based Intel® Vision Accelerator Design card – x1. Original configuration performance benchmark represents results without conversion to the Intel® Distribution of OpenVINO™ toolkit.

Performance varies by use, configuration, and other factors. Learn more at intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details.

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