

## Building Custom AI Models to Help Cities Meet Their Net-Zero Goals

To mitigate climate change, local authorities can optimize their planning and operations with smart cities technology. In the UK, SSE Energy Solutions is developing AI-powered optical sensors based on Intel® architecture, Intel AI technology, and the Sensing Feeling software platform to transform video feeds into insights at the network edge that help cities meet environmental imperatives.



### The Smart Cities AI Skills Gap

Smart city usage models can help local authorities apply data-driven decision making to help reduce their carbon footprints. Data analytics can guide government initiatives and provide environmental benefits in areas as diverse as traffic calming, reducing energy usage, and optimizing public space. However, it has been challenging for many local government agencies to provide the technology skills needed to create, train, and deploy AI models for complex industry use cases. In addition to expertise requirements, projects may also require extensive resources to adjust models individually for different optical sensor placements.

Intel is introducing the Intel® Geti™ computer vision platform, a new AI technology that reduces the complexity of building computer vision AI models. The platform's intuitive approach targets business users and domain experts, in addition to computer and data scientists. The analytics platform provided by Sensing Feeling applies those models on edge devices to transform input data from remote optical sensors into insights that drive decision making. In collaboration with Sensing Feeling and Intel, SSE Energy Solutions is implementing AI-powered Sentinel Optical sensors based on Intel Atom® processors and Intel® Movidius™ Myriad™ X Vision Processing Units (VPUs) to deploy this software technology.

The potential of AI to solve current problems has been hampered by the challenges of its implementation. Standing up AI models has previously involved specialists who are in high demand and short supply, keeping the technology generally out of direct reach for mainstream analysts and domain experts. Training AI models typically can take weeks or months and requires massive sets of data, while deploying the models is complex. These challenges and the resources required to address them are compounded when the AI models need retraining to handle a new task.

### Intel® Geti™ Platform Streamlines AI Model Creation

The Intel Geti platform overcomes many common practical limitations of AI with an interactive graphical interface where data scientists, software developers, and domain experts collaborate to create, train, and deploy computer vision AI models. The platform specifically empowers non-technical users to implement, use, and maintain visual AI based on convolutional neural networks, broadening the technology's value to society. Sensing Feeling Founder and CEO Jag Minhas elaborates, "The labeling, training, and testing of new models is done on the Intel Geti platform. And what would usually require a technical PhD or machine-learning engineer can now be done by someone who is much closer to the subject matter related to the client problem we are trying to solve."

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- Sensing Feeling Founder and CEO  
Jag Minhas

Additionally, Intel Geti platform helps make the model development process more agile, helping Sensing Feeling quickly adapt to new use cases. Minhas said, “We’re excited by being able to rapidly create new detection capabilities or classifiers for our clients ... the Intel Geti platform simplifies the creation of new models for us.”

The company saw the opportunity to expand its value proposition by customizing models to specialized customer needs, but it was limited by the high resource costs and scarce expertise required to rapidly build and label datasets and train new models. The Intel Geti platform addresses those limitations. The technology provides fast prototyping for proofs of concept and customized pre-trained models, without the resource investment needed to acquire new skill sets.

The platform takes an active learning approach to training models that engages human operators to guide the process. Using an initial training set consisting of just 20 to 30 images, the operator selects and labels objects of interest. Next, the Intel Geti platform creates an initial model and starts making predictions. As the operator accepts or corrects those predictions and labels additional data, the model rapidly becomes more accurate. New images can be added to update and retrain the model on demand, using the same process.

Once a model is trained, it can be exported in the original framework as well as optimized OpenVINO™ toolkit intermediate representation (IR) files. Enablement work by Intel ensures these optimized files are ready to run inferencing on Intel® hardware across platforms, from edge to cloud. This work means that as the Intel Geti platform reduces the overhead of creating computer vision AI models, it also maintains high performance and power efficiency for complex applications. Combined, these two properties enable local governments to take on ambitious public projects that incorporate computer vision AI, within stringent budget and time constraints.

## Sensing Feeling Analytics Provide Rapid, Flexible Insight

The Sensing Feeling smart visual sensing platform provides edge-based computer vision AI to measure and analyze human behavior in public spaces. In addition to its extensive library of ready-to-use deep learning models, the Sensing Feeling platform implements Intel Geti platform to let customers create their own. The platform makes AI accessible, so that general business users without extensive technical expertise can build AI models unaided.

That ease of use contributes to time savings during annotation and model training that helps accelerate solution timelines and reduce costs. With the Intel Geti platform, Minhas says, Sensing Feeling is “significantly reducing the technical aspects that are required for a company to be able to start producing and testing new models.” This easy access to sophisticated models helps democratize AI computer vision technology, helping accelerate its adoption.

The architecture is designed to scale across large numbers of distributed optical sensors, making it ideal for municipal use. The Sensing Feeling platform also provides a real-time API for easy integration with existing reporting, data-visualization, and control systems, as well as an intuitive but powerful web console that operates right out of the box.

The Visual Processing Engine (VPE) is the Sensing Feeling platform’s embedded software. The VPE processes images at the network edge—in proximity to the optical sensor—rather than recording or transmitting them, maintaining privacy and avoiding backhaul bandwidth requirements. It sends real-time telemetry metadata to a centralized cloud-based analytics engine for higher-order algorithmic processing and reporting.

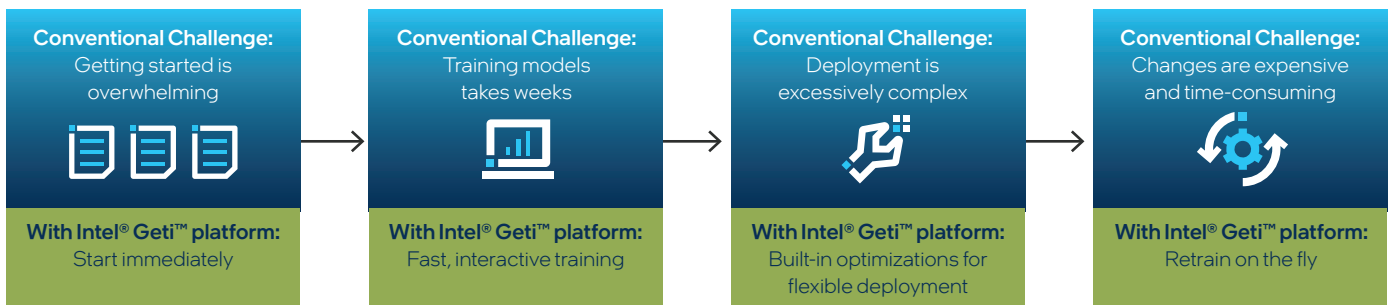


Figure 1. Accelerated AI solution pipeline based on the Intel Geti platform.

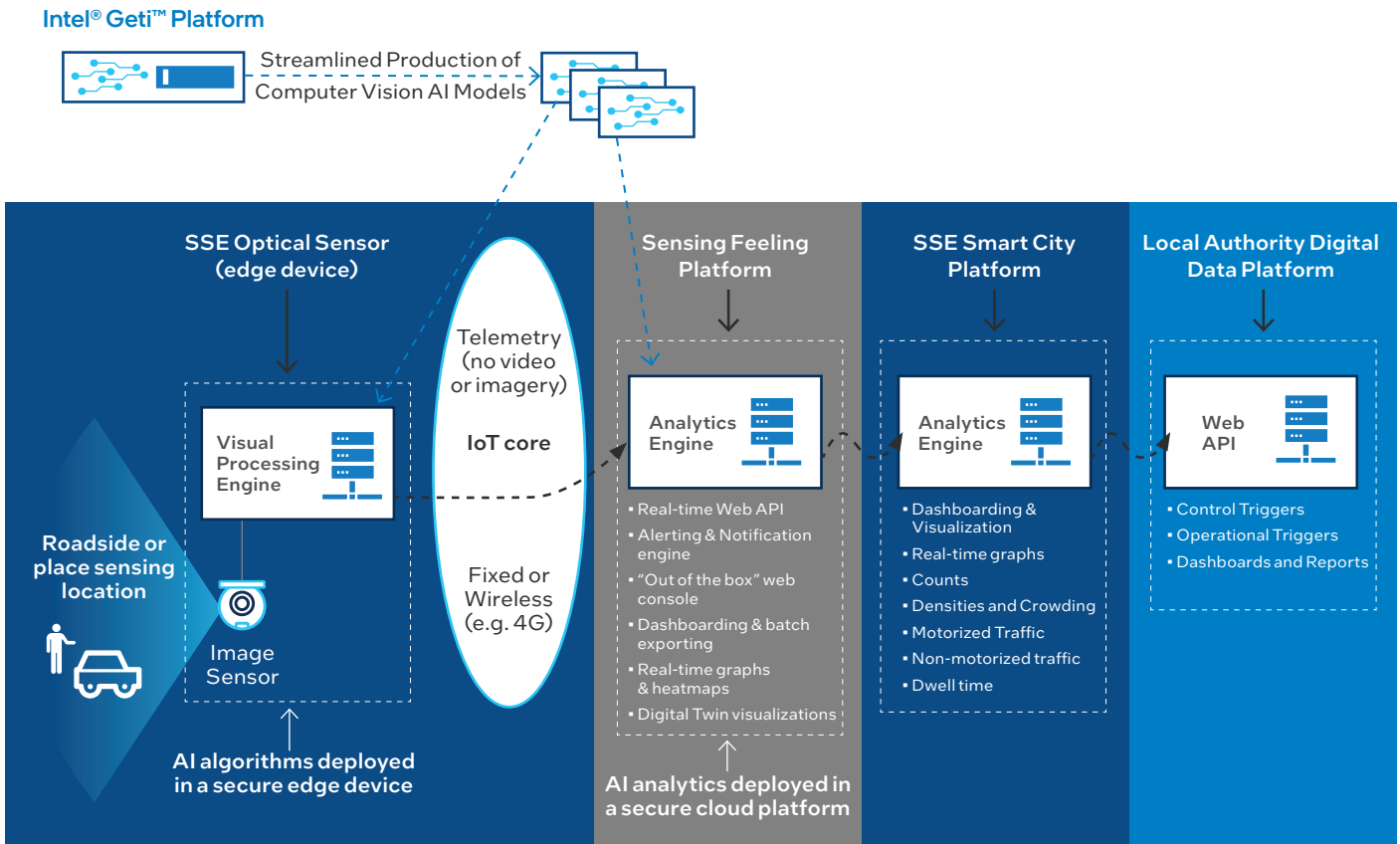


Figure 2. The Sensing Feeling visual sensing platform puts data to work for local authorities.

Insights created by AI-powered optical sensors have significant potential to help make local authorities more climate-friendly. For example, such optical sensors can continuously classify and count all forms of motorized and non-motorized traffic. Using that information, the Sensing Feeling platform can detect and analyze usage patterns by pedestrians, bicycles, e-scooters, motorcycles, cars, and trucks. Additionally, the Intel Geti computer vision platform enables the AI models to be readily adapted in the future to accommodate additional subjects of interest, such as dog walkers or strollers.

Assisted by visualizations such as charts, heatmaps, and tracking maps, insights based on current data can help local authorities make and justify informed, environmentally sound space planning choices such as changing a thoroughfare to a pedestrian area or adding lanes for non-motorized traffic. Changes such as these can contribute directly to helping local authorities meet their zero-carbon goals. They can also help improve public safety and health by encouraging active travel such as cycling or walking. Similar analyses could support planning for special events, such as reducing traffic by identifying the best way to route it around a market or festival.



Figure 3. Encouraging active transportation helps support net-zero goals.

### SSE Energy Solutions Deploys AI-Powered Optical Sensors Across Public Spaces

As part of its broader smart city vision, SSE Energy Solutions is conducting a proof-of-concept study that implements Intel Geti solution and the Sensing Feeling platform. The company developed an optical sensor with AAION Technology, a specialized hardware designer and manufacturer.

At approximately 8 to 10 pounds (3.5 to 4.5 kg), the device can be installed on a light post or wall, incorporating a five-megapixel camera and embedded computing hardware to provide built-in, on-device AI computer vision. The encrypted feed of telemetry metadata based on that video is processed immediately using cloud-based infrastructure. These network-wide analytics may also draw from additional data sources, such as air quality monitors, water-level sensors, and weather instruments.



**Figure 4.** Insite Sentinel Optical Sensor from AAEON Technology.

Insite Sentinel Optical Sensor Specifications	
Processor	Intel Atom® x7-E3950 system-on-chip (SoC)
Visual AI Accelerators	2x Intel® Movidius™ Myriad™ X Vision Processing Unit (VPU)
Camera	Mini PTZ 5MP
System Memory	8 GB (expandable) LPDDR SO-DIMM
Onboard Storage	64 GB (expandable) mSATA embedded MultiMedia Card (eMMC) via M.2 slot
Operating Systems	Windows/Linux

The sensor’s quad-core Intel Atom x7-E3950 processor provides high computational throughput at just 12 watts TDP, from a system-on-chip (SoC) built specifically to operate in an extended temperature range for space-constrained embedded applications. The two Intel Movidius Myriad X VPUs that work alongside the SoC accelerate deep neural network inference in hardware with the dedicated Neural Compute engine and 16 programmable processing cores that are enabled by an instruction set tailored for computer vision. Sentinel Optical sensors provide multimodal wireless access, including LTE, Wi-Fi, and Bluetooth.

Patrick Mitchell, Head of Smart City and Places for SSE Energy Solutions, noted that a recently published UK local authority report (Create Streets in February 2022)<sup>1</sup> outlines the infrastructure challenges facing local councils, town centers, and planning authorities. The report challenges the current approach and encourages analysts, “Count people. Acquire better real-time data on how people move, not just individual vehicles. Use artificial intelligence and machine learning to analyze it and inform smarter infrastructure provision.”

Mitchell says, “This recommendation clearly sets out the need for a smarter approach in the future, placing this collaborative solution based on optical sensors and analytics ahead of the market.”

## Conclusion

AI technology using optical sensors and analytics can help local authorities deepen their understanding of how citizens use and interact with public spaces and services. The Intel Geti platform makes implementation of these capabilities practical, with streamlined model creation by users without deep technical expertise. In particular, the Intel Geti platform helps local authorities and others address resource limitations that would otherwise make it difficult or impossible to use deep learning effectively, without sourcing data science expertise. That capability helps bring smart cities initiatives to reality, even with tight budgets and timelines.

Optical sensors can enable data and analytics engines to become powerful tools for towns and cities as they adapt to behavioral shifts by consumers as a result of the pandemic. With e-commerce expected to steadily increase and predicted to reach nearly one-third of all retail sales by 2024,<sup>2</sup> it is even more essential that open spaces as well as town and city centers are positioned to sustain vitality.

The collaboration by Sensing Feeling, SSE Energy Solutions, and Intel contributes to the democratization of computer vision AI for the common good. It advances the application of distributed video analytics to guide wise, data-driven public decision making in support of critical shared climate goals.

Learn more about the Intel Geti platform at [geti.intel.com](https://geti.intel.com), Sensing Feeling at [sensingfeeling.io](https://sensingfeeling.io), and SSE Energy Solutions at [sseenergysolutions.co.uk](https://sseenergysolutions.co.uk)



<sup>1</sup><https://www.createstreets.com/wp-content/uploads/2022/02/Computer-says-road-1.pdf>.

<sup>2</sup><https://www.swifterm.com/uk-ecommerce-statistics-2021/>.

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