

WELCOME

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Consulting services in Computer Vision and AI



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IN COMPUTER VISION
AND ARTIFICIAL INTELLIGENCE



Our board



**DR. GARY
BRADSKI**

CHIEF SCIENTIST
AND PRESIDENT



**DR. SATYA
MALICK**

CHIEF EXECUTIVE
OFFICER



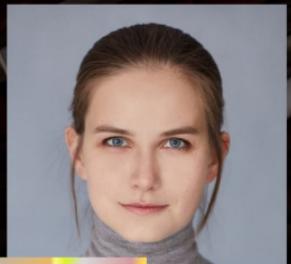
**ANNA
PETROVICHÉVA**

CHIEF TECHNOLOGY
OFFICER



**GRIGORY
SEREBRYAKOV**

CHIEF DEVELOPMENT
OFFICER



**TATIANA
KHANOVA**

CHIEF RESEARCH
OFFICER

We are innovators with long-term experience

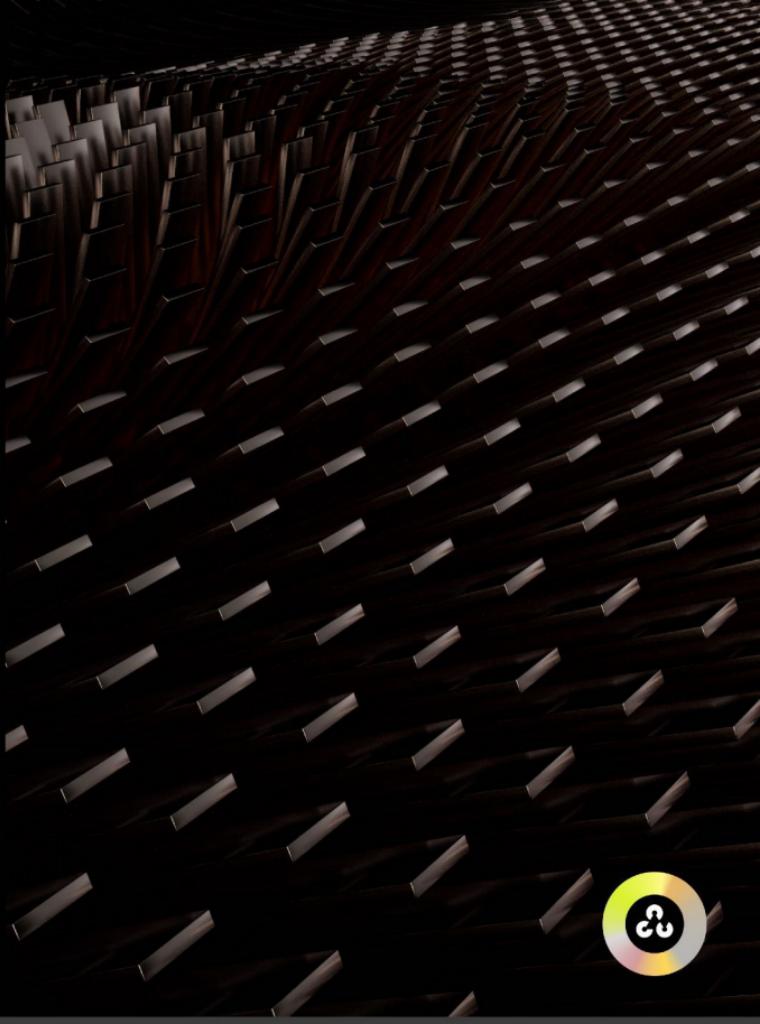


Our team is a core part of OpenCV, the world's largest open-source Computer Vision library that powers CV pipelines worldwide. Together with other modern tools such as Pytorch, TensorRT, ONNX, JAX, and CVAT, we use our multi-decade expertise in Computer Vision and Artificial Intelligence to efficiently and scalably solve your problems.

[OpenCV.AI](#) is the professional consulting arm of [OpenCV.org](#). While OpenCV.AI's solutions belong to you, we contribute part of our revenue to support [OpenCV.org](#)'s code, education, and documentation efforts.



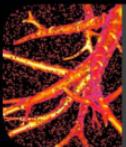
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What we do

We specialize in creating advanced AI solutions, offering end-to-end ML development and strategic consultation for addressing business challenges and discovering new prospects.

INDUSTRIES



MEDICINE



PEOPLE



SPORTS



AUTOMOTIVE



STORES, OFFICES, AND WAREHOUSES

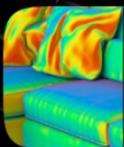
TECH



DEEP LEARNING ON EDGE



CAMERA SOLUTIONS



3D



OPENCV.ORG CONTRIBUTION



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OUR PROJECTS

Medical solutions



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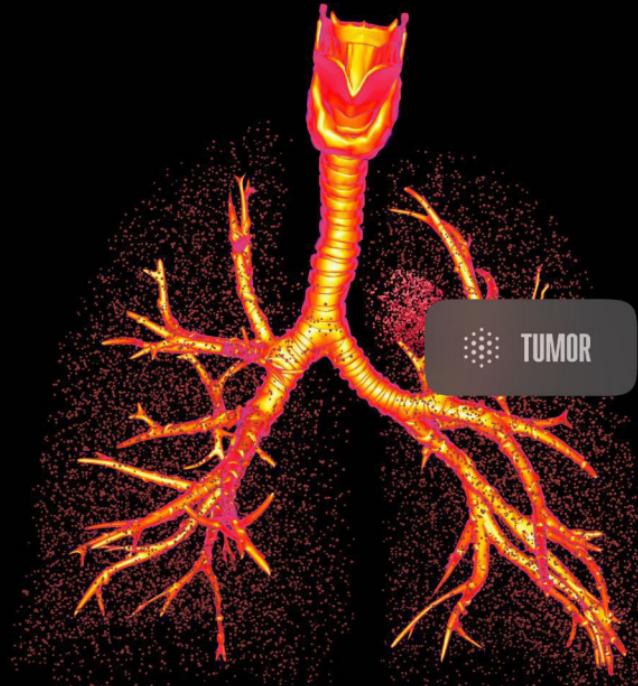
3D tomography analysis

We applied our expertise in 3D understanding to create medical tools that help radiologists diagnose diseases. Our algorithms recognize tumors in liver, kidney and lungs.

We have won one of the challenges in LNDb – a big public benchmark on computer tomography segmentation. The paper was published on ICIAR2020 conference in June.



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RANKED 1ST

LNDb TOMOGRAPHY SEGMENTATION
CHALLENGE, 2020



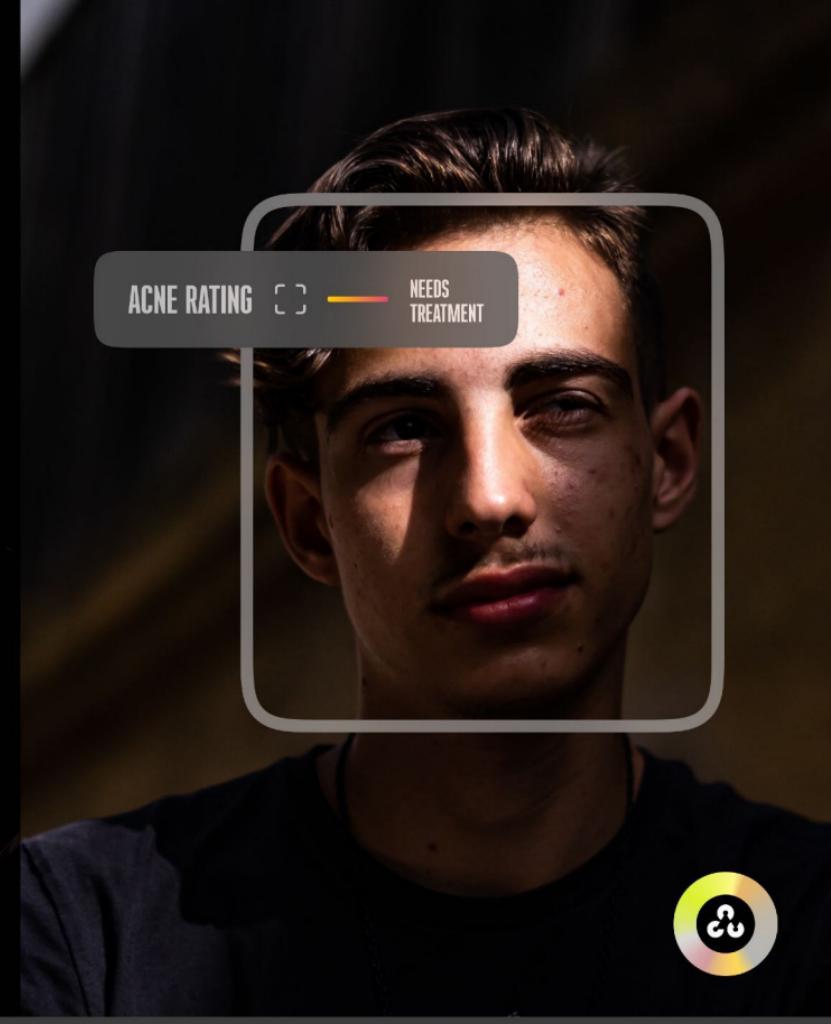
Skin health recommendation system

Our cutting-edge Computer Vision technology developed for a client can detect skin imperfections such as wrinkles and acne with unparalleled accuracy. We accomplish this by leveraging the latest semantic and instance segmentation algorithms and optimizing them for lightning-fast performance on mobile devices.

This solution preserves user's privacy by eliminating the need to send data to the server.



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Blood flow visualization

We used precise spatial tracking and signal amplification techniques for blood flow analysis. This real-time solution used off-the-shelf color camera and edge hardware.

To do that, we used precise spatial tracking and signal amplification techniques.



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3D reconstruction of human bones

Automation has revolutionized modern medicine, providing precision and speed in minimally invasive surgeries and operating rooms.

Our expertise in cutting-edge computer vision techniques, such as Neural Radiance Fields (NeRF), enables our client to reconstruct 3D surfaces with sub-millimeter accuracy in just one minute using an NVIDIA RTX 3070 GPU.

With only 100 precisely located images taken from all angles, we can provide medical professionals with a detailed and accurate 3D model for enhanced diagnosis and treatment planning.



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Contactless reading of vital signs

Using advanced AI techniques, we created a solution for a client for real-time measurement of human vital signs, including pulse and breathing.

The solution uses standard smartphones cameras.

We accurately detect facial features with deep neural networks and tracks them using optical flow techniques. We employ learned region detection and additional deep networks to find high confidence regions. This information is then used to amplify the stabilized pulse signal, providing a remarkably accurate vital sign measurements in real time.

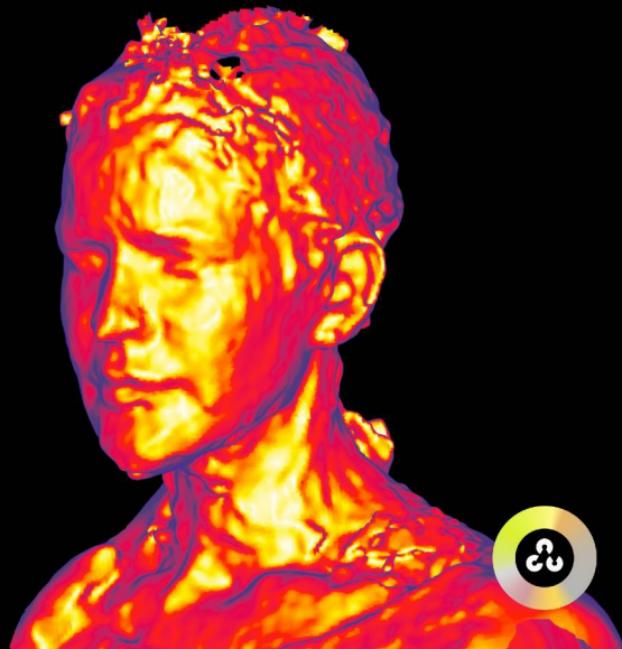


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VITAL SIGN READER

SECONDS

22



People detection, recognition, tracking



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DETECTION, RECOGNITION, TRACKING

593 TOTAL VISITORS

People counting in a video

Our system detects and tracks people in a video stream providing state-of-the-art detection quality using a model that is **50 times smaller** and requires **370 times** fewer computations than competing models.

50X

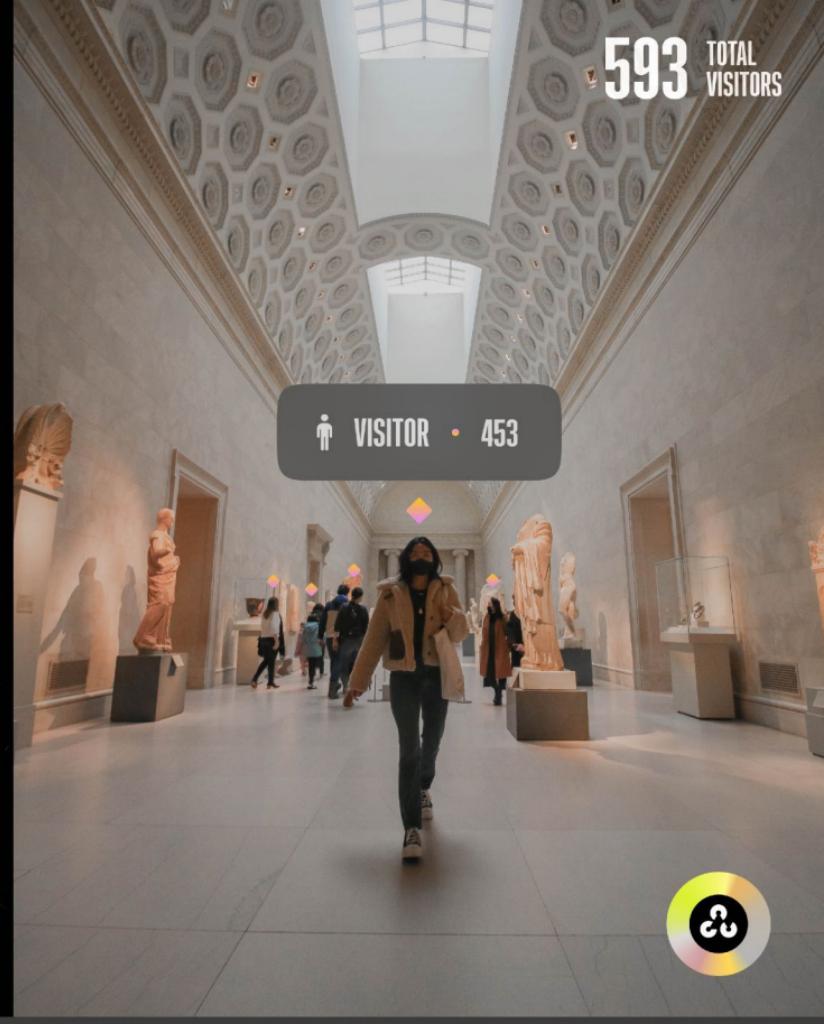
LESS WEIGHT

370X

LESS COMPUTATION



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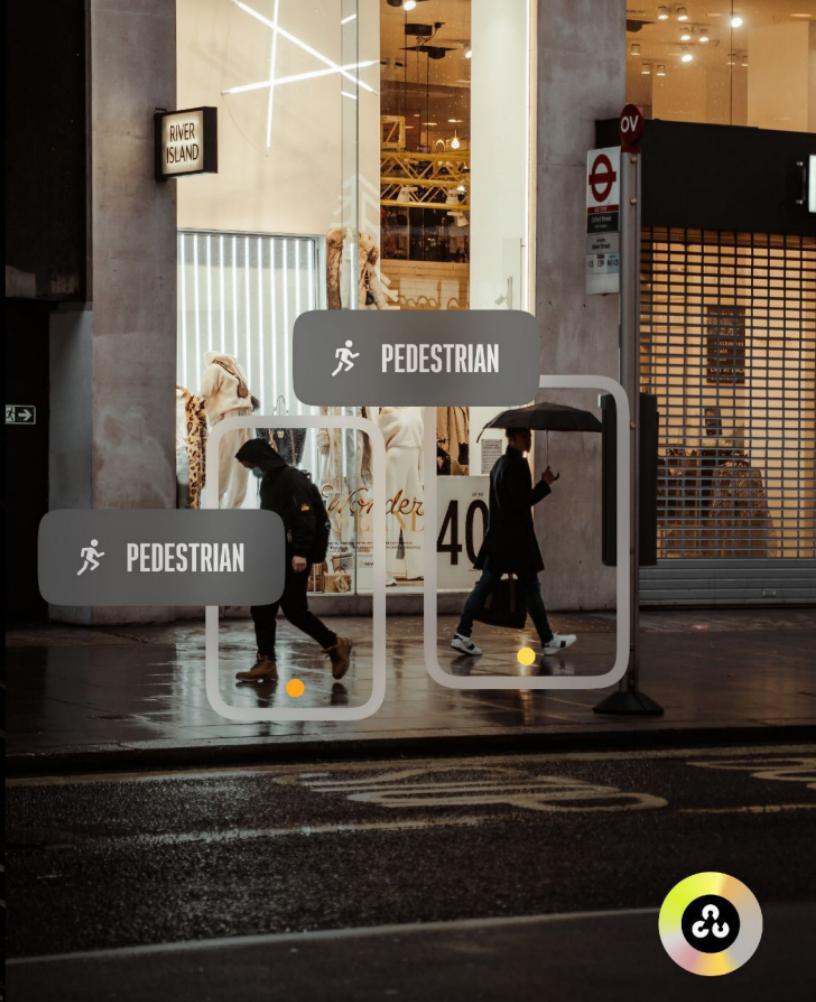
People detection on FPGA

FPGA boards are a challenging environment for Deep Learning models. To fit the requirements, we came up with a highly optimized detection model with only 600 Kb of weights.

Apart from bounding box prediction, it also computes a precise view-agnostic projection to the 2D floor map – that can be used to analyze space utilization.



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OUR PROJECTS

Sports & training



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Automated sports production

Our solution is used for automatic sports broadcasts. The algorithms detect the players and the ball, automatically moving the camera to capture every movement and broadcast it in a fully automated manner.

The system operates in real-time and is utilized worldwide.



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1 – 3 TOTAL SCORE



Human pose tracking

The pose tracking algorithms we create are capable of analyzing human body poses and are used for various applications, ranging from automatic workout analysis to AR gesture recognition.



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TOP-10

CVPR19 LOOK INTO PERSON CHALLENGE



Automotive



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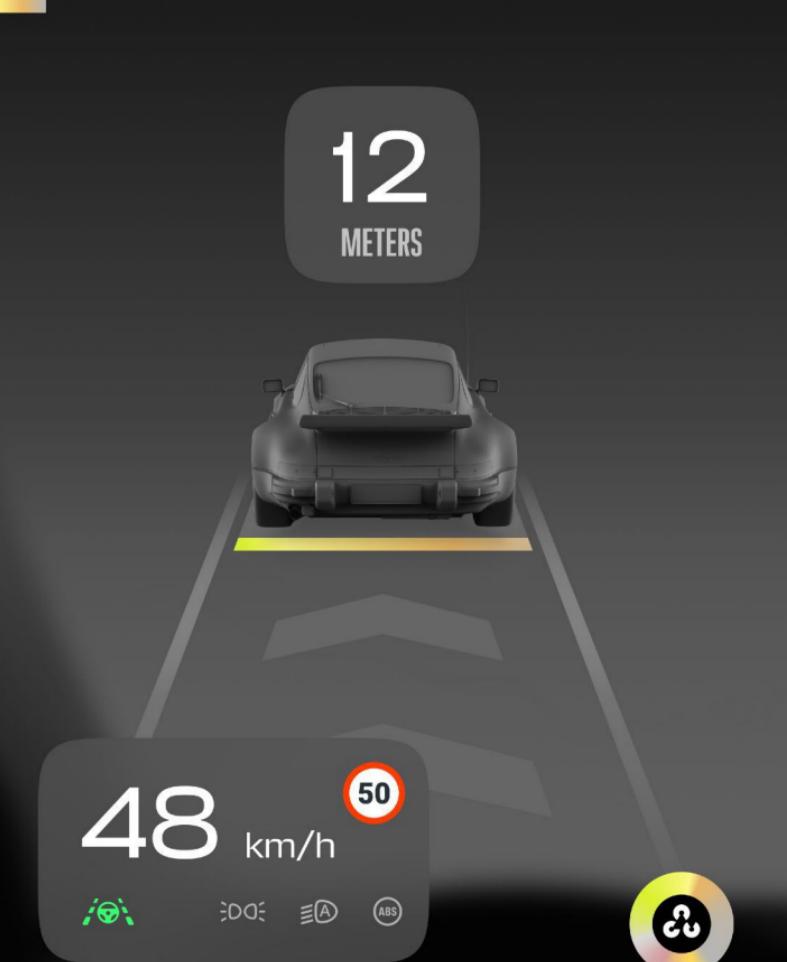
Advanced driver-assistance systems

Our team is experienced in **ADAS** systems creation: traffic light recognition, traffic sign detection and recognition, pedestrian and vehicle detection, lane departure warning.

The systems we created were integrated in real cars to ensure safety on the roads.



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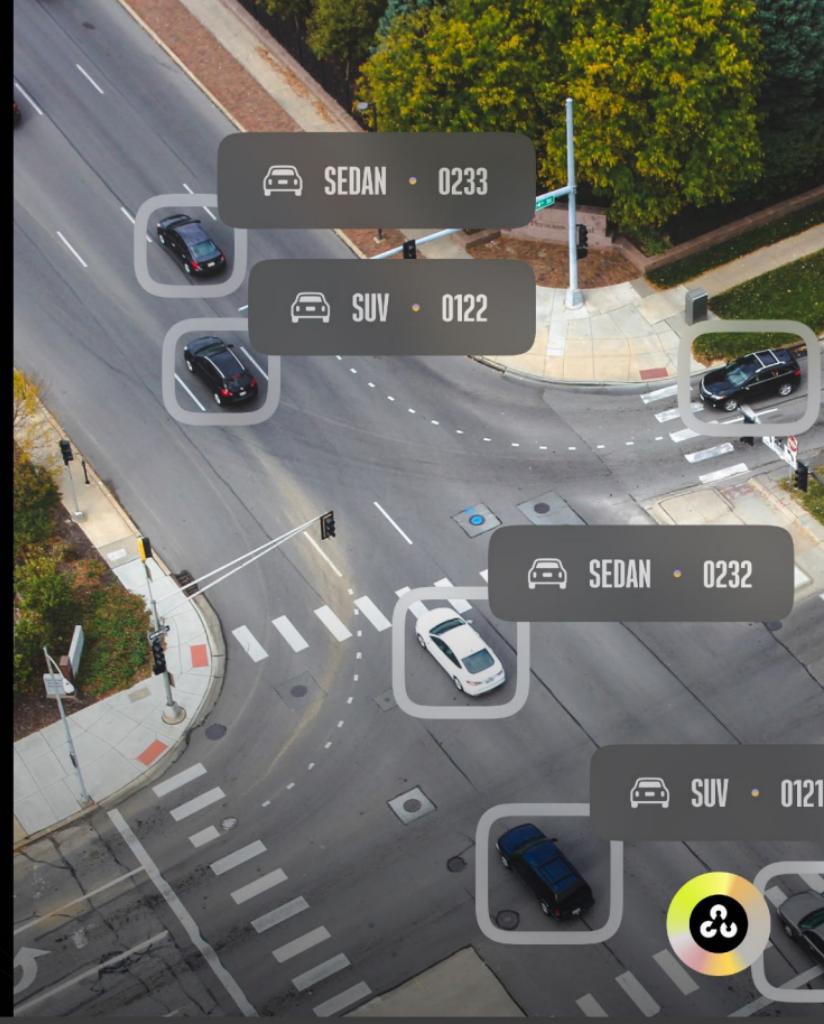
Vehicle classification and counting in a surveillance scenario

Smart cities demand real-time traffic information, and our innovative solution delivers just that. Our system recognizes various vehicle types, including cars, buses, trucks, tuk-tuks, and motorcycles, while also counting vehicles and measuring their speed.

Powered by NVIDIA Jetson Xavier NX with TSP stream, our algorithm operates seamlessly in real-time, driving urban efficiency and convenience.



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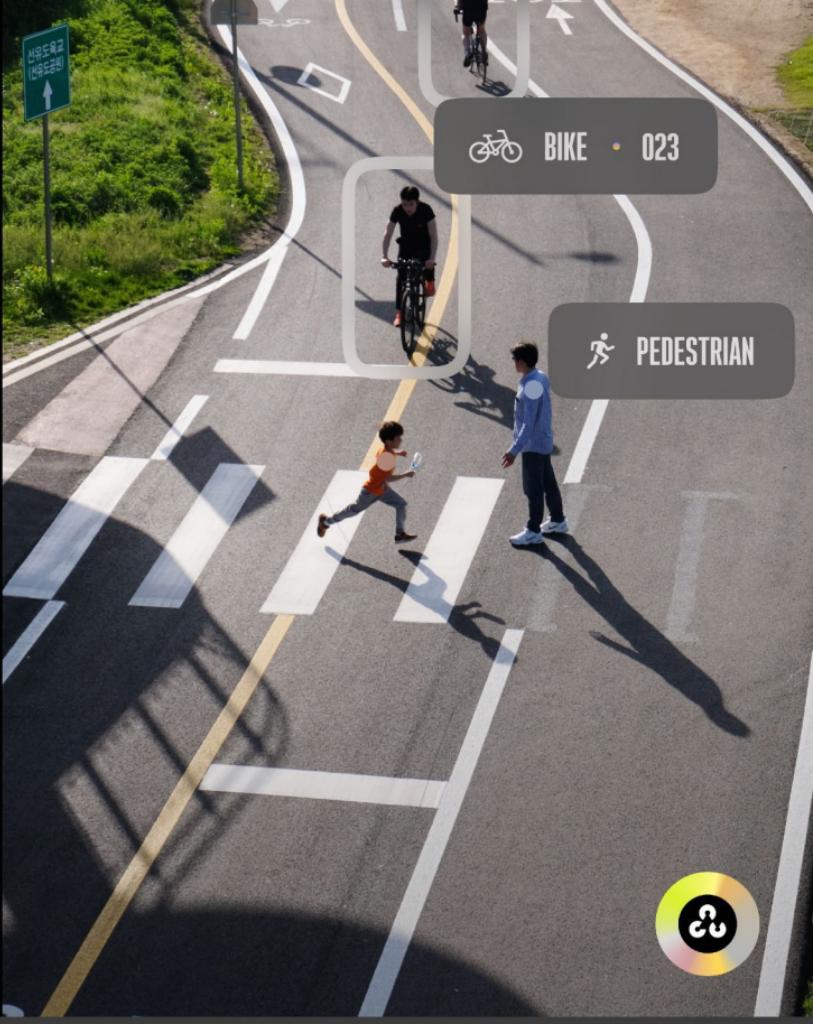
Track bicyclists in a city

Analyzing bicycle traffic can be challenging due to the absence of license plates and unpredictable trajectories. Our advanced system simplifies this task by adeptly detecting, counting, and identifying bicyclists across multiple cameras.

Operating in real-time on an NVIDIA Jetson Xavier NX, our solution boasts an impressive 0.83 F1-score for the ReID task, showcasing its effectiveness and accuracy in addressing complex urban mobility challenges.



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Stores, offices, and warehouses



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Cashier-less store

Enhancing shopping efficiency, our innovative solution eliminates the need for cashiers, ensuring a seamless checkout experience with no queues.

Our AI algorithm detects and recognizes items at the checkout, streamlining the process.

Integrated with Deepstream 4.6+ SDK, we natively utilize four RealSense cameras on Jetson AGX, accelerating our pipeline by 1.6 times, ultimately revolutionizing the retail experience.



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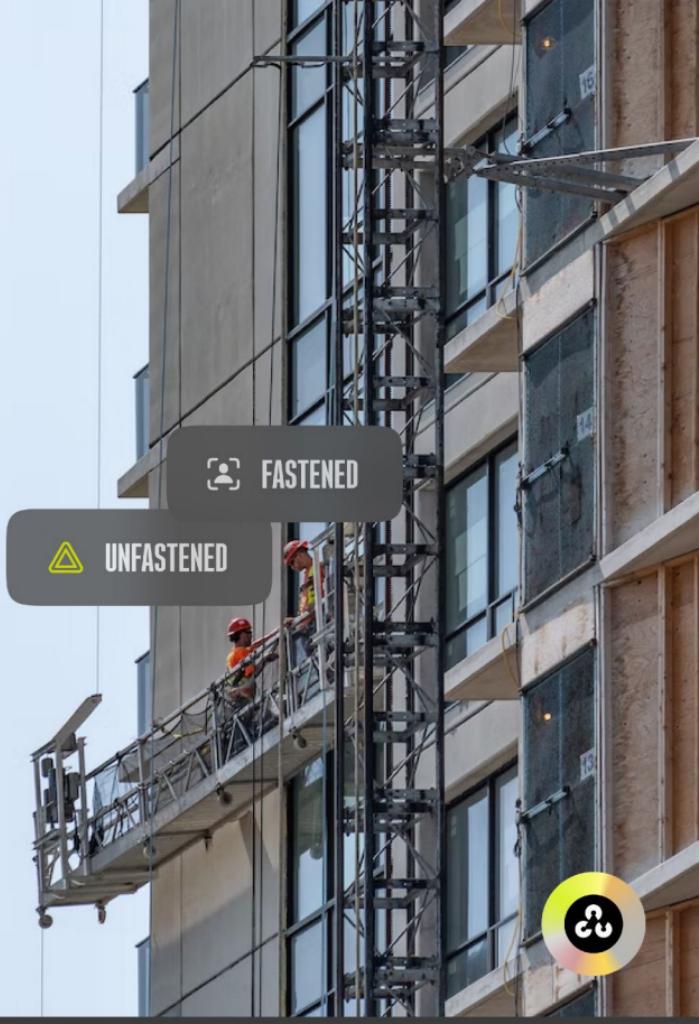
Industrial safety

With the help of AI, industrial safety systems can now detect potential risks and alert workers before an incident can occur.

This revolutionary technology can save lives, not only time and money. The main challenge is to run a small neural network on a modern power-efficient chip.



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And much more



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Synthetic Dataset Generation

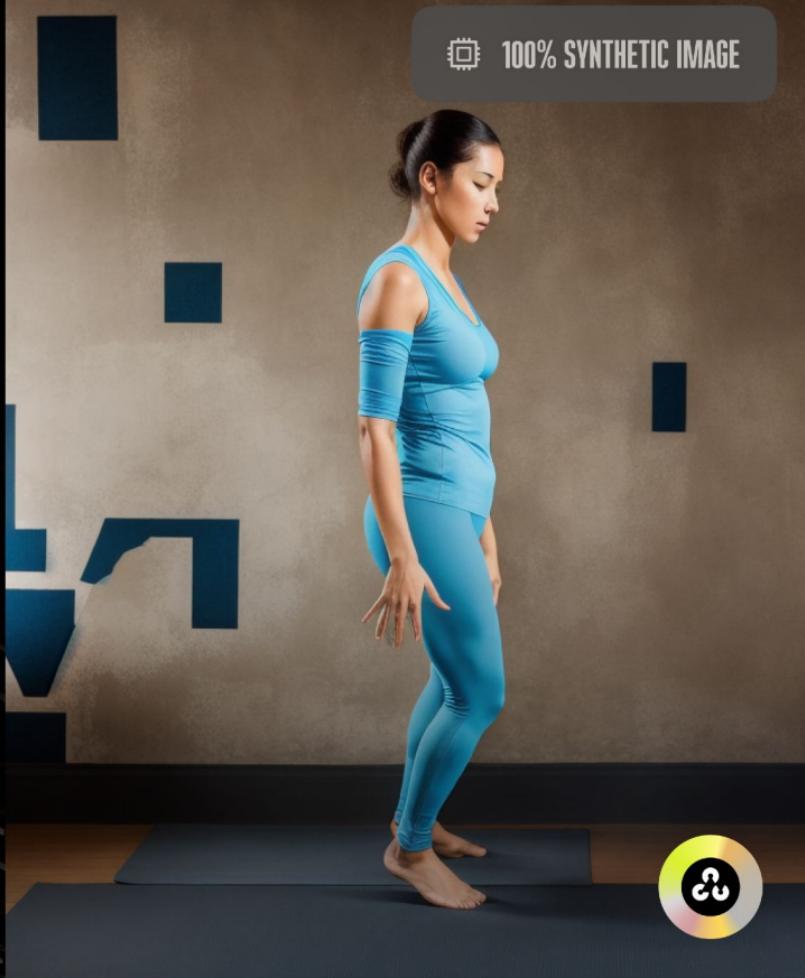
Synthetic dataset generation offers the ideal solution for anyone seeking an annotated dataset with minimal effort.

Our cutting-edge algorithms are trained to replicate real images in the generated data, making them exceptionally reliable and significantly more efficient than manual data entry. Furthermore, you'll obtain large volumes of annotated data, streamlining the process and enhancing your project's overall performance.



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 100% SYNTHETIC IMAGE



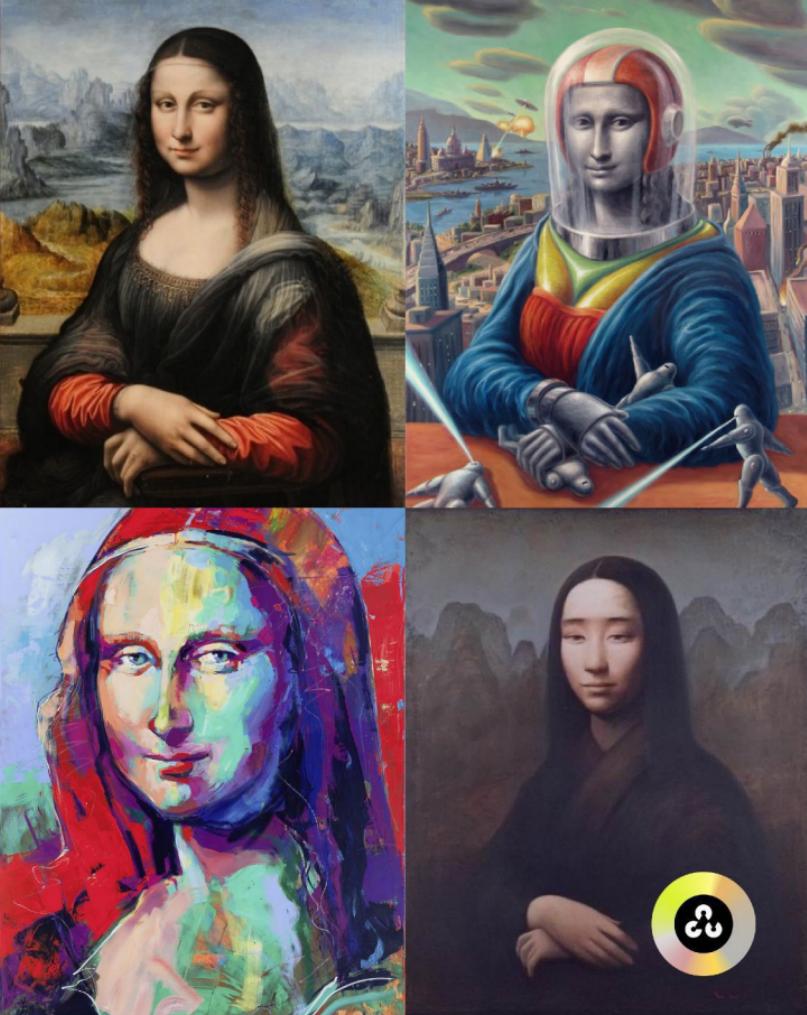
Dataset deduplication

We created a tool that enables efficient removal of duplicate images from large datasets, resulting in significant reduction in dataset size, faster model training, and lower storage requirements.

By applying this tool to LAION-2B, we were able to decrease the dataset size by a **factor of 10**, including the removal of garbage images, leading to better quality and faster processing.



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Background subtraction

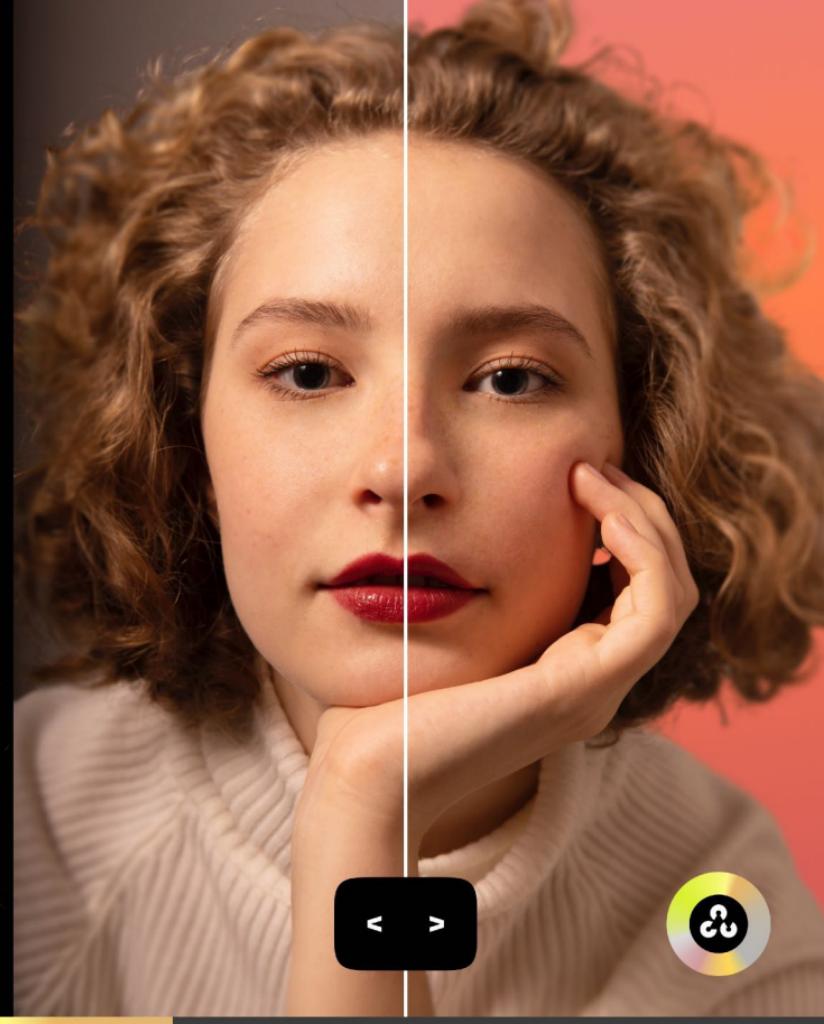
Real-time background subtraction

Our model runs on all platforms – Windows, MacOS, Linux, iOS, Android and even a browser.

It is only **9 MB** in size!



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Edge devices



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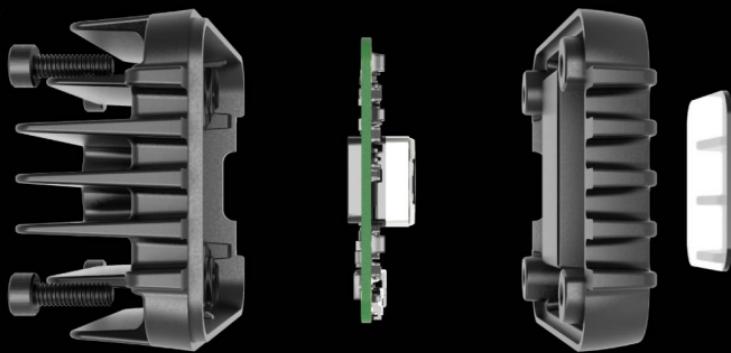


Optimized inference for edge devices

Our cutting-edge deep learning algorithms are designed to run seamlessly on ARM, FPGA, or RISC-V chips.

By creating remarkably compact DL models, we've successfully integrated AI into these platforms. For instance, our highly optimized people detection solution for FPGA is a mere 600 Kb in size, showcasing our commitment to efficiency and performance.

600KB
SIZE OF FPGA MODEL

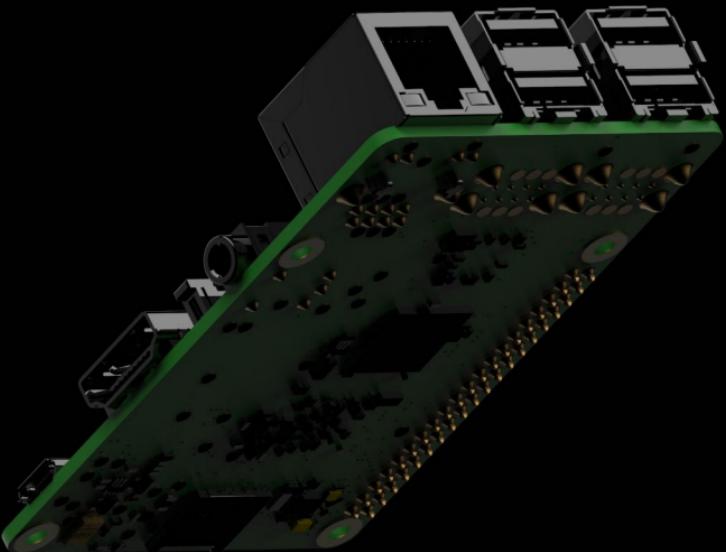


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Quantization for low-power architectures

- We've developed a groundbreaking quantization algorithm for FPGA, enabling us to perform inference using just 5 bits. The compact model has a total size of only 600 Kb.
- For safety solutions, we trained YOLOX-S and quantized it into int8, achieving a speed of 10 FPS on the RV1126 chip with an input resolution of 480x832. The resulting mAP is an impressive 80.6%.
- For the GAP8 platform by GreenWaves Technologies, we trained a people detection model and quantized it into int8. The full size of the model is a mere 700 Kb, with an outstanding resulting mAP of 96%.



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Power-Efficient DL

Face Re-ID, our collaborative project with GreenWaves Technologies, focused on neural network inference for an ultra-low-power RISC-V platform capable of operating for two years on the same battery power.

We've developed a comprehensive pipeline, encompassing training, quantization, and inference for a Face Re-ID scenario.

Our people detection and tracking solution for a thermal camera, features a 700KB model that runs at 5 FPS on an edge device. This battery-powered innovation offers up to 3.5 years of operation from a single charge, demonstrating our commitment to efficiency and sustainability in cutting-edge AI solutions.



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512KB

RAM IS ENOUGH FOR THE
NETWORK INFERENCE

SARAH SMITH



OUR PROJECTS

Camera solutions



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Camera calibration and autocalibration

Calibration plays a crucial role in nearly all computer vision solutions. Our team is highly experienced in camera calibration, including fisheye cameras, for which we have developed a custom calibration system capable of supporting view angles greater than 180 degrees.

Additionally, we have expertise in camera auto-calibration solutions, showcasing our dedication to providing cutting-edge and versatile technologies in the field of computer vision.



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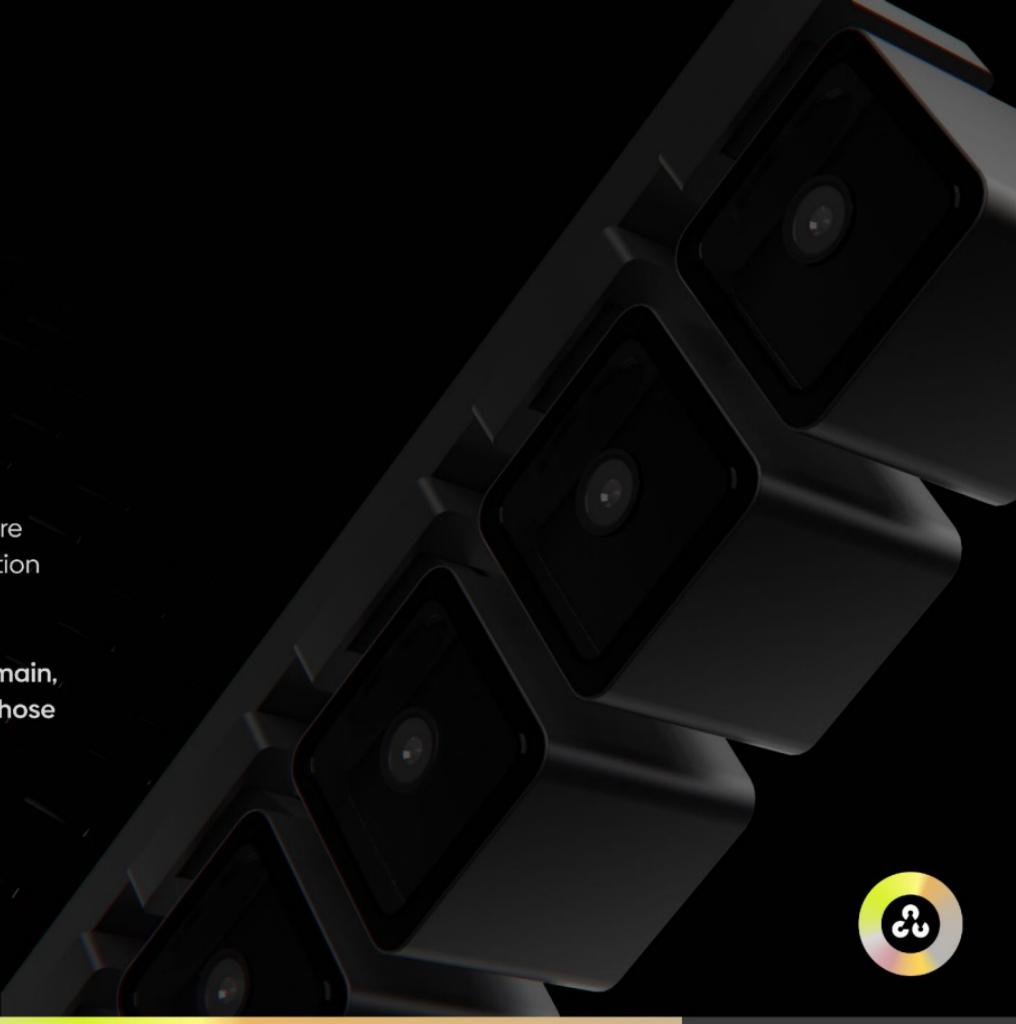
Multi-camera calibration

Multi-camera calibration is a vital component of spatially aware computer vision applications, such as 3D human pose estimation and augmented reality.

Our team boasts significant expertise in the multi-camera domain, offering a variety of ready-to-implement solutions, including those based on RGB-D setups.



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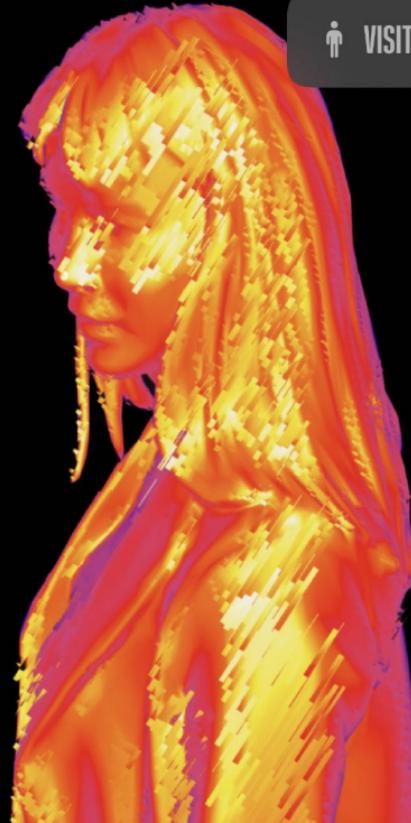
People Detection with Thermal Camera

Thermal cameras effectively protect personal information and privacy. However, they require unique processing methods compared to traditional optical images in computer vision. Our team has developed a solution that detects and tracks individuals using low-resolution thermal cameras.

This robust system adeptly manages sensor noise, extracts valuable information, while enhancing the visibility and differentiation of people from other warm objects.



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OUR PROJECTS

Seeing world in 3D



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3D space understanding

Our advanced 3D algorithms emulate human perception, comprehending depth of view and distance to objects.

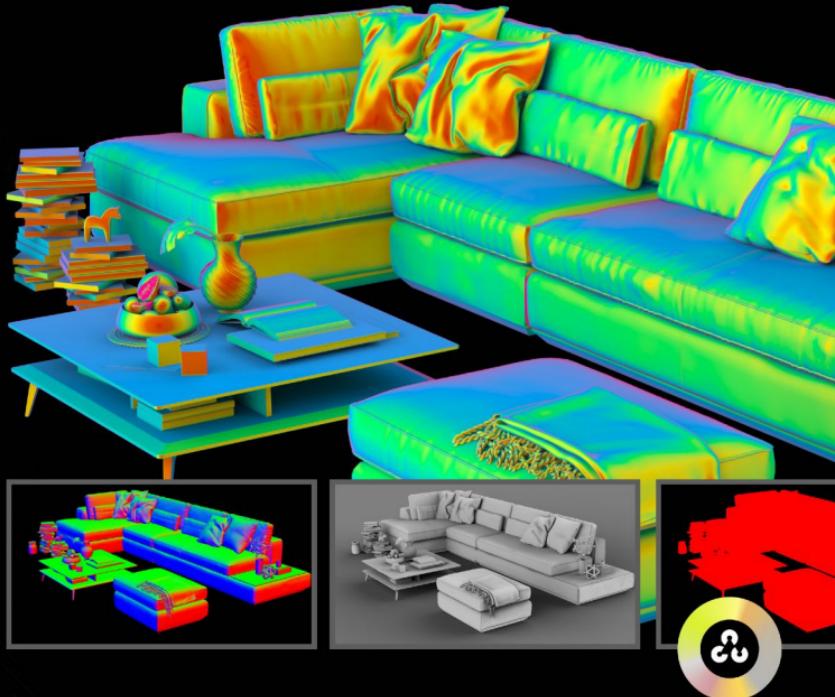
Our award-winning solution for indoor scene understanding achieved first place in the largest public benchmark for furniture segmentation in 2019.

This accomplishment highlights our expertise in developing AI solutions that effectively interpret and interact with the world around them.



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RANKED 1ST
TOP PUBLIC BENCHMARK
ON INSTANCE SEGMENTATION, 2019



Augmented reality and human interfaces

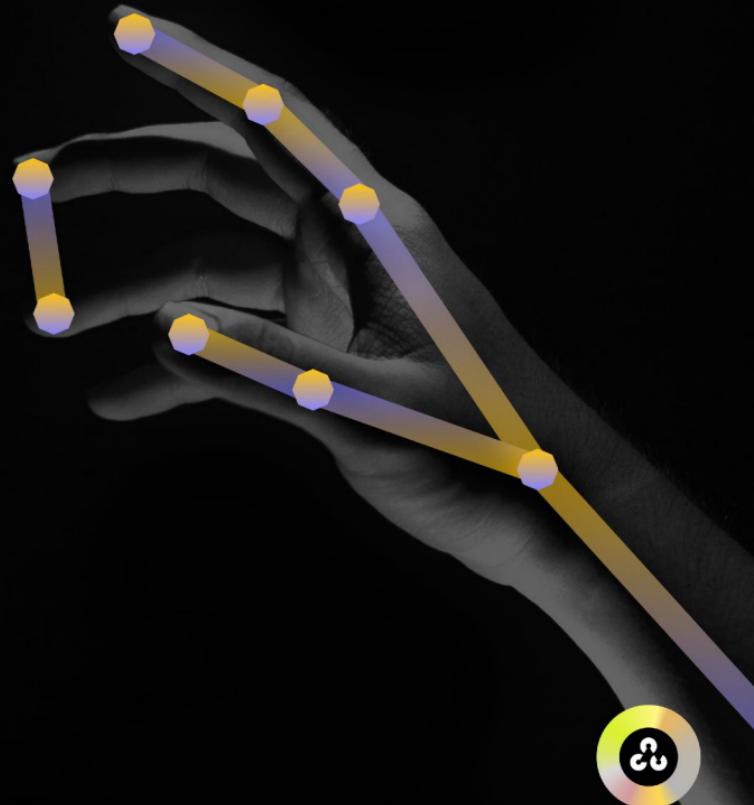
We have extensive expertise in developing hand gesture recognition algorithms for Augmented Reality kits.

Our innovative solution interprets hand gestures and converts them into commands, facilitating seamless communication with the device.

This user-friendly approach enhances the overall AR experience, making interactions more intuitive and immersive.



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OpenCV Contributions

Our team includes current and former core members of the OpenCV development team.

We've played a pivotal role in extending OpenCV's functionality, particularly for mobile platforms. The code we've contributed powers millions of smartphones worldwide, making a significant impact on users across the globe.

Our contributions include the implementation of OpenCV for Android (and Java bindings for the library), WinRT support, OpenCV for Windows on ARM, as well as OpenCV support on various NVIDIA platforms and CUDA support.



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We are a world class team delivering AI solutions

Boasting over a decade of experience in Computer Vision and Deep Learning consulting, our team stands prepared to support your project.

Our expertise encompasses a variety of solutions, such as training and deploying cutting-edge neural networks, optimizing models for edge computing, and creating custom hardware when necessary.

As specialists in visual perception challenges, we welcome the opportunity to discuss your requirements and collaborate on a tailored solution.

Please feel free to reach out to us at contact@opencv.ai to discover the ideal solution for your unique needs.



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