Can AI Solve the Low Light and HDR Challenge?

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VISIONARY.AI

Who Are We?

Visionary.ai

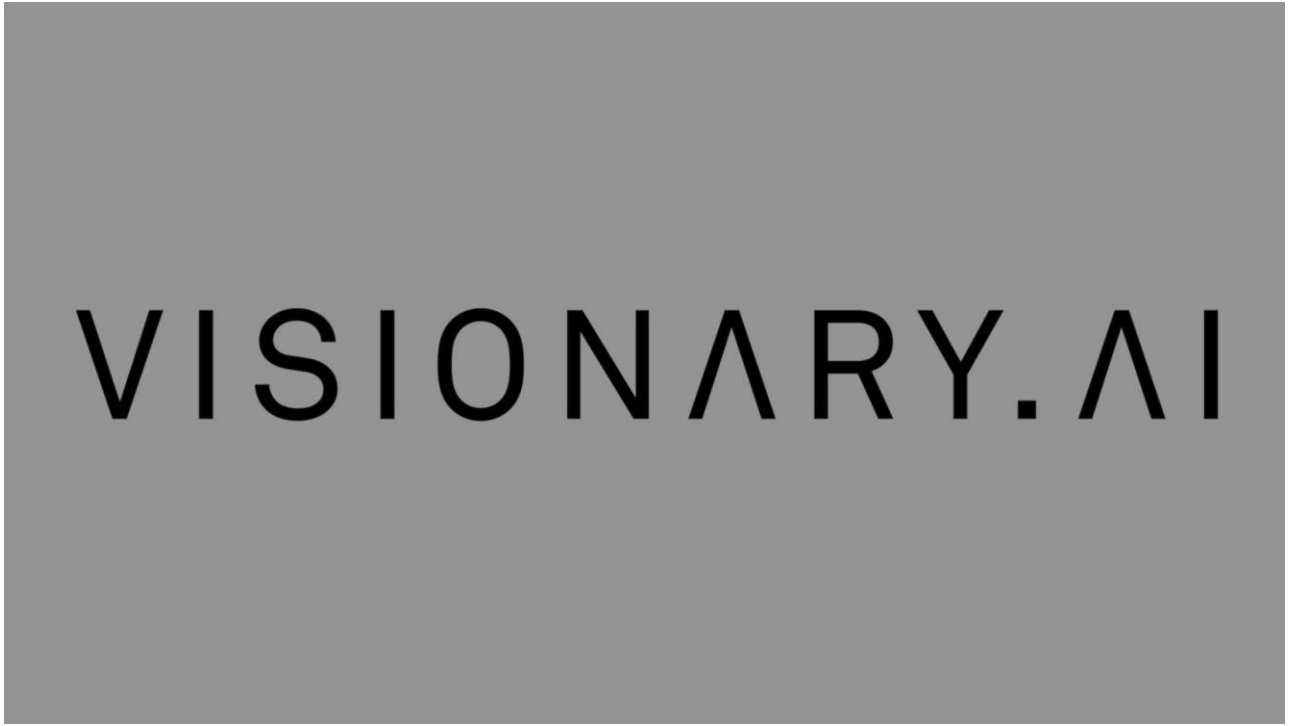
- Enhancing video quality in real-time using AI
- The world's first fully software-based ISP
- Based in Israel, our leadership team holds over 50 patents in the fields of AI and computer vision.

Our specialization

- Licensable IP, software and integration services for real time image quality improvement

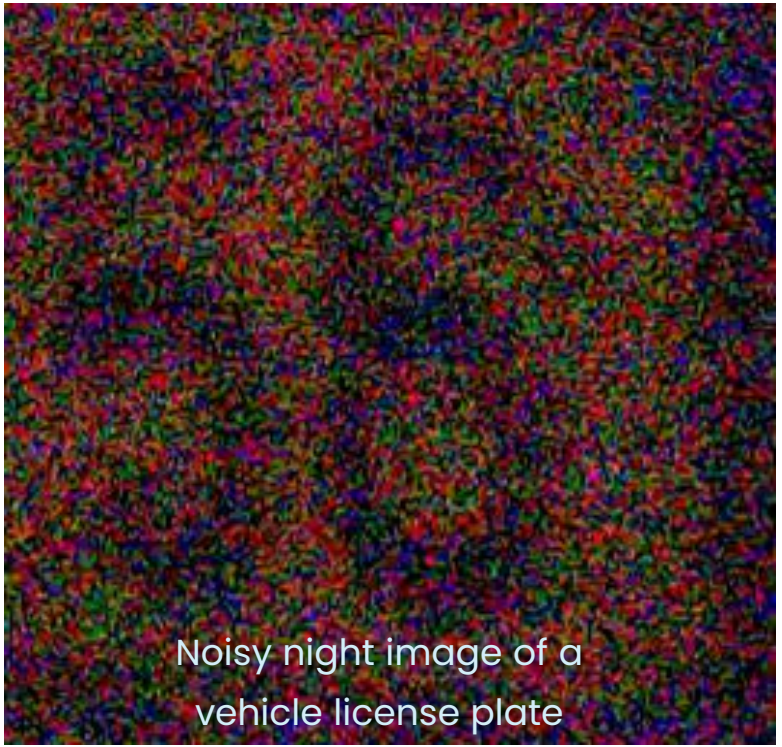

Our Vision
to make cutting-edge image quality available to all cameras

True Night Vision



Noise - The Enemy of the Image

- Multiple sources of noise in image sensors
- Low light makes noise worse
- Few photons per pixel = low signal to noise
- Heat makes noise worse
- Hot silicon generates more random noise
- Noise reduces capability of machine vision



Noisy night image of a vehicle license plate

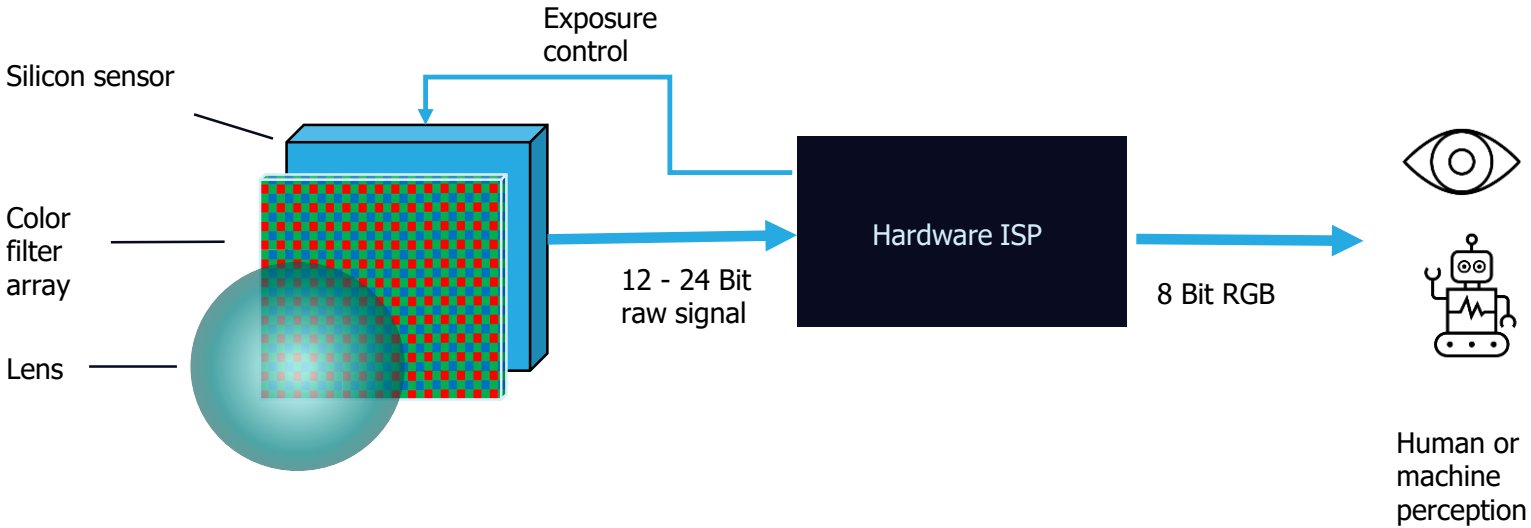
Noise - The Key to Unlocking Degrees of Freedom for Designers

If you can remove image noise, you can improve design parameters like:

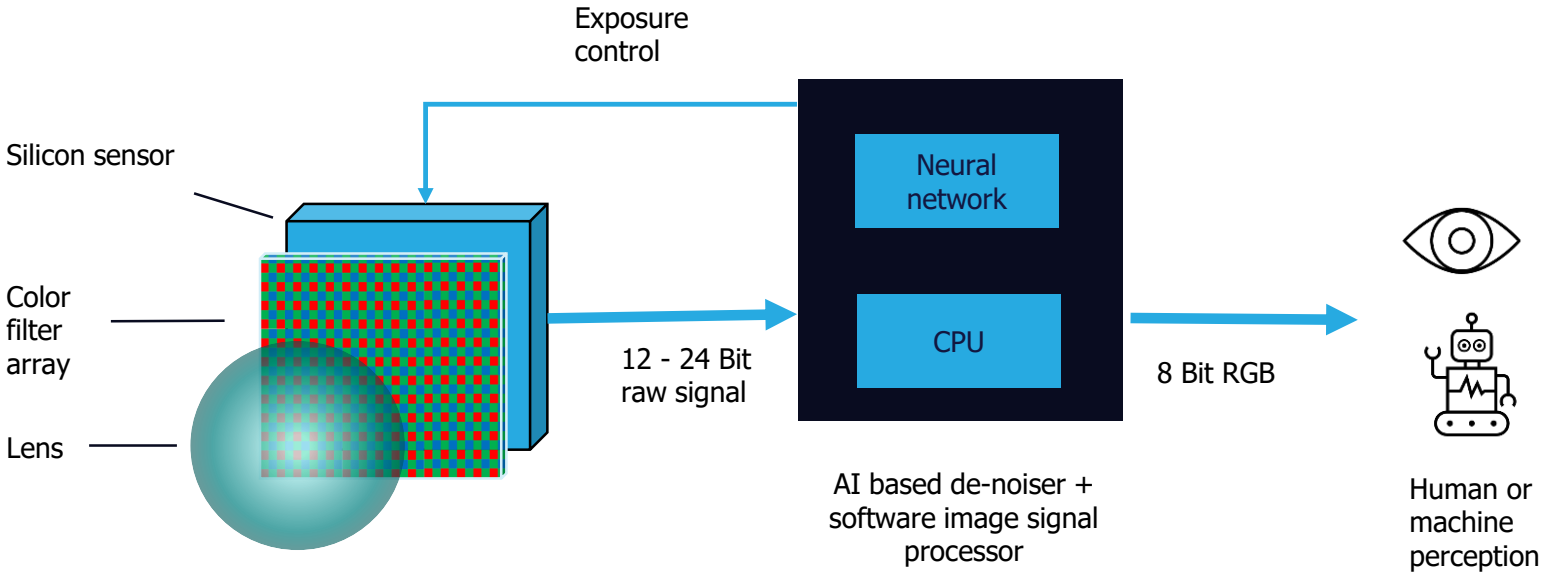
- Low light performance
- Smaller and/or lower cost sensors
- Higher frame rate
- Shorter exposures (reduced motion blur)
- Reduce or eliminate cost of illumination

Smartphone Image Quality has Created a New Standard of Consumer Expectations

The Classic Image Pipeline

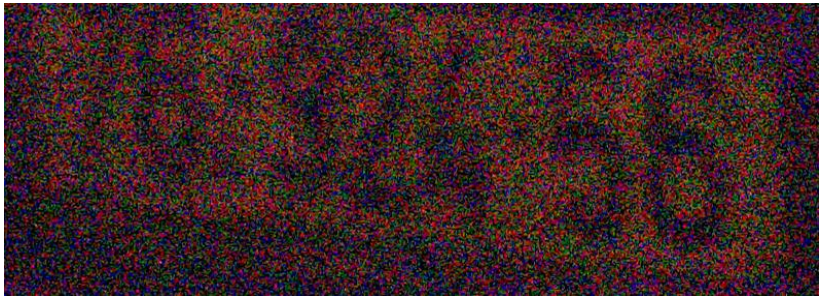


The New Image Pipeline



Real Time AI Denoiser Enables Night Vision

We reduce noise to achieve clarity and cutting-edge detection accuracy



Detail from a night image taken of a vehicle license plate

Image after noise removal. Becomes readable for both humans and computer vision

Premium Images from Standard Cameras

High end low light camera w/o Visionary.ai

Standard camera upgraded by Visionary.ai SW ISP

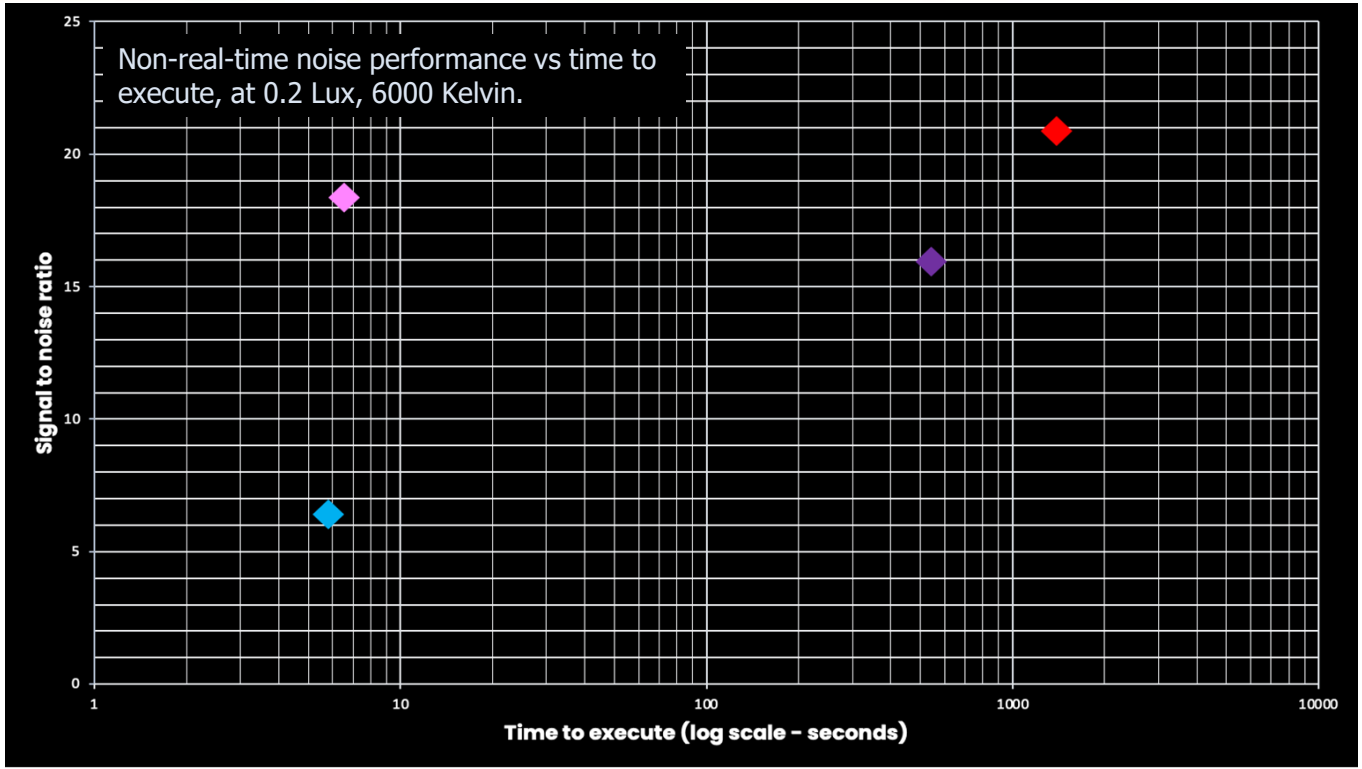
HIKVISION IDS-2CD9396-BIS
9 MP IR GMOS ANPR

FLIR Blackfly S USB3
7.1 MP, 51 FPS, Sony IMX428, Color

Increase in Object Detection Accuracy

More objects detected and higher detection confidence

Benchmarks vs Leading Denoising Algorithms



Denoising performance close to current leading denoising approach, "Restormer," in less than 0.005% of the time

- Visionary.ai
- Guided Filtering
- BM3D
- Restormer

Denoising without Compromising Image Sharpness

- Classic denoising approaches can cause loss of image sharpness
- This harms machine vision performance
- Visionary.ai retains image quality, measured by modular transfer function MTF30 and MTF50 (higher is better)
- Critically, our denoiser runs in real-time

(Note: -1 means that value could not be calculated due to low performance)

	3000 Kelvin / 0.2 lux	6000 Kelvin / 0.2 lux
mtf30 BM3D	0.248772	0.23652
mtf30 Guided Filtering	-1	-1
mtf30 Restormer	0.251703	0.221795
mtf30 Visionary.ai	0.234336	0.227869
mtf50 BM3D	0.172759	0.200379
mtf50 Guided Filtering	0.040672	-1
mtf50 Restormer	0.123717	0.149752
mtf50 Visionary.ai	0.160527	0.175771

Can a Mid-range Smartphone Beat Samsung's S22 Ultra with the Help of AI?

High Dynamic Range Improvement

20% less noise, improved color accuracy and facial details

Opportunities for Ecosystem Collaboration

Direct to OEMs

Working directly with major electronics companies, often in higher volume systems requiring some hardware or feature customisation

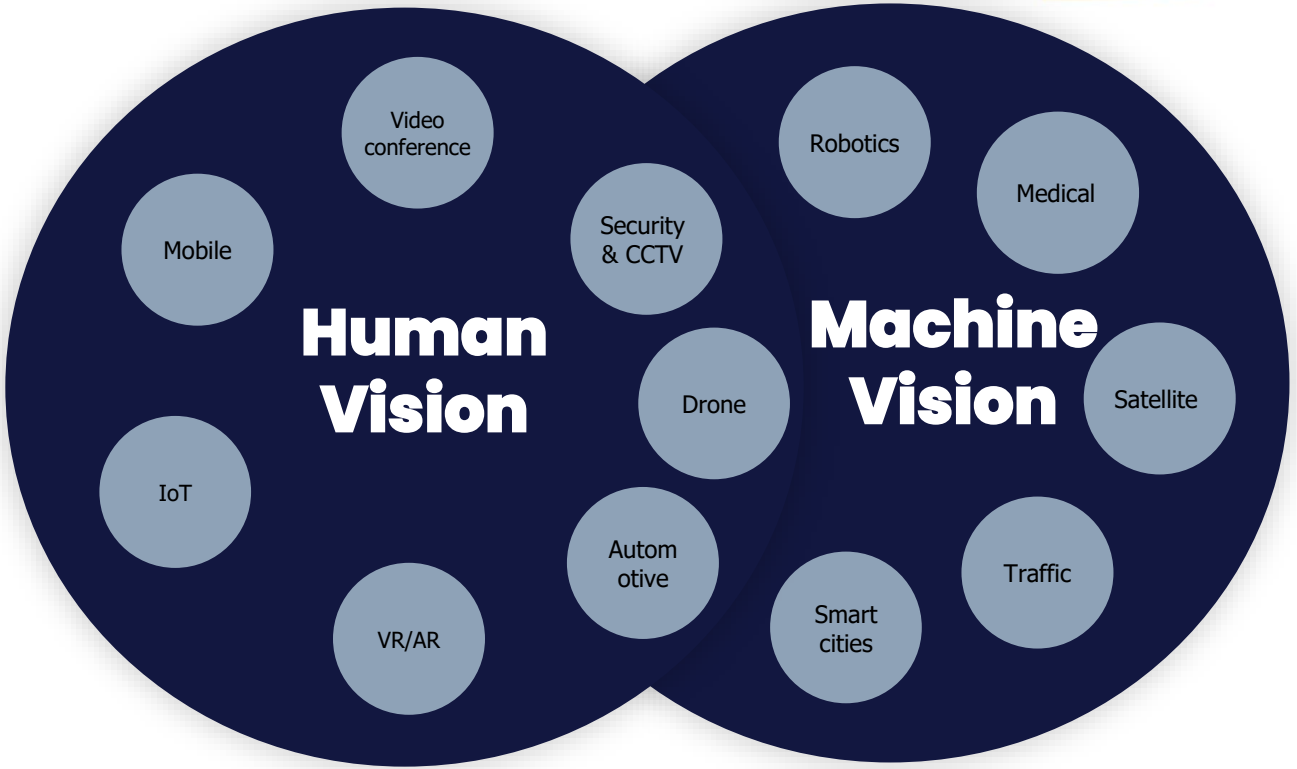
Design Partners

Collaboration with semiconductor and sensor companies to accelerate availability for a wider range of OEMs and system integrators

Applications

Recent POCs in a range of use cases

- Robotics: delivery drones
- IoT: Smart doorbells
- Smart ovens
- Medical imaging: laparoscopic surgery
- Mobile phones



Resources

- Visionary.ai website: https://www.visionary.ai
- Live video demo at EVS 2022: Same hardware, with and without Visionary.ai software.
- Video: Urban Night Scene demo

Drop by the Visionary.ai booth today to see the unseen

Thank you

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