



# HORIZON MATRIX

## -- Autonomous Driving Computing Platform

Horizon Robotics® Matrix™ Product Series is a scalable perception compute solution for automated driving. Starting with vehicle ready hardware platforms, customer can choose between turnkey algorithm packages and custom network training toolchain to deploy perception software. Passively cooled with TDP < 40 W, Matrix is an ideal choice for accelerating the time to market for autonomous shuttles and delivery fleets.



Matrix 1.6



Matrix 1.7



Matrix 2

### Energy Efficient & Vehicle-Ready Hardware

Passively cooled and tested to support turbulent road conditions and the ambient temperatures of -40 to 85C, Matrix is designed to be vehicle ready. Benefiting from Horizon Robotics' energy efficient BPU architecture and Journey AI SoC, each Matrix can support up to 4 real-time perception video stream at as low as 5W per stream. Combined with L4 vision perception algorithm, Matrix can fulfill multiple 1080P streams of environmental perception workloads and provide customers the scalability to deploy the setup they need based on system architecture.

### Field-Tested Algorithm Packages

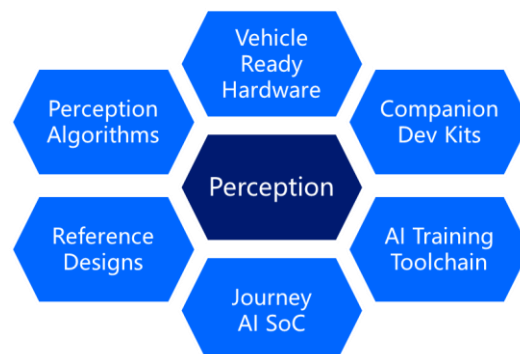
For customers looking to reduce time to market, Horizon Robotics' field-tested Matrix perception algorithm package is an ideal choice. The packages come with many options and can be tailored to meet different use cases. Some key perception capabilities include pedestrian (type, pose), vehicle (3d, type, status, heading, velocity), lane and free space detection, traffic light & sign recognition and construction zone detection. Additional robustness and failsafe features are also included, such as warning for loss of focus, glare, obstruction etc.

### Network Customization with Horizon AI Toolchain

For customer looking to deploy proprietary models, Horizon Robotics' AI training toolchain supports mainstream frameworks such as TensorFlow and comes with design examples and documentation of best practices for maximizing performance on Matrix.

### Companion Boards for Data Collection and Simulation Testing

Framegrabber 1.0 and Hardware-In-Loop (HIL) Test Kit are two additional companion solutions designed for Matrix. Framegrabber can record up to 12 streams of raw video data along with odometry information while HIL Test Kit enables the replay of these information into Matrix during desktop development and validation.



## Hardware Specifications

Specifications		Matrix 1.6	Matrix 1.7	Matrix 2
Overall Spec	Size	250×197×71mm	275×240×63mm	285×215×62mm
	Weight	5kg	3.5kg	3.5kg
	IP Rating	IP41	IP41	IP41
Electrical Spec	Input Voltage	9-16V	9-16V	9-16V
	Power Consumption (average)	30W	38W	20W
	Working Temperature	-20°C ~ 60°C	-20°C ~ 60°C	-40°C ~ 85°C
	Main Compute Processors	A10+TC233	A10+TC233	Journey 2*4+TC297
Input Spec	Camera*	720P@30fps	1080P/720P@30fps	1080P/720P@30fps
	Input Interface	FPD-Link IIIx4, CANx2, GPS, IMU	FPD-Link IIIx4, CANx2, GPS, IMU	FPD-Link IIIx4, CANx6, GPS, IMU
	Camera Trigger	Not available	GPIO x 4	GPIO x 4
Output Spec	Image Bypass	Not available	FPD-Link III x 4	FPD-Link III x 4
	Structured Data Output	Ethernet & CAN	Ethernet & CAN	Ethernet , CAN & CAN-FD
	Computing Frame Rate	4X 720p@10fps, 1x 720p@25fps	4x 720p@15fps, 1x 720p@30fps	4x 1080p@30fps

\* Camera is not part of Matrix hardware platform

## Algorithm Features by Camera Layout

Class	Features	Narrow Front	Fisheye Front
Vehicle	2D Detection	√	√
	3D Detection	√	N/A
	Vehicle Classification	√	N/A
	Vehicle Signal Light Classification	√	√
	Emergency Vehicle: Vehicle and flash mode classification	√	N/A
Pedestrian	2D Detection and Classification (child and adult)	√	√
	Heading	√	N/A
Cyclist	2D Detection	√	√
	3D Detection	√	N/A
Traffic Light	2D Detection and Classification Lenses 2D Detection	√*	N/A
Traffic Sign	2D Detection and Classification	√*	N/A
Lane	Detection	√	N/A
Free Space	Free Space	√	√
General Object	Segmentation	√	√
Semantic Segmentation	Segmentation	√	√
Construction Zone	Channelizing Devices, Segmentation and Detection	√*	N/A
Cross-walk/Stop bar/Speed-bump	Segmentation and Detection, VCS Polygon	√*	√
Weather Classification	Normal, Light / Heavy rain	√	√
Image Fail Safe	Freeze/Blockage/Blur/Glare/Calibration Loss Detection	√	√

\* For 12/2019 release version

To learn more about Matrix 2 visit [www.horizon.ai/product/matrix](http://www.horizon.ai/product/matrix)

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