

# AUMO

INTELLIGENT VEHICLE



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## AD Station W100 PRODUCT MANUAL

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## One stop Solution for Autonomous Driving

### Vehicle Acquisition and Calculation, Hardware in the loop Simulation HIL Solution

As to the demands of the auto pilot industry, the AD Station W100 can integrate AUMO based on AMD Xilinx FPGA Zynq UltraScale+MPSoC series car mounted camera GMSL acquisition card and video injection card to achieve video data acquisition, video injection, and other functions. Customers can deploy the software simulation to the W100 server to build a more comprehensive hardware in the loop simulation testing environment. By combining programmable FPGA, powerful data acquisition and processing capabilities, the system achieves synchronous reinjection of multi-channel data acquisition and virtual scene data, and adapts to various mainstream serial and deserialization chips. The system is flexible in adapting to different auto pilot schemes.

## Automatic Driving Data Processing Station

### AD Station W100



The AD Station W100 is an ideal choice for auto pilot vehicle acquisition and calculation, hardware in the loop simulation testing systems. It is equipped with Intel Xeon Gold5317, 12 cores and 24 threads, with a maximum expandable memory of 4T DDR4, and supports dual graphics cards. It can be paired with Xilinx FPGA Zynq UltraS-scale+MPSoC series 16 channel in car camera GMSL acquisition card A16, 8 channel in car video injection card S2, and 4 channel in car video injection card S1.

#### | Basic Parameters

- System: Linux Ubuntu 20.04
- CPU: Intel Xeon Gold5317, 12 cores, 24 threads
- Memory: 16GB DDR4, expandable up to 4TB
- Storage: 1TB M.2 NVMe SSD (scalable to more)
- Graphics Card: Integrated graphics card (supports dual GPU, such as GTX3090)
- PCIe Slots: A total of 7 PCIe 3.0 x16 slots, supporting up to 4 PCIe 3.0 x16 channels

#### | Functional characteristics

- Supports 7 PCIe 3.0 X8 or 4 PCIe 3.0 X16
- Can mix 16 channel acquisition card A16, 8 channel injection card S2, and 4 channel injection card S1
- Dual card S2 can be used in parallel to achieve 16 channel video injection
- A16 and S2 can be used to achieve integrated injection and acquisition functions
- Can add dual GPU cards, such as RTX3090, to achieve high computing power AI computing
- Supports multi-channel 1000BASE-T1 and CAN/CAN-FD communication, meeting various commonly used vehicle interfaces
- Can achieve collection and injection of GMSL2 interface
- HDMI video injection and GMSL2 injection can be achieved through S1

## A16 (Purchase Additionally)

### 16-channel Car Camera Acquisition Card



A solution for the data collection needs of autonomous driving cameras is achieved through the PCIe 3.0x16 interface, which enables 16 channel camera video collection and provides PTP timestamp function to ensure the synchronization of 16 channel video data. It is the best choice for industrial computer IPC autonomous driving solutions.

#### | Interface

- PCIe 3.0 X16 interface
- 4x 4-in-1 Amphenol min Fakra interface, using 4-in-1 Amphenol Z Code Fakra car gauge coaxial connectors
- One M8 6pin aviation socket (male) for GPS communication and external trigger input
- 1x 10/100/1000M adaptive Gigabit Ethernet port

#### | Key Parameters

- Deserializer: MAX96712
- Serializer: MAX96705/MAX9295A/MAX96717F/- MAX96717, etc
- Supports 16 channel GMSL1/GMSL2 camera inputs
- Supports up to 16 channels 1920\* 1080@30fps Input
- Supports up to 8 channels 3840 × 2160@30fps Input
- Support YUV422, RAW12 video formats
- Support Ethernet PTP timing timestamp with an accuracy of less than 1ms
- Support for scalable GPS timing synchronization
- Support for external trigger synchronization of cameras
- Support V4L2 software architecture
- Support PC firmware upgrade
- Cable length:  
In GMSL1 mode, the cable can reach up to 40 meters (3Gbps),  
In GMSL2 mode, the cable can reach up to 20 meters (6Gbps)
- Working temperature: -40 °C~70 °C
- Storage temperature: -40 °C~85 °C
- Working humidity: 10%~90%
- Storage humidity: 0~90%
- MTBF: 5 years

#### | Software Parameters

- Tested Linux kernel version:  
Ubuntu 18 LTS / Ubuntu 20 LTS / Ubuntu 22.04 LTS
- Support Linux operating system, using V4L2 framework driver
- Support AXI interface extension of peripherals and supports the use of MSI interrupts
- Support standard IIC devices
- Memory mode supports USERPTR and MMAP
- Support camera configuration and query operations through IIC bus

## S2 (Purchase Additionally)

### 8-channel Car Video Injection Card



By the PCIe 3.0x16 interface, 8-channel video, 3-channel 1000Base-T1, and 3-channel CAN/CAN-FD data ECUs are injected, and PTP timestamp synchronization function is provided to ensure the synchronization of multi-channel data. It supports industrial computers/standard servers to achieve hardware in the loop simulation of HIL systems.

#### | Interface

- PCIe 3.0 X16 interface
- 2-way 4-in-1 Amphenol min Fakra interface, using 4-in-1 Amphenol Z Code Fakra car gauge coaxial connectors
- One M8 aviation socket (including three CAN/CAN-FD interfaces) for CAN/CAN-FD bus communication and GPS PPS trigger input
- 3-way 1000Base\_T1 onboard Ethernet interface

#### | Key Parameters

- Serializer: MAX9295A
- Support 8-channel 3840x2160 @ 30fps video injection
- Support YUV422, RAW12 video formats
- Support timestamp injection mode
- Support ECU and other devices to trigger synchronous injection mode
- Each channel supports 3 I2C device response simulations
- Support Ethernet PTP timing timestamp with an accuracy of less than 1ms
- Image injection delay less than 100us
- Support PC firmware upgrade
- Cable length:  
In GMSL1 mode, the cable can reach up to 40 meters (3Gbps),  
In GMSL2 mode, the cable can reach up to 20 meters (6Gbps)
- Working temperature: -40 °C~70 °C
- Storage temperature: -40 °C~85 °C
- Working humidity: 10%~90%
- Storage humidity: 0~90%
- MTBF: 5 years

#### | Software Parameters

- Support Linux/Window dual systems
- Support SDK development

## S1 (Purchase Additionally)

### 4-channel Car Video Injection Card



By the PCIe 3.0x4 interface, 4-channel video injection is achieved, and PTP timestamp synchronization function is provided to ensure the synchronization of multi-channel data. At the same time, 4-channel HDMI video signal input is supported, and industrial computer/standard server hardware in the loop simulation HIL system is supported.

#### | Interface

- PCIe 3.0 X4 interface
- 1-way 4-in-1 Amphenol min Fakra interface, using 4-in-1 Amphenol Z Code Fakra car gauge coaxial connectors
- 4-way mini HDMI input interface

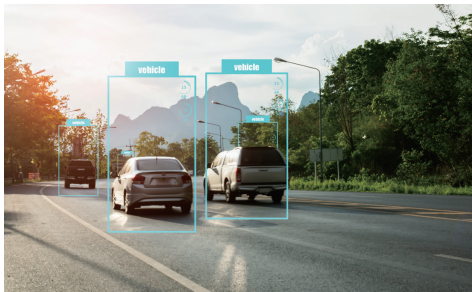
#### | Key Parameters

- Serializer: MAX9295A
- Support 4-channel 3840x216 @ 30fps video injection
- Support 4-channel 3840 × 2160@30fps HDMI video injection
- Support YUV422, RAW12 video formats
- Support timestamp injection mode
- Support ECU and other devices to trigger synchronous injection mode
- Image injection delay less than 100us
- Each channel supports 3 I2C device response simulations
- Support Ethernet PTP timing timestamp with an accuracy of less than 1ms
- Support PC firmware upgrade
- Cable length:  
In GMSL1 mode, the cable can reach up to 40 meters (3Gbps),  
In GMSL2 mode, the cable can reach up to 20 meters (6Gbps)
- Working temperature: -40 °C~70 °C
- Storage temperature: -40 °C~85 °C
- Working humidity: 10%~90%
- Storage humidity: 0~90%
- MTBF: 5 years

#### | Software Parameters

- Support Linux/Window dual systems
- Support SDK development

## Business scope



### Data Collection Vehicle

After the camera video is collected, it is dropped and stored to provide data support for subsequent algorithm simulation and restoration.



### Video Injection System

Retrieve the actual data collected from the road and feed it back to the ECU to restore the true situation of the road and optimize the algorithm.



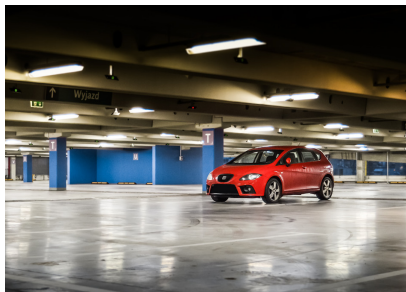
### Hardware-in-the-Loop (HIL)

Simulate the car mounted camera and inject the scene data simulated by the software into the ECU, virtual vehicle roads, and other information.



### Autopilot System

Send the onboard camera data to the ECU, and at the same time, send the data to the PC host or server through the PCIE/optical port for real-time data analysis or disk storage.



### ADAS

Adaptive cruise control, lane keeping assist, pre collision braking, automatic parking assist (APA), and automatic valet parking (AVP)



### Driver Monitoring System (DMS)

Visual based infrared sensors actively monitor the driver's attention and participation status in real-time AI, helping the driver maintain focus.



### Interior Monitoring System (ICMS)

Real time rapid and accurate recognition of the identity, emotions, gestures, and preferences of vehicle occupants to help improve safety and comfort inside the vehicle.



### Automatic switching station

Monitor vehicle battery swapping behavior from multiple perspectives, and upload real-time data to the host for analysis and processing.



### CMS

Electronic rearview mirrors solve blind spots in commercial and passenger vehicles, assist in driving in rainy and snowy weather, increase safety, and reduce accidents.

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