



THE
AUTOWARE
FOUNDATION

Autoware.Auto Supported Hardware List v.1.0

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This document is created to describe and give additional information of the sensors and systems supported by Autoware.Auto software.

All equipment listed in this document has available ROS2 drivers and has been tested by one or more of the community members on field in autonomous vehicle and robotics applications.

The listed sensors and systems are not sold, developed or given direct technical support by the Autoware community. Having said that any ROS2 and Autoware related issue regarding the hardware usage could be asked using the community guidelines which found here: <https://answers.ros.org/questions/ask/?tags=autoware>

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1.LiDARs

1.1. Velodyne 3D LiDAR Sensors

Velodyne Lidars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (V), (H)	ROS2 Driver	Autoware Tested (Y/N)
Alpha Prime	245m	(+15°)/(-25°), (360°)	Y	Y
Ultra Puck	200m	(+15°)/(-25°), (360°)	Y	Y
Puck	100m	(+15°)/(-15°), (360°)	Y	Y
Puck Hi-res	100m	(+10°)/(-10°), (360°)	Y	Y

Link to ROS2 driver:

https://github.com/ros-drivers/velodyne/tree/ros2/velodyne_pointcloud

Link2:

https://gitlab.com/autowarefoundation/autoware.auto/AutowareAuto/-/tree/master/src/drivers/velodyne_nodes

Link to company website: <https://velodynelidar.com/>

1.2. Robosense 3D LiDAR Sensors:

Robosense Lidars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (V), (H)	ROS2 Driver	Autoware Tested (Y/N)
RS-Ruby	250m	(+15°)/(-25°), (360)	Y	
RS-Ruby-Lite	230m	(+15°)/(-25°), (360)	Y	
RS-LiDAR-32	200m	(+15°)/(-25°), (360)	Y	
RS-LiDAR-16	150m	(+15°)/(-15), (360)	Y	

Link to ROS2 driver: https://github.com/RoboSense-LiDAR/rslidar_sdk

Link to company website: <https://www.robosense.ai>

1.3.HESAI 3D LiDAR Sensors:

Hesai Lidars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (V), (H)	ROS2 Driver	Autoware Tested (Y/N)
Pandar 128	200m	(+15°)/(-25°), (360°)	Y	
Pandar 64	200m	(+15°)/(-25°), (360°)	Y	
Pandar XT	120m	(+15°)/(-16°), (360°)	Y	
Pandar QT	20m	(-52.1°/+52.1°)/(360°)	Y	

Link to ROS2 driver: https://github.com/HesaiTechnology/HesaiLidar_General_ROS

Link to company website: <https://www.hesaitech.com/en/>

1.4.Leishen 3D LiDAR Sensors:

Leishen Lidars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (V), (H)	ROS2 Driver	Autoware Tested (Y/N)
LS C16	150m	(+15°/-15°), (360°)	Y	
LS C32	150m	(+15°/-15°), (360°)	Y	
CH 32	120m	(+3.7°/-6.7°),(120°)	Y	
CH 128	20m	(+14°/-17°)/(150°)	Y	

Link to ROS2 driver: <https://github.com/leishen-lidar>

Link to company website: <http://www.lslidar.com/>

1.5. Livox 3D LiDAR Sensors:

Livox Lidars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (V), (H).	ROS2 Driver	Autoware Tested (Y/N)
Horizon	260m	(81.7°), (25.1°)	Y	Y
Mid-70	90m	(70.4°), (77.2°)	Y	
Avia	190m	(70.4°), Circular	Y	
HAP	150m	(25°), (120°)		

Link to ROS2 driver: https://github.com/Livox-SDK/livox_ros2_driver

Link to company website: <https://www.livoxtech.com/>

1.6. Ouster 3D LiDAR Sensors:

Ouster Lidars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (V), (H).	ROS2 Driver	Autoware Tested (Y/N)
OS0	50m	(90°), (360°)	Y	
OS1	120m	(45°), (360°)	Y	
OS2	240m	(22.5°), (360°)	Y	Y

Link to ROS2 driver: https://github.com/ros-drivers/ros2_ouster_drivers

Link to company website: <https://ouster.com/>

2. RADARs

2.1. Smartmicro Automotive Radars

Smartmicro Radars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (Azim.), (Elev.)	ROS2 Driver	Autoware Tested (Y/N)
Type 153 (Triple Mode Short, Medium Long)	S:0.2...19 m M:0.4...55 m L:0.8...120 m	Short: (130°), (15°) Med.: (130°), (15°) Long: (100°), (15°)	Y	Y
Type 132 (Dual Mode (Medium, Long))	M:0.5...64 m L:1...175 m	Med.: (100°), (15°) Long: (32°), (15°)	Y	Y

Link to ROS2 driver: https://github.com/smartmicro/smartmicro_ros2_RADARS

Link to company website: <https://www.smartmicro.com/automotive-radar>

2.2. Aptiv Automotive Radars

Aptiv Radars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (Azim.), (Elev.)	ROS2 Driver	Autoware Tested (Y/N)
Aptiv MMR (Dual Mode Short, Long)	S: 1..40 m L: 3..160 m	Short.: (90), (90°) Long: (90°), (90°)	Y	
Aptiv ESR 2.5 (Dual Mode (Medium, Long))	M: 1..60 m L: 1..175 m	Med.: (90°), (4.4°) Long: (20°), (4.4°)	Y	

Link to ROS2 driver: ?

Link to company website: <https://autonomoustuff.com/products>

2.3. Continental Engineering Radars

Continental Engineering Radars which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	Range	FOV (Azim.), (Elev.)	ROS2 Driver	Autoware Tested (Y/N)
ARS430DI	250m	(120), (18°)		

Link to ROS2 driver: ?

Link to company website: <https://conti-engineering.com/components/ars430/>

3. CAMERAS

3.1. FLIR Machine Vision Cameras

FLIR Machine Vision cameras which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	MP	FPS	Interface	Sensor Format	Lens	ROS2 Driver	Autoware Tested (Y/N)
Blackfly S	2.0 5.0	22 95	USB-GigE	1" - 2/3"	C & CS	Y	
Grasshopper3	2.3 5.0	26 90	USB-GigE	1" - 2/3"	C & CS	Y	

Link to ROS2 driver: https://github.com/berndpfrommer/flir_spinnaker_ros2

Link to company website: <https://www.flir.eu/iis/machine-vision/>

3.2. Lucid Vision Cameras

Lucid Vision cameras which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	MP	FPS	Interface	Sensor Format	Lens	ROS2 Driver	Autoware Tested (Y/N)
TRITON 054S	5.4	22	GigE	1/1.55"	C Mount	Y	Y
TRITON 032S	3.2	35.4	GigE	1/1.8"	C Mount	Y	Y

Link to ROS2 driver: https://gitlab.com/leo-drive/Drivers/arena_camera

Link to company website: <https://thinklucid.com/triton-gige-machine-vision/>

3.3. Allied Vision Cameras

Allied Vision cameras which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	MP	FPS	Interface	Sensor Format	Lens	ROS2 Driver	Autoware Tested (Y/N)
Mako G319	3.2	37.6	GigE	1/1.8"	C Mount	Y	

Link to ROS2 driver: https://github.com/neil-rti/avt_vimba_camera

Link to company website: <https://www.alliedvision.com/en/products/cameras>

4. Thermal CAMERAs

4.1. FLIR Thermal Automotive Dev. Kit

FLIR ADK Thermal Vision cameras which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	MP	FPS	Interface	Spectral Band	FOV	ROS2 Driver	Autoware Tested (Y/N)
FLIR ADK	640x 512	30	USB-GMSL, Ethernet	8-14 um (LWIR)	75°, 50°, 32°, and 24°		

Link to ROS2 driver: -

Link to company website: <https://www.flir.eu/products/adk/>

5. IMU, AHRS & GNSS/INS

5.1. NOVATEL GNSS/INS Sensors:

NOVATEL GNSS/INS sensors which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	INS Rate	Roll, Pitch, Yaw Acc.	GNSS	ROS2 Driver	Autoware Tested (Y/N)
PwrPak7D-E2	200 Hz	R (0.013°) P (0.013°) Y (0.070°)	20 Hz L1 / L2 / L5, 555 Channels	Y	
Span CPT7	200 Hz	R (0.01°) P (0.01°) Y (0.03°)	20 Hz L1 / L2 / L5, 555 Channels	Y	

Link to ROS2 driver:

https://github.com/swri-robotics/novatel_gps_driver/tree/dashing-devel

Link to company website: <https://hexagonpositioning.com/>

5.2. XSENS GNSS/INS & IMU Sensors:

XSENS GNSS/INS sensors which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	INS/IMU Rate	Roll, Pitch, Yaw Acc.	GNSS	ROS2 Driver	Autoware Tested (Y/N)
MTi-680G	2 kHz	R (0.2°) P (0.2°) Y (0.5°)	5 Hz L1 / L2 184 Channels	Y	
MTi-300 AHRS	2 kHz	R (0.2°) P (0.2°) Y (1°)	Not Applicable	Y	

Link to ROS2 driver: http://wiki.ros.org/xsens_mti_driver

Link to company website: <https://www.xsens.com/>

5.3. SBG GNSS/INS & IMU Sensors:

SBG GNSS/INS sensors which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	INS/IMU Rate	Roll, Pitch, Yaw Acc.	GNSS	ROS2 Driver	Autoware Tested (Y/N)
Ellipse-D	200 Hz, 1 kHz (IMU)	R (0.1°) P (0.1°) Y (0.05°)	5 Hz L1 / L2 184 Channels	Y	Y
Ellipse-A (AHRS)	200 Hz, 1 kHz (IMU)	R (0.1°) P (0.1°) Y (0.8°)	Not Applicable	Y	

Link to ROS2 driver: https://github.com/SBG-Systems/sbg_ros2

Link to company website: <https://www.sbg-systems.com/products/ellipse-series/>

5.4. Applanix GNSS/INS Sensors:

SBG GNSS/INS sensors which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	INS/IMU Rate	Roll, Pitch, Yaw Acc.	GNSS	ROS2 Driver	Autoware Tested (Y/N)
POSLVX	200 Hz	R (0.03°) P (0.03°) Y (0.09°)	L1 / L2 / L5, 336 Channels	Y	Y
POSLV220	200 Hz	R (0.02°) P (0.02°) Y (0.05°)	L1 / L2 / L5, 336 Channels	Y	Y

Link to ROS2 driver: http://wiki.ros.org/applanix_driver

Link to company website: <https://www.applanix.com/products/poslv.htm>

5.5. POLYEXPLORE GNSS/INS Sensors:

POLYEXPLORE GNSS/INS sensors which has ROS2 driver and tested by one or more community members are listed below:



Supported Products List	INS/IMU Rate	Roll, Pitch, Yaw Acc.	GNSS	ROS2 Driver	Autoware Tested (Y/N)
POLYNAV 2000P	100 Hz	R (0.01°) P (0.01°) Y (0.1°)	L1 / L2 240 Channels	Y	
POLYNAV 2000S	100 Hz	R (0.015°) P (0.015°) Y (0.08°)	L1 / L2 240 Channels	Y	

Link to ROS2 driver: https://github.com/polyexplore/ROS2_Driver

Link to company website: <https://www.polyexplore.com/>

6. AD COMPUTERS

6.1. ADLINK In-Vehicle Computers:

ADLINK solutions which is used for autonomous driving and tested by one or more community members are listed below:



Supported Products List	CPU	GPU	RAM, Interfaces	Environmental	Autoware Tested (Y/N)
AVA-3501	Intel® Xeon® E-2278GE	Dual RTX 8000 or RTX A6000	64GB RAM CAN, USB, Ethernet, DIO, Hot-Swap SSD	24 Volt Vibration:3 Grms, 5-500 Hz, 3 axes, 30g shock	Y
SOAFEE's AVA Developer Platform	Ampere Altra ARMv8	optional	USB, Ethernet, DIO, M.2 NVMe SSDs	110/220 AC	Y

SOAFEE's AVA AP1	Ampere Altra ARMv8	optional	CAN, USB, Ethernet, DIO, M.2 NVMe SSDs	12 Volt	Y
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Link to company website:

<https://www.adlinktech.com/en/Connected-Autonomous-Vehicle-Solutions>

6.2. NXP In-Vehicle Computers:

NXP solutions which is used for autonomous driving and tested by one or more community members are listed below:



Supported Products List	CPU	GPU	RAM, Interfaces	Environmental	Autoware Tested (Y/N)
BLUEBOX 3.0	16 x Arm® Cortex®-A72	Dual RTX 8000 or RTX A6000	16 GB RAM CAN, FLEXRAY, USB, Ethernet, DIO, SSD	ASIL-D ??	

Link to company website: <http://bit.ly/nxpbluebox3>

6.3. NEOUSYS In-Vehicle Computers:

NEOUSYS solutions which is used for autonomous driving and tested by one or more community members are listed below:



Supported Products List	CPU	GPU	RAM, Interfaces	Environmental	Autoware Tested (Y/N)
8208-GC	Intel® Xeon® E-2278GE	Dual RTX 2080ti or RTX 3070	128 GB RAM CAN, USB, Ethernet, Serial, Hot-Swap SSD	8-35 Volt Vibration:MIL-ST D810G 5-500 Hz, 3 axes	

Link to company website: <http://bit.ly/neousys8208GC>

6.4. Crystal Rugged In-Vehicle Computers:

Crystal Rugged solutions which is used for autonomous driving and tested by one or more community members are listed below:



Supported Products List	CPU	GPU	RAM, Interfaces	Environmental	Autoware Tested (Y/N)
AVC 0161-AC	Intel® Xeon® Scalable	Dual GPU RTX Series	2TB RAM, CAN, USB, Ethernet, Serial, Hot-Swap SSD	10-32 Volt Vibration:2 G RMS 10-1000 Hz, 3 axes	

Link to company website:

<https://www.crystalarugged.com/product/avc1529-ai-autonomy-solution/>

7. Vehicle Drive By Wire Suppliers:

7.1. New Eagle DBW Solutions:

New Eagle DBW Controllers which is used for autonomous driving and tested by one or more community members are listed below:



Supported Vehicles	Power	Remote Control	ROS2 Support	Autoware Tested (Y/N)
Jeep Cherokee				
Chrysler Pacifica	500W Sine			
Toyota Prius	Inverter			
Chevy Bolt	2000 Watts,	Optional, Available	Y	Y
Ford Transit				
RAM 1500	8 Channel PDS			

Custom				
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Link to company website: <https://neweagle.net/autonomous-machines/>

7.2. Dataspeed DBW Solutions:

Dataspeed DBW Controllers which is used for autonomous driving and tested by one or more community members are listed below:

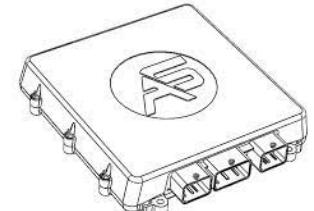


Supported Vehicles	Power	Remote Control	ROS2 Support	Autoware Tested (Y/N)
Lincoln MKZ, Nautilus				
Ford Fusion, F150,				
Transit Connect, Ranger	12 Channel PDS, 15 A Each at 12 V	Optional, Available	Y	
Chrysler Pacifica				
Jeep Cherokee				
Polaris GEM, RZR				

Link to company website: <https://www.dataspeedinc.com/>

7.3. AStuff Pacmod DBW Solutions:

Autonomous Stuff Pacmod DBW Controllers which is used for autonomous driving and tested by one or more community members are listed below:



Supported Vehicles	Power	Remote Control	ROS2 Support	Autoware Tested (Y/N)
Polaris GEM Series				
Polaris eLXD MY 2016+				
Polaris Ranger X900	Power distribution panel	Optional, Available	Y	Y
International Prostar				
Lexus RX-450h MY				
Ford Ranger				

Toyota Minivan				
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Link to company website: <https://autonomoustuff.com/products/pacmod>

7.4. Schaffler-Paravan Spacedrive DBW Solutions:

Schaffler Spacedrive DBW Controllers which is used for autonomous driving and tested by one or more community members are listed below:



Supported Vehicles	Power	Remote Control	ROS2 Support	Autoware Tested (Y/N)
Custom Integration with Actuators	-	Optional, Available	Y	Y

Link to company website:

<https://www.schaeffler-paravan.de/en/products/space-drive-system/>

8. VEHICLE PLATFORM SUPPLIERS

8.1. PIX MOVING Autonomous Vehicle Solutions:

PIX Moving AV solutions which is used for autonomous development and tested by one or more community members are listed below:



Vehicle Types	Sensors Integrated	Autoware Installed	ROS2 Support	Autoware Tested (Y/N)
Electric DBW Chassis and Platforms	Y	Y	Y	

Link to company website: <https://www.pixmoving.com/pixkit>

Different sizes of platforms

PIX Platform Matrix



8.2. Autonomoustuff AV Solutions:

Autonomoustuff platform solutions which is used for autonomous development and tested by one or more community members are listed below:



Vehicle Types	Sensors Integrated	Autoware Installed	ROS2 Support	Autoware Tested (Y/N)
Road Vehicles, Golf Carts & Trucks	Y	Y	Y	

Link to company website: <https://autonomoustuff.com/platform>

8.3. NAVYA AV Solutions:

NAVYA platform solutions which is used for autonomous development and tested by one or more community members are listed below:



Vehicle Types	Sensors Integrated	Autoware Installed	ROS2 Support	Autoware Tested (Y/N)
Shuttle Bus, Taxi and Tow Tractors	Y	Y		

Link to company website: <https://navya.tech/en>

8.4. ZING ROBOTICS AV Solutions:

ZING Robotics platform solutions which is used for autonomous development and tested by one or more community members are listed below:



Vehicle Types	Sensors Integrated	Autoware Installed	ROS2 Support	Autoware Tested (Y/N)
Purpose built electric autonomous vehicles for aviation, military etc.	Y	Y		

Link to company website: <https://www.zingrobotics.com/>

9. REMOTE DRIVE

9.1. FORT ROBOTICS

Fort Robotics remote control & E-stop devices which are used for autonomous driving and tested by one or more community members are listed below:



Supported Products	Op.Frequency	Controller	ROS2 Support	Autoware Tested (Y/N)
Vehicle Safety Controller with E-stop	900 Mhz radio: up to 2km LOS 2.4Ghz radio: up to 500m LOS	IP 66 Enclosure Built-in emergency stop safety control (2) 2-axis joysticks (2) 1-axis finger sticks (8) buttons		

Link to company website: <https://fortrobotics.com/vehicle-safety-controller/>

9.2. LOGITECH

Logitech joysticks which are used for autonomous driving and tested by one or more community members are listed below:



Supported Products	Op.Frequency	Controller	ROS2 Support	Autoware Tested (Y/N)
Logitech F-710	2.4 GHz Wireless, 10m range	(2) 2-axis joysticks (18) buttons	Y	Y

Link to company website:

<https://www.logitechg.com/en-us/products/gamepads/f710-wireless-gamepad.html>

Link to ROS driver: <http://wiki.ros.org/joy>

10. Operating Systems and ROS Middleware

Operating Systems and ROS Middleware support per ROS 2 REP-2000. ROS 2 Foxy is current focus though expect to add ROS 2 Galactic support soon.

<https://www.ros.org/reps/rep-2000.html#foxy-fitzroy-may-2020-may-2023>

11. Full Drivers List

The list of all drivers listed above for easy access as a table with additional information:

Type	Maker	Driver links	License	Maintainer
Lidar	Velodyne	https://github.com/ros-drivers/velodyne/tree/ROS2/velodyne_pointcloud	BSD	jwhitley@autonomoustuff.com
Lidar	Robosense	https://github.com/RoboSense-LiDAR/rslidar_sdk	BSD	zdxiao@robosense.cn
Lidar	Hesai	https://github.com/HesaiTechnology/HesaiLidar_General_ROS	Apache 2	wuxiaozhou@hesaitech.com
Lidar	Leishen	https://github.com/leishen-lidar		
Lidar	Livox	https://github.com/Livox-SDK/livox_ros2_driver	MIT	dev@livoxtech.com
Lidar	Ouster	https://github.com/ros-drivers/ros2_ouster_drivers	Apache 2	stevenmacenski@gmail.com, tom@boxrobotics.ai
Radar	Smartmicro	https://github.com/smartmicro/smartmicro_ros2_radars	Apache 2	opensource@smartmicro.de

Camera	Flir	https://github.com/berndpfrommer/flir_spinnaker_ros2	Apache 2	bernd.pfrommer@gmail.com
Camera	Lucid Vision	https://gitlab.com/leo-drive/Drivers/arena_camera	"TODO"	kcolak@leodrive.ai
Camera	Allied Vision	https://github.com/neil-rti/avt_vimba_camera	Apache 2	at@email.com
GNSS	Novatel	https://github.com/swri-robotics/novatel_gps_driver/tree/dashing-devel	BSD	preed@swri.org
GNSS	SBG Systems	https://github.com/SBG-Systems/sbg_ros2_driver	MIT	support@sbg-systems.com
GNSS	Polyexplore	https://github.com/polyexplore/ROS2_Driver		support@polyexplore.com

12. MEMBERS SOLUTIONS LIST

AWF Members with their respected fields listed below as informative:

SOLUTION SUPPLIERS: LEODRIVE, TIERIV, MACHNICA, ADASTEC, ROBOTEC, ASTUFF

MIDDLEWARE ROBOT OS SUPPLIERS: APEX OS, AUTOCORE OS

MAP SERVICE SUPPLIERS: TOMTOM, MANDLI, AISAN

SIMULATION SUPPLIERS: SVL,