

# LPVR-DUO

## LP-Research's Mixed Reality Complete System Solution

The systems enable VR/AR experiences in vehicles and aircraft during operation.

LPVR-DUO tracking system with specific algorithms and tools can realize VR/AR in vehicles/moving platforms such as airplanes, helicopters, and automobiles by decoupling measurements of the user's HMD and vehicle's motion.



A. NRC & DRDC - IRIS



B. TOKYO DRIVE DEMO



C. PHIARO X VARJO

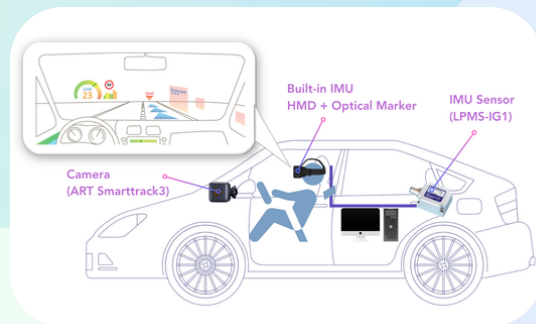


D. BMW-M2 MIXED REALITY

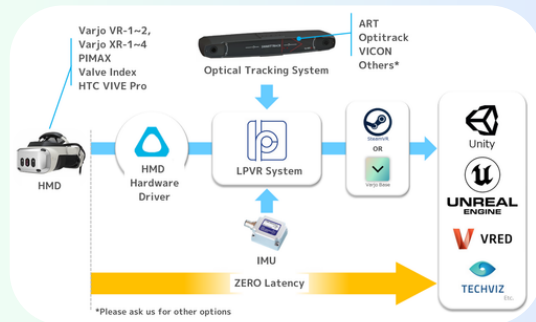
- Achieved by integrating and calculating the vehicle pose detection by vehicle-fixed IMU sensor, HMD motion detection with optical marker tracking, and the posture data of the HMD's built-in IMU sensor.
- Proprietary and exclusive technology.
- The VR contents are continuously displayed in a fixed position inside the car, even if the user's head/car is moves in different directions.

- A. The National Research Council Canada(NRC) & Defence Research and Development Canada (DRDC) - Integrated Reality In-flight Simulation(IRIS): Flight training the limits of a helicopter's capabilities while the rush of wind and turbulence
- B. Tokyo Night Drive Demo - Driving Tokyo street with virtual dashboard
- C. PHIARO x VARJO - NGDP Project: Using LPVR-DUO on the electric car platform without a "body shell," wearing the VarjoXR-3 adds AR functionality, the user can drive a vehicle that does not exist.
- D. BMW-M2 Drive in Mixed Reality World - Driving simultaneously in a mixed reality world

### Experience VR/AR inside your car while driving



### LPVR-DUO System Architecture



### LPVR-DUO Product Package Notes

※1: Required only for the first year

※2: Online support only. On-site support requires additional cost

LPVR-DUO Software	Required	Permanent license (electronic or USB type), LPVR middleware
Maintenance Contract	Mandatory ※1	One year of maintenance service (support, updates, maintenance) *2, implementation support service *2,
In-vehicle IMU	Required	LPMS-IG1, Sensor Mounting Plate
HMD	Compatible HMDs & optional items	Varjo (XR 3, XR-3, XR-4), HTC VIVE (Pro 2, Cosmos), Valve Index + Optical marker ball holder for HMD
Optical Tracking Camera System	Option	ART Smarttrack 3, Optitrack, VICON, others.

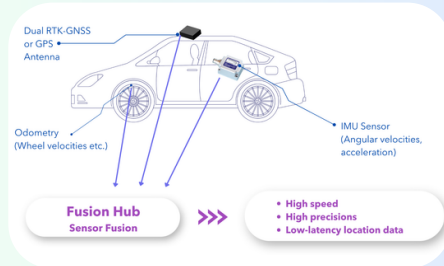
# LPVR-POS LP-Research's Vehicle Localization Solution for Augmented Reality

LPVR-POS is a high-precision vehicle localization system for augmented reality.

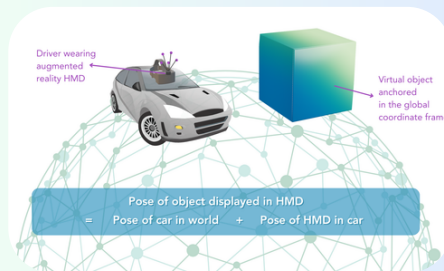
- The only solution in the market specialized for AR/VR in vehicles
- Works even in areas where GPS is unavailable
- Enables smooth and highly accurate vehicle pose tracking
- To display AR content aligned with a globally referenced coordinate system, it is essential to capture the vehicle's pose in world coordinates at high frame rates.
- LPVR-POS achieves this by combining two specialized sensor fusion algorithms.



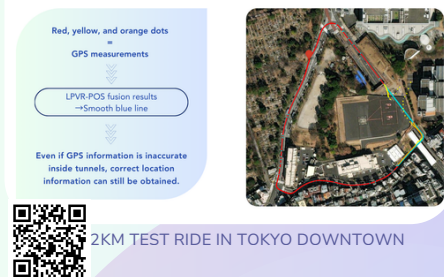
LPVR-POS System Architecture



How can AR objects be displayed with accurate pose in the world frame?



LPVR-POS - 2 km Test Ride in Tokyo Downtown (including tunnels)



## LPVR-DUO+POS: CUPRA Exponential Experience



View from Reality



View from Virtual Reality



View from Virtual Reality



VIDEO - 1



VIDEO - 2

- ※1: Required only for the first year
- ※2: Online support only. On-site support requires additional cost
- ※3: Pairing with other LPVR products

## LPVR-POS Product Package Notes

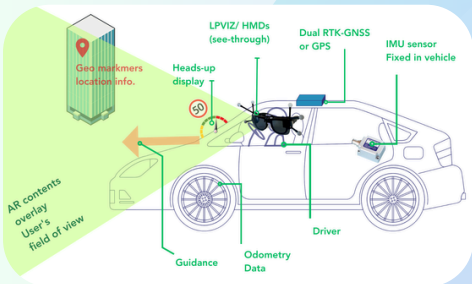
LPVR-POS Software	Required ※3	Permanent license (electronic or USB type), LPVR middleware
Maintenance Contract	Mandatory ※1	One year of maintenance service (support, updates, maintenance) *2, implementation support service *2,
IMU	Required	LPMS-IG1P, USB cable
RTK Base	Required	RTK Base
Unblock RTK GPS Sensor	Required	RTK Sensor + Antenna
PCAN-USB Adapter	Required	PCAN-USB Adapter

### The only see-through VR glasses usable inside a moving vehicle

- LPVIZ is a see-through HMD (VR glasses) that can be used in moving platforms such as cars or simulators.
- In contrast to closed HMD displays, which can become dangerous if the power supply fails (leading to a blackout in the user's vision), see-through glasses like LPVIZ maintain transparency, allowing the user to see their surroundings even if the system shuts down.



LPVIZ System Architecture



View through the LPVIZ



Recent vehicles are equipped with large touchscreen displays

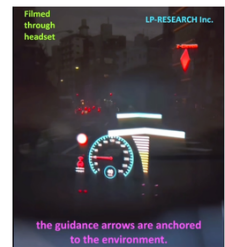
→ These are expensive, heavy, and take up limited interior space.

### Alternative or supplementary solution:

- Flexible 3D user interface elements and virtual screens via an AR interface
- The only see-through HMD specifically designed for in-vehicle use
- State-of-the-art waveguide display
- Seamless compatibility with LPVR-DUO and LPVR-POS
- Users view the real-world scene through transparent lenses, with AR/VR content overlaid—creating a more natural mixed reality experience.
- LPVIZ is the only product designed to be used in conjunction with LPVR-DUO and LPVR-POS.

LPVIZ Tokyo Drive Demo

LPVR-DUO  
+  
LPVR-POS  
+  
LPVIZ



LPVIZ TOKYO STREET DEMO SCENE



LPVIZ TOKYO STREET DEMO - MINIMAL ARROW VERSION

### LPVR Series - Product Options

Items	LPVR-CAD	LPVR-AIR	LPVR-DUO	LPVR-POS	LPVIZ
Main Purpose	In-door VR/AR design for car/airplane /architecture	Wireless in-door VR/AR design for car/airplane /architecture	3D contents platform in-moving vehicle MR	High accuracy positioning system for automotive AR	High accuracy positioning system for automotive AR (see-through glasses)
Supported HMD	Varjo ( VR 3, XR-3, XR-4 ) HTC VIVE ( Pro 2, Cosmos ) Valve Index	Meta Quest 2, 3, Pro	Varjo ( VR 3, XR-3, XR-4 ) HTC VIVE ( Pro 2, Cosmos ) Valve Index	(Pair with other LPVR product)	X-Real Light AR glasses
Marker holder for HMD	Marker holder for HMD	Marker holder for HMD	Marker holder for HMD	Marker holder for HMD	Marker holder for AR glasses
3D Software Engine	Unreal, Unity, VRED, Techviz etc.	Unreal, Unity, Techviz etc.	Unity, Unreal, VRED, Techviz etc.	Unity, Unreal	Unity, Unreal
Optical tracking system	ART, VICON, Optitrack	ART, VICON, Optitrack, Antilatency	ART, VICON, Optitrack	ART, VICON, Optitrack	ART, VICON, Optitrack
Software series	LPVR-CAD	FusionHub	LPVR-DUO	FusionHub	LPVIZ driver
License & Security Dongle	Security dongle or online license	Security dongle or online license	Security dongle or online license	Security dongle or online license	Security dongle or online license
Other files	LP-RESEARCH sensor fusion core for large-room scale VR/AR applications	LP-RESEARCH sensor fusion core for large-room scale VR/AR applications	LP-RESEARCH sensor fusion core for differential in-car tracking	a pre-defined calibration file	Bizlink Adapter