



Udelv Tele-operations System

Udelv's proprietary tele-operations system is one of the world's lowest latency remote driving and control systems. It enables remote perception, monitoring and control for automotive and non-automotive robotics applications. Udelv's tele-operations system can be used in autonomous as well as non-autonomous vehicles. It consists of in-unit sensors and processing software, networking functionality, and a remote (back-office) command center. A wide range of remote, multi-unit oversight and control capabilities can be enabled for various use cases.





Fact Sheet:

- Autonomous system agnostic, with integrated safety and cyber-security features
- Automotive grade design with redundant real time processors for all in-unit interfacing and processing
- Up to 8 channel dynamic encoding video streaming for 360-degree perception awareness
- Comprehensive sensor coverage map support with diverse camera Field-of-View and resolution compatibility
- Overcome cellular network challenges with cellular bonding (up to 3 modems)
- Capture, composition, encoding and transmission in less than 8ms, and glass-to-glass in less than 85 ms with network-latency mitigated nominal performance
- Comprehensive I/Os and interface protocols allow for in-unit communication, command and feedback for a wide range of peripherals and functions onboard.
- Complete telemetry, perception data and controls state rendering for remote user for human in-the-loop oversight and control
- Compact, low footprint command system for back-office integration through standard internet service
- Expandable I/Os and hardware provisioning for additional equipment interfaces, such as other sensors and inputs sources.
- Works with Udelv's uECU^{TM1}

¹ Please refer to our uECUTM brochure and pricing



Benefits:

- AV and non-AV system agnostic
- Multiple use cases: transportation, robotaxis, delivery, logistics, agriculture, mining, warehouse, distribution center, ports and airports
- Remote monitoring and control provide credibility and safety of human in-the-loop for novel robotics systems in challenging applications
- Reduced cost of field engineering support – remote diagnostics and access allows for over the air issue mitigation
- One to many back-office command system supports many units with a single remote operator, allowing for scaling with oversight benefits
- Onboard 4G/5G communication backplane allows instantaneous networking without added telemetry hardware costs and lag. Future-proof for next generation mobile services with backwards compatibility.
- Mission continuity for out-of-scope areas: Allows autonomous solutions to navigate intermittent unstructured/unpredictable zones with human input for end-to-end operation
- Provides a redundant safety layer for unmanned robotics testing applications



Examples of applications for non-AV or semi-AV (L2/L3 ADAS) Use Cases:

- What non-AV system problems can tele-operations solve?

Problem	Ex. Of End-Users	Solution	Benefit
Human driver is locally expensive, or must be paid overtime and double time	Fixed routes during holiday season	Remote operation with no human driver	Cost savings and higher vehicle utilization
Human not capable or trained to navigate a particular situation	Teen, senior, vision-impaired, etc.	Remote operation with local driver present	Safety improvement, getting the job done
Human driver is inconvenient	Moving people who need to do something else while being driven. Long rides.	Remote operation without human driver	Convenience
Human driver is underutilized	Yard/Port operators School bus fleets Shipping & logistics cos.	Pooling remote driving across multiple vehicles	Cost savings



Parts & Pricing:

The complete Udelv tele-operations system consists of a uECU^{TM2}, cameras and a command center kit. Cameras and the uECUTM can be purchased as part of the whole system or separately. Udelv’s tele-operations system supports up to 8 cameras simultaneously.

TELE-OPERATIONS COMMAND CENTER KIT	Part Count	
Est. Lead Time		~6 to 8 weeks
32" ultra-low latency curved monitors	3	
Touchscreen monitor – 15.6 USB Type A & C	1	
Triple Monitor Stand	1	Please contact
Keyboard & Mouse	1	sales@udelv.com
10 ft. Display Port Cable	3	for pricing
UPS Batter Backup 8 Outlet, 600 VA 360 W	1	
Steering wheel and pedals	1	
Custom Desktop	1	

TELE-OPERATIONS SUBSCRIPTION		
Annual Software License & Updates	1	Please contact
Volume Discounts		sales@udelv.com
Hourly Cost (<i>Optional</i>)	1	for pricing

² Please refer to our uECUTM brochure and pricing



CAMERAS³	Automotive ADAS Camera 1080p video applications ADAS + Viewing Fusion <i>(Per Unit)</i>	Wide Angle Camera <i>(Per Unit)</i>
Est. Lead Time	~4 weeks	~6 to 8 weeks
Features	Sony Sensor Supports HDR Coax Serial real time streaming GMSL2 Serializer Lens: FOV H 40° / 120° GMSL2 Serial Coax Interface with PoC IP: IP67 Resolution: 1920 (H) x 1080 (V) Optical format: ½.7" Pixel size: 3.0 x 3.0 µm Power supply: 9 ~ 19 VDC Compact size: 30 x 30 mm	Sony Sensor Supports WDR (Wide Dynamic Range) Coax Serial real time streaming GMSL2 Serializer Lens: FOV H 60° / 120° / 200° GMSL2 Serial Coax Interface with PoC IP: IP67 Active Pixels: 1937 (H) x 1217 (V) Frame rate: 30 fps Optical format: ½.7" Pixel size: 3.0 x 3.0 µm Power supply: 9 ~ 19 VDC Compact size: 30 (L) x 30 (W) x 20 (D) mm
Price	Please contact sales@udelv.com	

³ While these options are the ones used by the standard Udelv tele-operations system, Udelv can support other FoVs and resolution specifications and can work with client to identify cameras per specific needs