

Provide Safety, Security, and Comfort



Towards the solution of traffic issues via autonomous driving technologies – bringing together core Mitsubishi Electric technologies

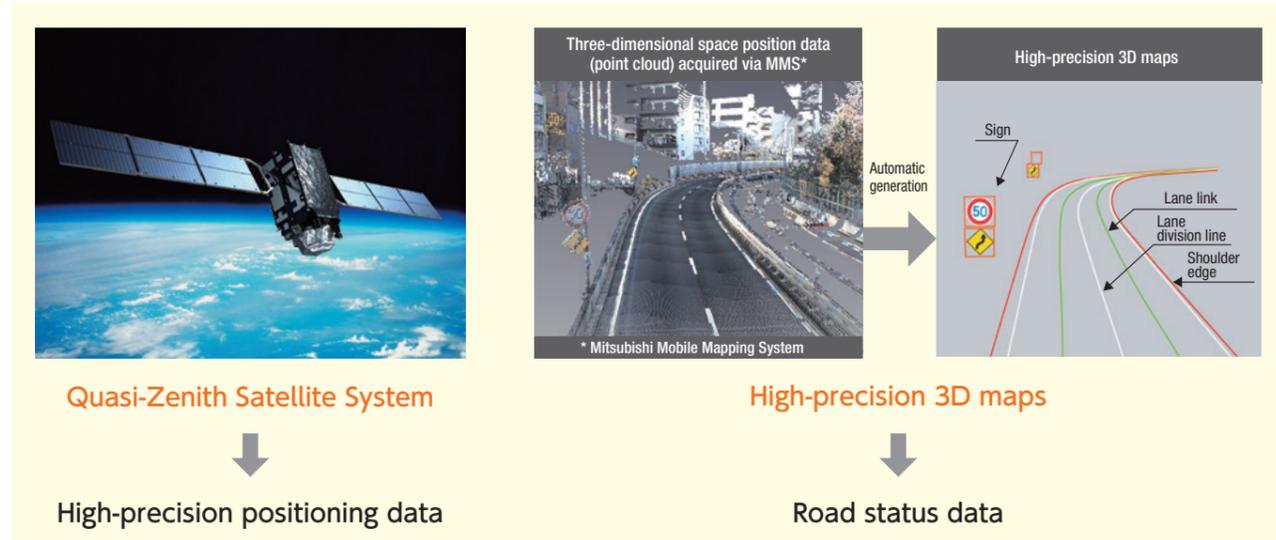
Traffic accidents and traffic congestion are responsible for enormous economic and social losses. In Japan, where a declining birthrate and an aging population are seeing accidents caused by elderly drivers becoming a social problem, these are urgent issues. The Mitsubishi Electric Group is working to realize high-precision autonomous driving systems through the fusion of two technologies: self-sensing driving technologies and network-based driving technologies.

Solution of social problems by means of autonomous driving technologies

- Reduction of traffic accidents
- Easing of traffic congestion

etc.

Autonomous driving mechanisms and the Mitsubishi Electric Group technologies that support them



Network-based driving technologies

Network-based driving technologies are new technologies that seek to enable more precise autonomous vehicle operation by means of cooperation between the vehicle and infrastructure in the surrounding environment. In order to realize these systems, a diverse range of technologies must be integrated, allowing us to make use, apart from the vehicle itself, of systems in the surrounding environment including technologies that gather precise position data from satellites, high-precision three-dimensional maps, and intelligent transport systems.

The Quasi-Zenith Satellite System: Satellites that provide high-precision position data

Three satellites of the Quasi-Zenith Satellite System were launched in 2017. Mitsubishi Electric was responsible for the design and manufacture of this satellite system, which provides high-precision position data services. The use of these services will make it possible to realize autonomous driving in a range of road environments and conditions in which visibility is poor, such as heavy fog or snow. Mitsubishi Electric commenced proving

trials of autonomous driving on Japanese expressways from September 2017, and we have demonstrated that the use of high-precision positioning terminals that receive position data signals from the Quasi-Zenith Satellite System makes it possible to identify the position of the subject vehicle at the level of centimeters.

High-precision 3D maps

Dynamic maps are essential to accurately identifying the position of the subject vehicle on a map. In addition to static data on lanes and road edges, these digital maps include dynamic data that changes moment to moment, such as data on congestion and traffic signals. The Mitsubishi Electric Group is continuing research and testing in this area, and has been commissioned by a government agency to conduct and manage large-scale proving trials towards the creation of digital maps. In addition, in June 2017, Mitsubishi Electric joined together with an industrial innovation network, mapping companies, surveying companies, and Japanese automotive manufacturers to launch Dynamic Map Platform Co., Ltd., which is moving ahead with the formulation of data to create a dynamic map platform covering approximately 30,000km of Japanese expressways and vehicle roads.

Anticipatory data provision

Anticipatory data provision is a system that assists in making advance lane changes, etc. by providing the driver and the vehicle with information that cannot be obtained from the vehicle itself, including data on accidents ahead, data on traffic congestion, and data on traffic regulations (anticipatory data). Mitsubishi Electric is working towards the practical realization of anticipatory data provision, conducting test course trials in the provision of support for lane changes by providing autonomously operating vehicles with anticipatory data for each lane using road-to-vehicle communication.

Technological synergy × open innovation: blazing a path to the future

Autonomous driving technologies necessitate the integration of diverse and wide-ranging element technologies. The Mitsubishi Electric Group is advancing initiatives to create innovative technologies, for example by forming project teams across different divisions of the company and promoting open innovation that crosses industry boundaries.

In October 2017, we formed a partnership with Holland's HERE Technologies. By bringing together HERE's global high-precision maps and cloud-based position data services and Mitsubishi Electric's high-precision positioning technologies, our aim is to provide user-friendly position data services.

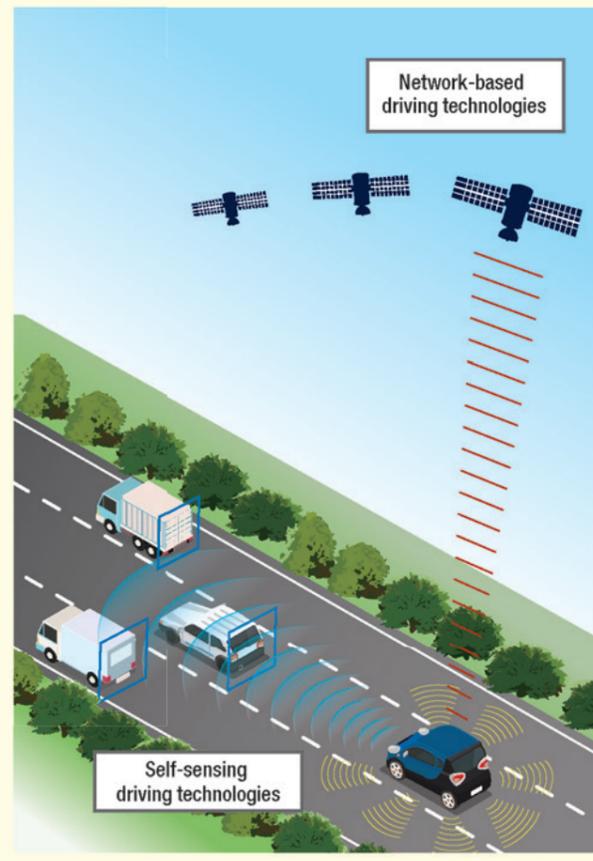
In March 2017, we successfully developed a technology able to efficiently create and modify high-precision 3D maps using AI and Mitsubishi Mobile Mapping System (MMS) technology.

The Japanese government is seeking to realize fully-autonomous driving with no human input on expressways by 2025. By means of these initiatives, the Mitsubishi Electric Group is contributing to the realization of a society that allows safer, more secure and more comfortable lifestyles.

Self-sensing driving technologies



Self-sensing driving technologies will enable vehicles to operate autonomously using a variety of onboard sensors, including cameras, millimeter-wave radar and sonar. Applying sensing technologies fostered in a broad range of fields, the Mitsubishi Electric Group is working to develop new products that assist drivers in recognition, judgment, and vehicle operation. Mitsubishi Electric will continue to polish these technologies into the future, at the same time as advancing applied development in the area of integrated control systems that will be key to the realization of safer, more secure and more comfortable autonomous driving, with the company's core AI technology Maisart as a central element.



VOICE (In charge of autonomous driving technology development)



In seeking to realize autonomous driving systems, in addition to considering the safety, security and comfort of passengers, I believe that it will also be important to realize vehicle control that is able to reproduce natural driving, operating the vehicle as an experienced driver might. This would further boost the sense of security and the comfort of the passengers.

Given this, Mitsubishi Electric is advancing development that will enable us to integrate self-sensing driving and network-based driving with a high degree of sophistication. We are engaging in a process of trial and error in order to ensure reliability in actual road environments by means of tests on public roads using our experimental vehicles.

Changes in the environment of the domestic and overseas automotive industry are accelerating, and one of the demands on us is to further advance and distinguish driver assist and autonomous driving technologies. Against this background, it is my goal to make our automotive society an even more appealing one through the advanced technologies that only Mitsubishi Electric is able to realize.