

Summary of SIP-adus Project (FY2017)

Name of the project

Development of Infrastructure Radar System Technology

Responsible Organization

Panasonic Corporation

Name Yoichi Nakagawa**Object of the Project**

The goal of the R&D initiative is to develop a practical 79GHz band high resolution radar system deployed as roadside sensors that is capable of detecting pedestrians, cyclists, and other smaller objects in or near roadways. This involves the development of millimeter-wave (mmW) sensing technology providing reliable detection, and robustness against interference and environment; and development of a cooperative safety support system that mainly contributes to automated and connected vehicle driving in the future.

Project Summary

The 79GHz band mmW radar sensing technology requires a number of key capabilities: “radar detection reliability enhancement” to improve the reliability of the radar for detecting pedestrians, “radar mutual interference attenuation” permitting multiple radar systems (such as vehicle-mounted radar and infrastructure radar) to coexist and properly work in the same intersection, and “environmental performance compensation” enabling the infrastructure radar to function properly even under adverse environmental conditions. The cooperative safety support system features a “wireless connection between infrastructure and vehicle” that feeds data gathered by the infrastructure radar to vehicles in the vicinity. These initiatives are critically important for clarifying the extent that the system will function under actual conditions; mainly, verification on worsening detection performance due to severe weather and other factor.

<R&D results in FY2017>

- Robustness to interference at the roadside radar was evaluated through propagation experiments and the analysis using a mmW radar module of general specification as vehicle mounted radar. In the incident direction of the interference signal, the characteristic that the noise floor fluctuates is quantitatively grasped, and it was confirmed that under an actual condition it is below the sensitivity level.
- The 79GHz band radars was installed on actual roads, and the detection performance for the passing vehicle was evaluated. During the verification period of about three months, typhoon caused storm, dense fog, snowstorm and different snow conditions were included, and stable operation was demonstrated without generating false alarm even under such severe weather conditions.
- Through the above-mentioned field verification, the radar evaluation data exceeding several thousand vehicles including large cars with various shapes were acquired at single lane roads. By developing a detection algorithm compatible with the suppression of the excessive detection of the large cars and the unseparation of the nearby motorcycles, accuracy of the vehicle count of 99.6% or more was achieved.
- In order to estimate the distance between vehicles required at highway merging point etc., an integrated clustering technique using data acquired simultaneously by multiple roadside radars was developed. The software process that integrates data measured with the radars installed in front of and behind of traveling cars using grid maps realized the function to measure the car length.

Future plan

We will promote total verification of infrastructure radar system technologies aiming to application development of the cooperative safety support that is as follows:

- Public road experiment toward dynamic map application:
Verification of high precision detection performance on public roads environment as the road side installed millimeter wave radar that generates not only dynamic information and but also semi-dynamic information.
- Demonstration experiment regarding to cooperative automated driving support technology:
Demonstration of the effectiveness of cooperative safety support that contributes to reduction of pedestrian accidents as a system technology to notify vehicles etc. acquisition information on the roadside radar.