

Summary of SIP-ADUS project (FY2015)

Name of the project	Development and Verification of Lane Marker Detection System in All-weather Condition
Responsible Organization	Japan Automobile Research Institute
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Object of the Project	<ul style="list-style-type: none">• In automated driving (Lev.3), in case it is necessary for the driver to take over the driving authority by the sudden change of natural environment (performance limitation), there is a need for function continuity, until driver's takeover or completion of the risk reduction measures to prepare for a case of absence of driver's takeover (such as automatic stop to the road shoulder). Therefore, there is a need for robust surrounding environment recognition technology against environmental degradation, such as weather or illumination change.• In this project, we verify the robustness of 79GHz band UWB millimeter-wave radar against the natural environment for the automated operation. The "lane marker identification system for lane-keeping function" is set as the "first example" of this verification.
Project Summary	<p>• In the lane marker detection method using the 79GHz band UWB millimeter-wave radar and the lane marker with rib, it was quantitatively evaluated the robustness against snow. As a result, it was possible to identify the ribs (6mm height) covered by 3cm depth snow. And because of the periodicity of the rib spacing, it was possible to measure the lateral distance between the lane marker and the vehicle with relatively simple recognition algorithm. However, depending on the snow of density, detection performance got rapidly worse. And, it was also confirmed at the same time that performance would fluctuate by clutter (irregular reflection of the snow surface). Thus, this approach is applicable to the time of beginning of snow fall, but it can not be said that robustness is sufficient, and the concerns remain for practical use.</p>
Future plan	<p>• Broadbandization of the millimeter-wave radar (UWB) contributes to the improvement of the distance resolution. On the other hand, new technology such as an active phased array (APA), largely contribute to the wide angle detection and improvement of direction resolution. Therefore, taking advantage of above mentioned basic performance improvement and all-weather robustness of the millimeter-wave radar, applications to the essential other example in automated driving should be actively considered. For example, all-weather self-position estimation technique (Localizer) using the 79GHz band UWB millimeter-wave radar, and the like.</p>