

Summary of SIP-adus Project (FY2016)

Name of the project	Task II Development of Vehicle-to-pedestrian Communication Technology
Responsible Organization	Panasonic Corporation /Panasonic System Networks R&D Lab. Co., Ltd. /NTT DOCOMO,INC./KDDI Research Institute
Name	Aoyama Yasuhiro
Object of the Project	<p>For the reduction of pedestrian accident, we aim to realize a vehicle-to-pedestrian system which is capable to alert drivers and pedestrians in the appropriate circumstances. We develop key technologies required for a pedestrian's terminal, such as vehicle-to-pedestrian protocols, high-precision positioning, danger identification. We also develop the collection and delivery system for pedestrians and vehicles information. Then we verify their technical validity through experiments on public roads.</p>
Project Summary	<p>①Development of high-precision positioning technology, Prototyping and basic verification of pedestrian terminal and in-vehicle device We are developing technologies to stabilize positioning accuracy in stages, taking into account the various scenes in which pedestrians might use it. We aim to improve the positioning accuracy in satellite signal deterioration environment such as high-rise building streets. And we confirmed the improvement by combining supplementary techniques such as pedestrian dead-reckoning (PDR) in addition to the multipath elimination technology based on satellite orbit and received signal strength. Furthermore, we confirmed the possibility of further improving the positioning accuracy by using the three dimensional map. In addition, we developed a prototype of a safety support application incorporating a danger notification method that is easy to lead to an accident avoidance behavior and a collision determination method that suppresses unnecessary support. Then we conducted demonstration experiments on test courses and public roads and confirmed its effectiveness. Furthermore, we have studied prototype development of pedestrian terminals and in-vehicle devices and extracted technical subjects for large-scale demonstration experiments.</p> <p>②Development of a communications protocol for the vehicle-to-pedestrian communications system Terminal's miniaturization and be able to use close to an existing communication terminal such as smartphone are necessary for popularization of pedestrian terminals. Simulation was conducted under the condition where 700 MHz band antenna and 700 MHz band cellular antenna are placed close together and an optimum small 700 MHz band communication antenna was constructed. Electromagnetic analysis and radio wave propagation of a small 700 MHz band communication antenna were measured in various places by assuming the user's scene where the communication terminal is held. For analysis of the battery saving function, we also analyzed more quantitatively and efficiently by sending information about the power consumption of the 700 MHz band communication terminal to the smartphone via Bluetooth and adding log acquisition function. In addition, we investigated the current value consumed in a day by the 700 MHz band communication terminal by investigating the time of going out from the behavior pattern of the user.</p> <p>③Development of pedestrian detection in the intersection area We developed a pedestrian detection method used multiple highly directional BLE beacons in the intersection area. Furthermore, we developed and evaluated an experimental system to this method. We considered applying this method to a pedestrian support system. For example, it is applied to the intrusion detection into service area and a traffic light control, etc..</p> <p>④Development of a web-based data collection system to deliver contextual awareness of pedestrians to drivers We developed a prototype system including a test suite so that data collection from all roads and cars can be broadly handled regardless of the type of car, smartphone or OS by the Vehicle Web APIs being making specifications in W3C. Our implementation and testing experience have been led and highly appreciated in standardization for automotive web APIs in W3C, because all specification features need to have at least two implementations.</p>
Future plan	<p>①Prototyping and basic verification of pedestrian terminal and in-vehicle device</p> <ul style="list-style-type: none">•Prototype development of pedestrian terminals and in-vehicle devices, prototype development of danger determination and safety support application for large-scale demonstration (including other system cooperation such as next-generation urban transport)•Establishment of key technologies for practical use (Improvement of pedestrian positioning accuracy and advancement of danger determination technology by pedestrian situation estimation and behavior estimation, etc.)