Digital Key Doubles as Child Presence Detection System

～ Child Presence Detection System ～

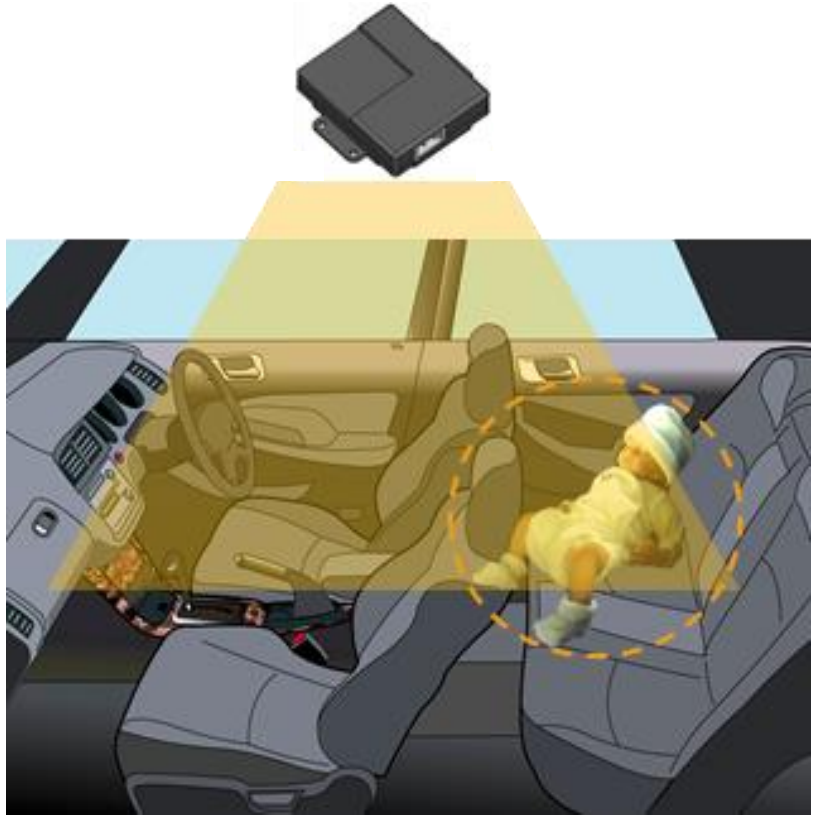
デジタルキーが置き去り防止も実現する

～幼児置き去り検知システム～

TOKAI RIKA

Background

The European new car assessment program (Euro NCAP) started testing of child presence detection (CPD) in 2023.



Existing problem

The detection system uses expensive millimeter-wave radar.

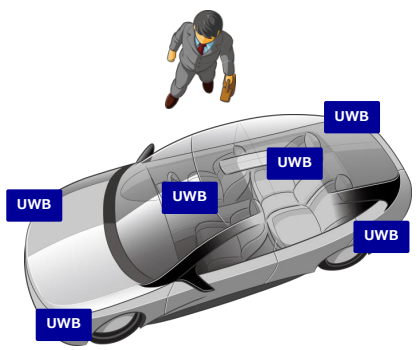
Goal

Use of an on-board UWB digital key device as a sensor to create a low-cost child presence detection system

Content and Overview

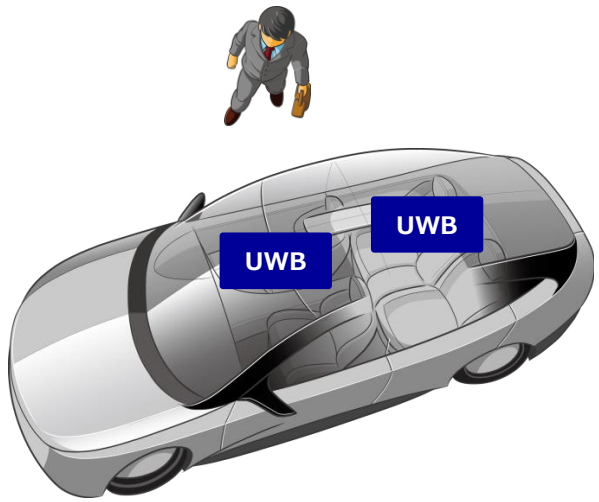
- **A UWB sensor installed overhead in the cabin detects a living body in the car.**
- **A low-cost UWB system equipped with two on-board multi-antenna devices**

Early UWB digital key



Six on-board UWB devices

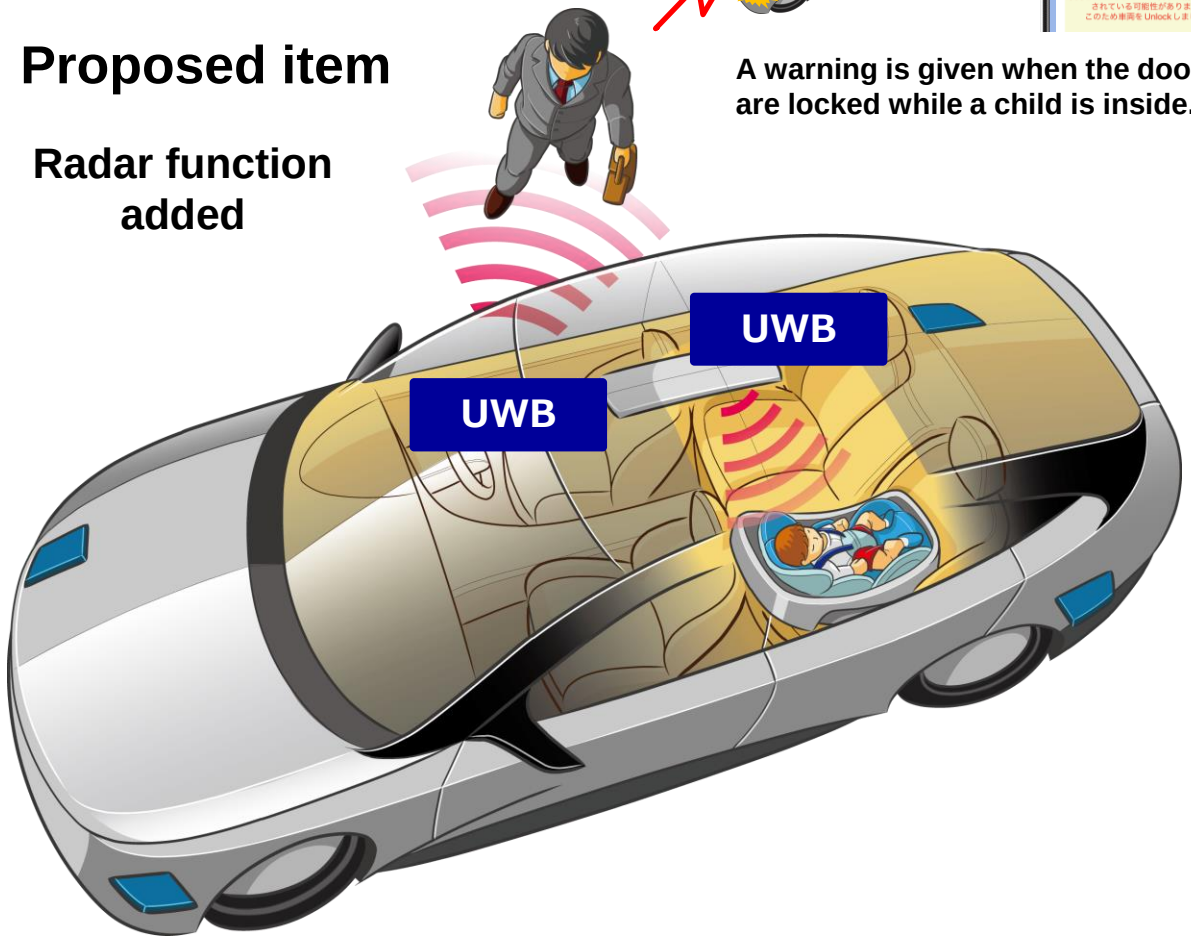
The use of multi-antenna reduces the number of on-board devices

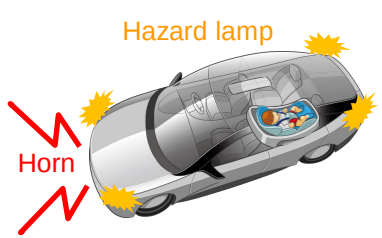


Two on-board UWB devices

Proposed item

Radar function added

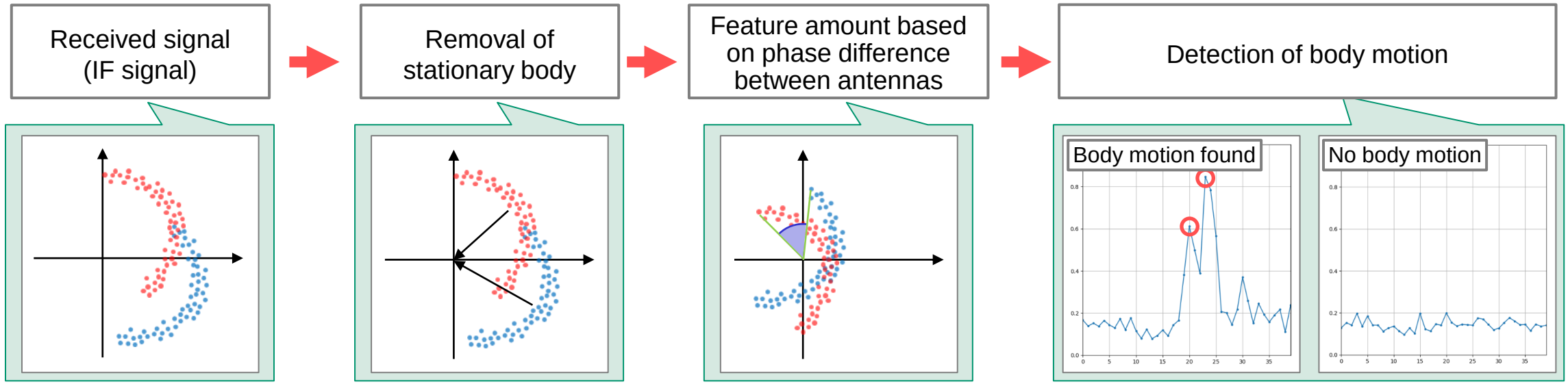




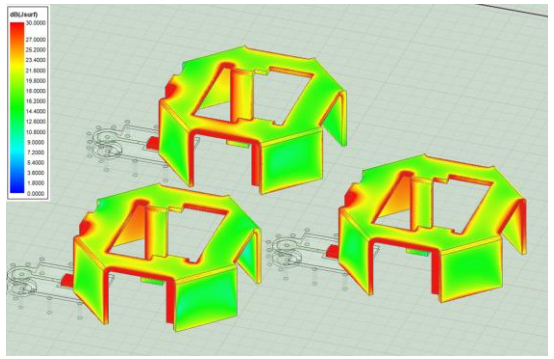
A warning is given when the doors are locked while a child is inside.

Technology

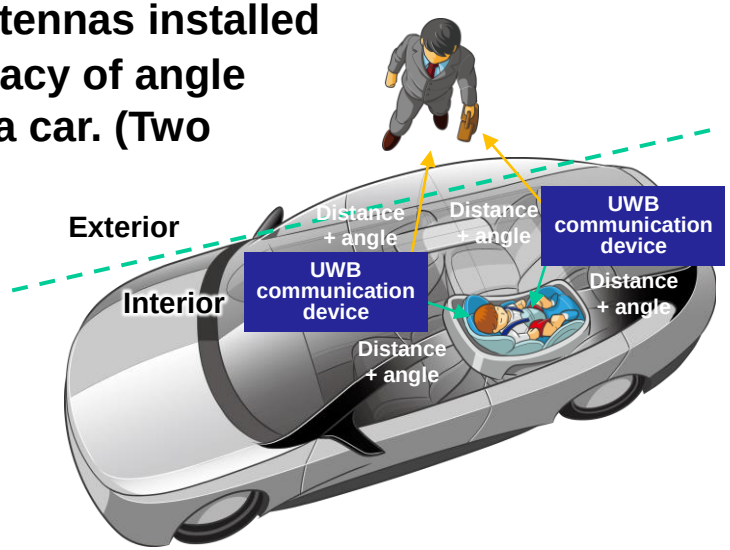
- **The original detection algorithm using the stationarity of phase difference between antennas improves the performance of detecting body motion. (Two patents applied)**



- **The multi-antenna technology that ensures the characteristics of antennas installed close to each other in the radio wave bandwidth improves the accuracy of angle detection, enabling fewer units to detect a living body in and out of a car. (Two patents applied)**



Multi-antenna current distribution



Distance and angle values are used to determine if a living body is in or out of a car.

Specification

External dimensions	45 x 70 x 30 mm
Incorporated functions	UWB transmitter and receiver circuit, antenna, clocking device
Conforming standard	IEEE802.15.4z
CPU core	32 bit ARM Cortex M4 CPU
Memory area	512 kB Flash and 64 kB SRAM
Interface	CAN FD
Power supply voltage	12 V
Operating temperature range	-40 to +105℃