UWB Child Presence Detection System

～UWB幼児置き去り検知システム～

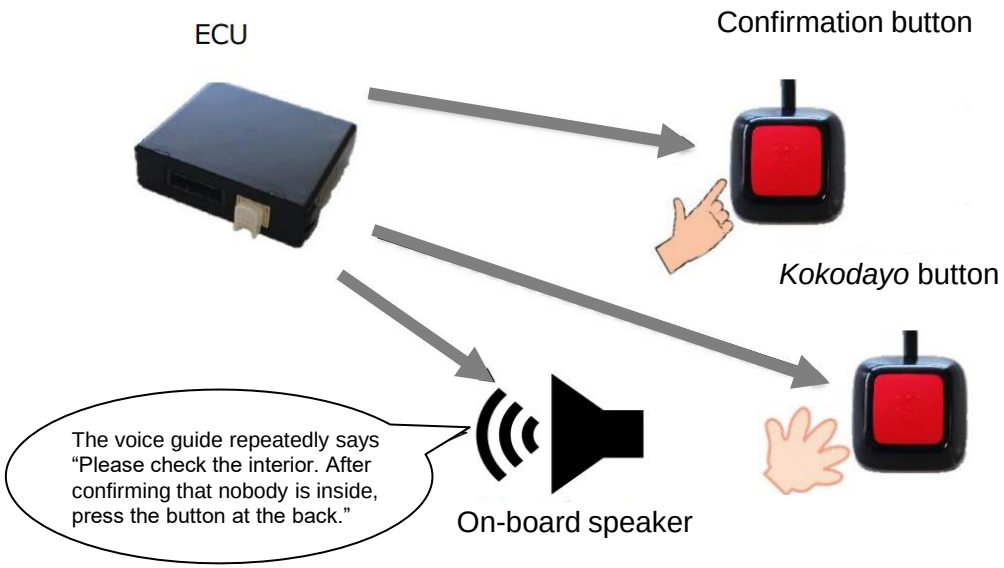
TOKAI RIKA

Background

Children left in cars or school buses have become a social problem.
The European New Car Assessment Program (Euro NCAP) started the testing of child presence detection (CPD) in 2023.

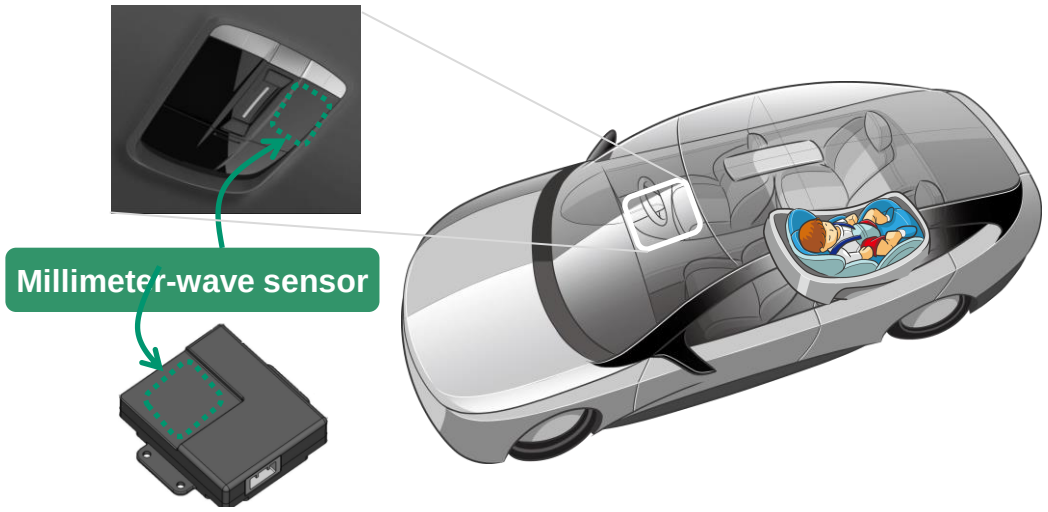
Tokai Rika's CPD product line-up

For school buses
CPD support device



For passenger cars
Millimeter-wave radar CPD device

Product example: Front overhead



Product example: Stand-alone module

The frequency of the radar signal is high.
⇒ The device boasts high performance but the parts cost is high.

Conventional problem

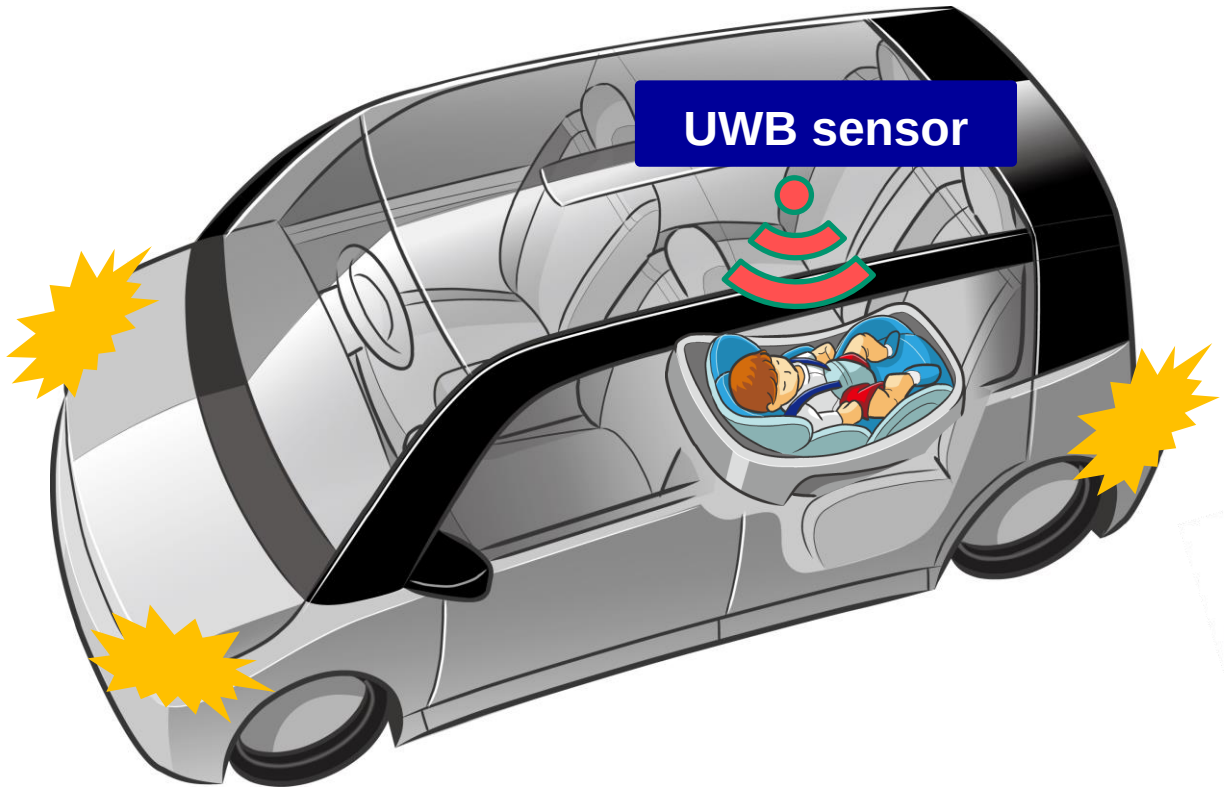
Demand for wide range of CPD products for small cars ≒ Cost reduction

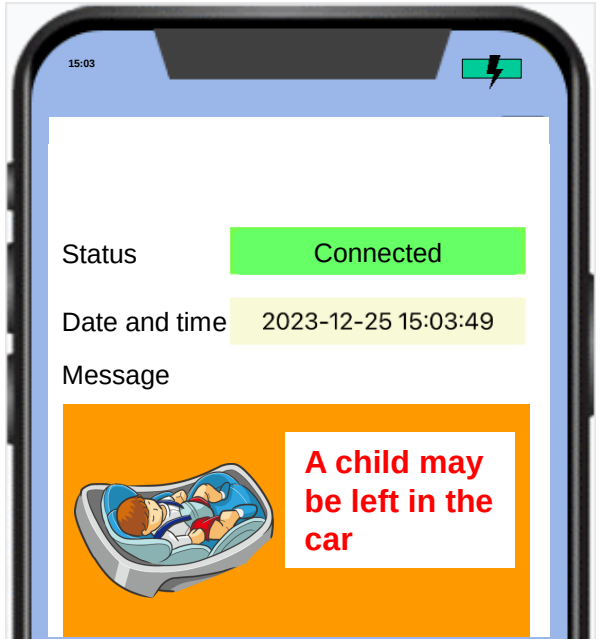
Purpose

Create a low-cost CPD system with UWB radar sensor for small cars

Content and Overview

- **The UWB radar sensor installed overhead of a car detects a living body inside.**
- **When detecting a child at the time the doors are locked, the CPD system gives warnings (hazard lamps, horns, and emails).**
- **The frequency of the radar signals is relatively low ⇒ Parts cost can be saved**



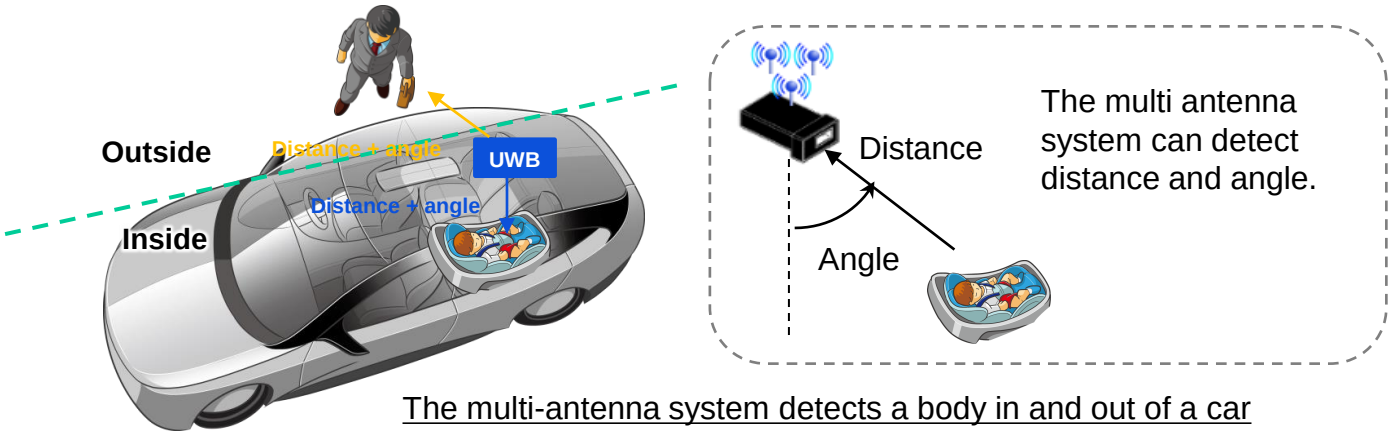


Strength of Tokai Rika

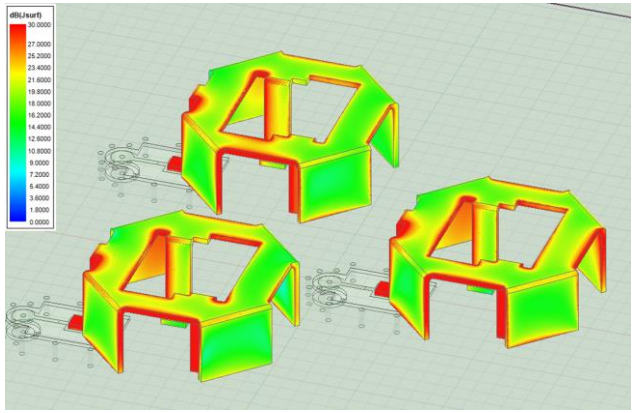
Tokai Rika's UWB communication technology gained through the development of smart and digital key systems against relay attack support this reliable detection system.

Technology

- **The multi-antenna system accurately detects whether a dynamic body is in or out of a car by determining its distance and angle. → Fewer units can work as a CPD system.**
- **The multi-antenna technology that ensures the characteristics of antennas in proximity in the UWB bandwidth detects angle accurately. (Two patents applied)**

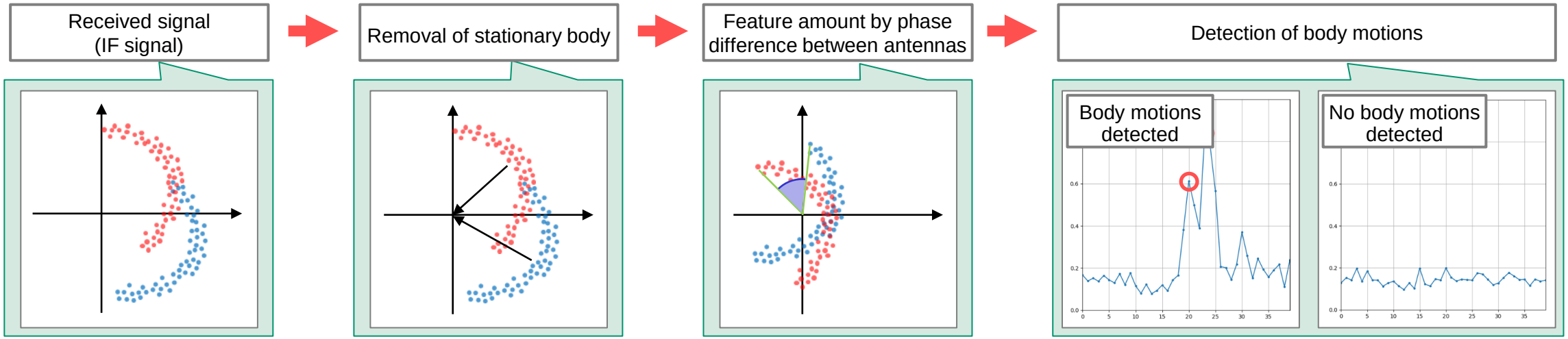


The multi-antenna system detects a body in and out of a car



Multi-antenna current distribution

- **The original detection algorithm using the stationarity of phase difference between antennas detects body motions accurately. (Two patents applied)**

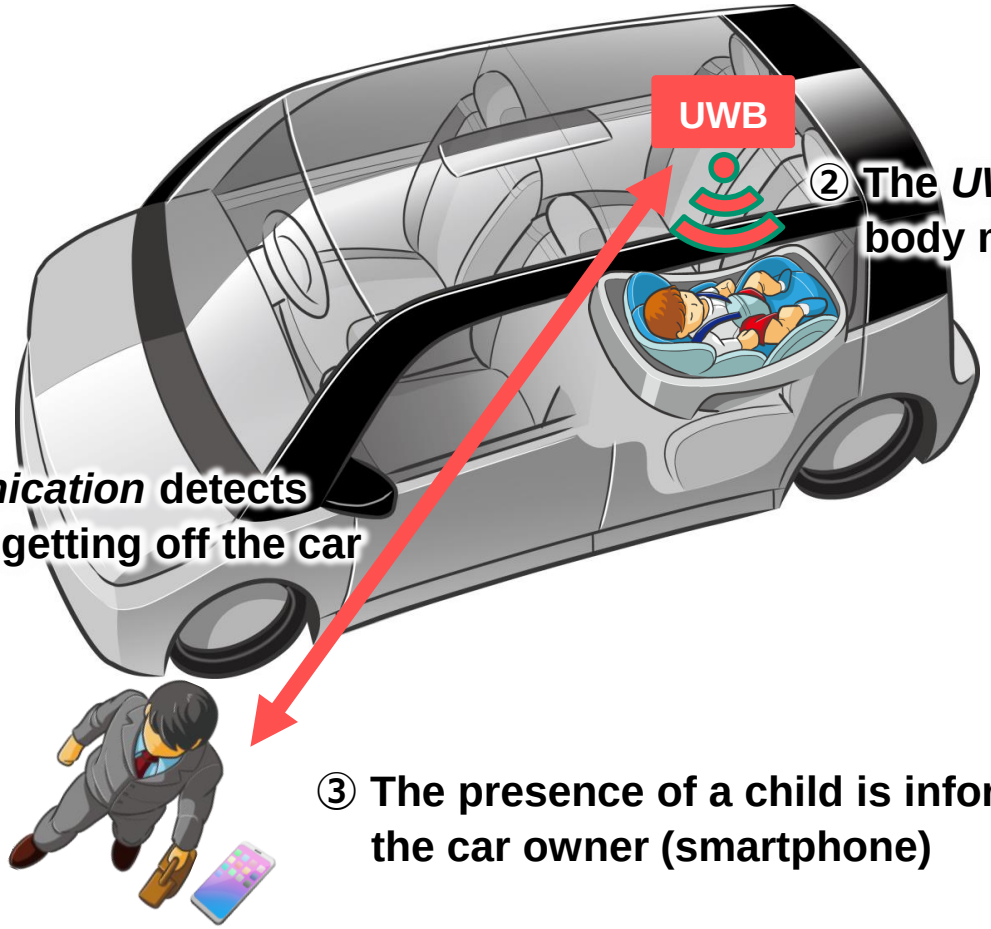


Specification

External dimensions	80 x 80 x 23 mm
Incorporated functions	UWB transmitter and receiver circuit, antenna, clocking device
Conforming standard	IEEE802.15.4z
CPU core	32 bit ARM Cortex M33 CPU
Memory area	768 kB flash and 128 kB SRAM
Power supply voltage	12 V
Operating temperature range	-40 to +105℃

Applications **The UWB unit can be easily installed later in a car.**

Child presence can be detected by the UWB ranging communication ① and the radar function ② installed in the simple system configuration.



② The *UWB radar function* detects body motions on a rear seat

① The *UWB ranging communication* detects a car owner (smartphone) getting off the car

③ The presence of a child is informed the car owner (smartphone)