Motion+ (motion recognition technology) ～Next-generation HMI experience: Natural, effortless control in any posture～

Outline

While cabin space is becoming more spacious and comfortable, there are situations where functions cannot be operated in a relaxed posture.

Switch operation

Touch operation

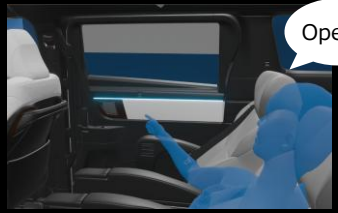
Problems: Difficult posture change

A flexible future seat layout demands HMI devices that can be operated by occupants from any position.

A seat layout image for autonomous cars

Features

・**Remote control（switch）**
⇒ Operation of switches that cannot be reached, improved comfort



Easy operation

＊Please experience the HMI in the mock-up car.

・**Finger pointing + voice (A short word such as “Open”)**
⇒ Operation of switches that cannot be reached, simple and intuitive operation

・**Remote control（display）**
⇒ Occupants in a relaxed posture can comfortably operate

Mid-air operation

＊Please experience the HMI in the mock-up car.

・**Mid-air operation**
⇒ Simple and intuitive operation
(The position of a floating interface is adjusted to the occupant’s body dimensions and position.)

Applications

- Human-centered variable cabin and safety control
- Use for gaming, education, or entertainment

Development completion

- 2027
- 2029（Mid-air operation）

Patent pending

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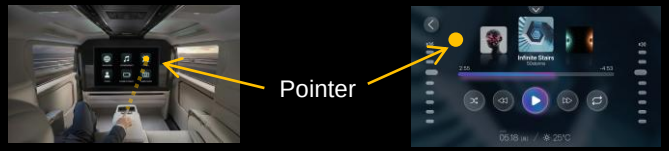
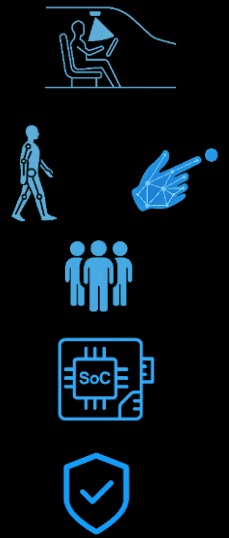
Technical features



- **High-precision monocular-camera sensing**
- **Simultaneous sensing of full-body skeletons and finger motions**
  ⇒ Security and safety sensing remains fully compatible with interface-input motions.
- **Simultaneous sensing of multiple occupants** reduces processing load.
- **The sensing system can also be offered as an ECU loaded with a SoC.**
- **Proper licensing** ⇒ All of the learning data was collected by Tokai Rika.



Patent pending

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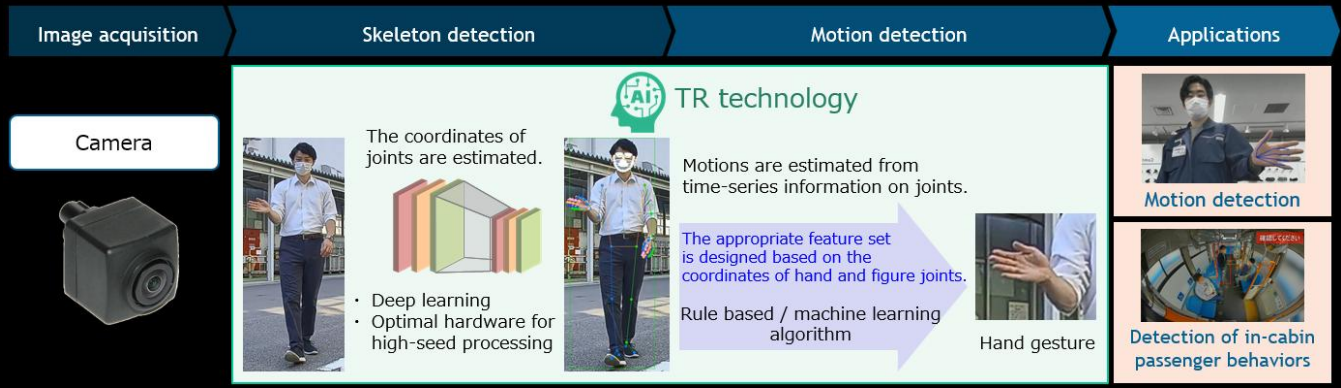
Technical details

Core technology

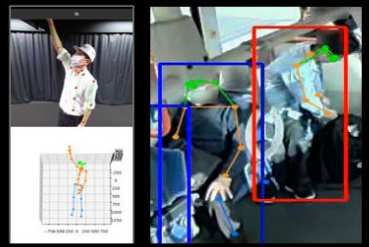


Added value Differentiation

● High-accuracy AI and high-speed AI

Two types of AI systems are used depending on the application:
• A high-accuracy posture-detection AI whose processing speed decreases as the number of people increases.
• A high-speed posture-detection AI that maintains a constant processing rate regardless of the number of people.

● Estimating passenger status from the estimated posture



AI-detected 2D postures enable additional value, such as:
• Posture-load quantification via 3D estimation
• Reminders based on estimated passengers status

● Proper licensing

Many images in open datasets used for posture-detection AI cannot be used commercially.
⇒Tokai Rika created original dataset to ensure proper licensing.

Patent pending

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Example applications **- Comfort -**

Remote control (display × Motion+)

Gaming and education (display × Motion+)

Entertainment (display × Motion+)

Display-based operation (projector × Motion+)

※Exhibited last year

Display-based operation (spatial interface × Motion+)

※Please experience the system in the mock-up car.

Direct operation (voice recognition × Motion+)

※Please experience the system in the mock-up car.

Patent pending

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Example applications **- Safety and peace of mind -**

Safety control and human-centered variable cabin and automatic seat control

Proper seatbelt use is monitored.

Reminders are issued when immobile occupants or unusual postures are detected.

Inappropriate infant postures on a booster seat is detected.

Patent pending

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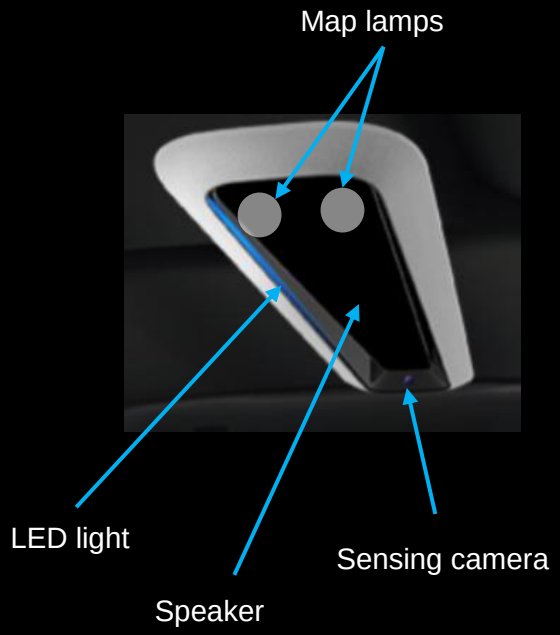
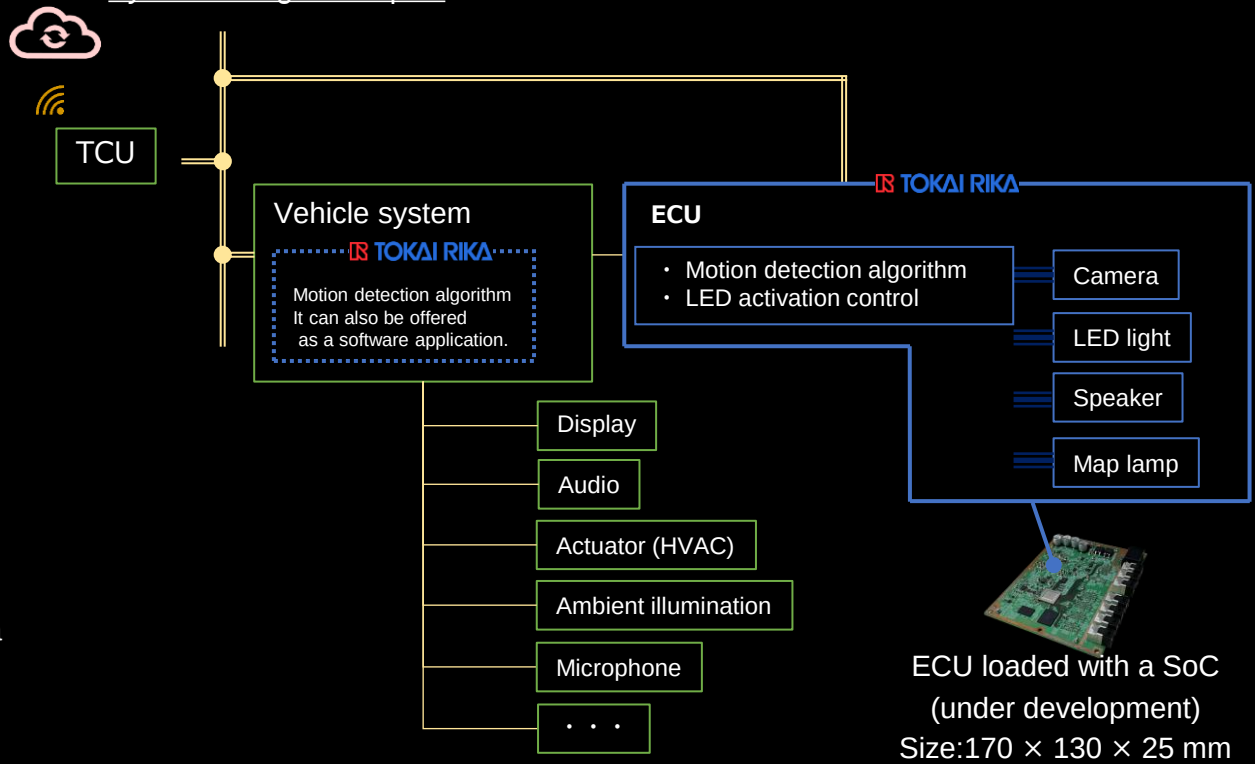
System configuration

Application example: Overhead module

Installed in the mock-up car



System configuration plan



ECU loaded with a SoC
(under development)
Size:170 × 130 × 25 mm

Patent pending

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