



NVNN: Non-visual Navigation and Notification

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Profile



- Akimasa Suzuki obtained his Ph.D. degree in engineering in 2011, and engineering degree (MSc) in information system science in 2008, all of them from the Soka University of Tokyo, Japan.
- He has been Assistant Professor at Soka University, Tokyo, Japan, until 2013.
- He is now Associate Professor at Iwate Prefectural University, Iwate, Japan.
- Research areas: sensing, robotics, and digital signal processing.
- Interests: positioning sensor, especially with spread spectrum ultrasonic waves for indoor positioning systems applied to mobile robots and people.

Introduction

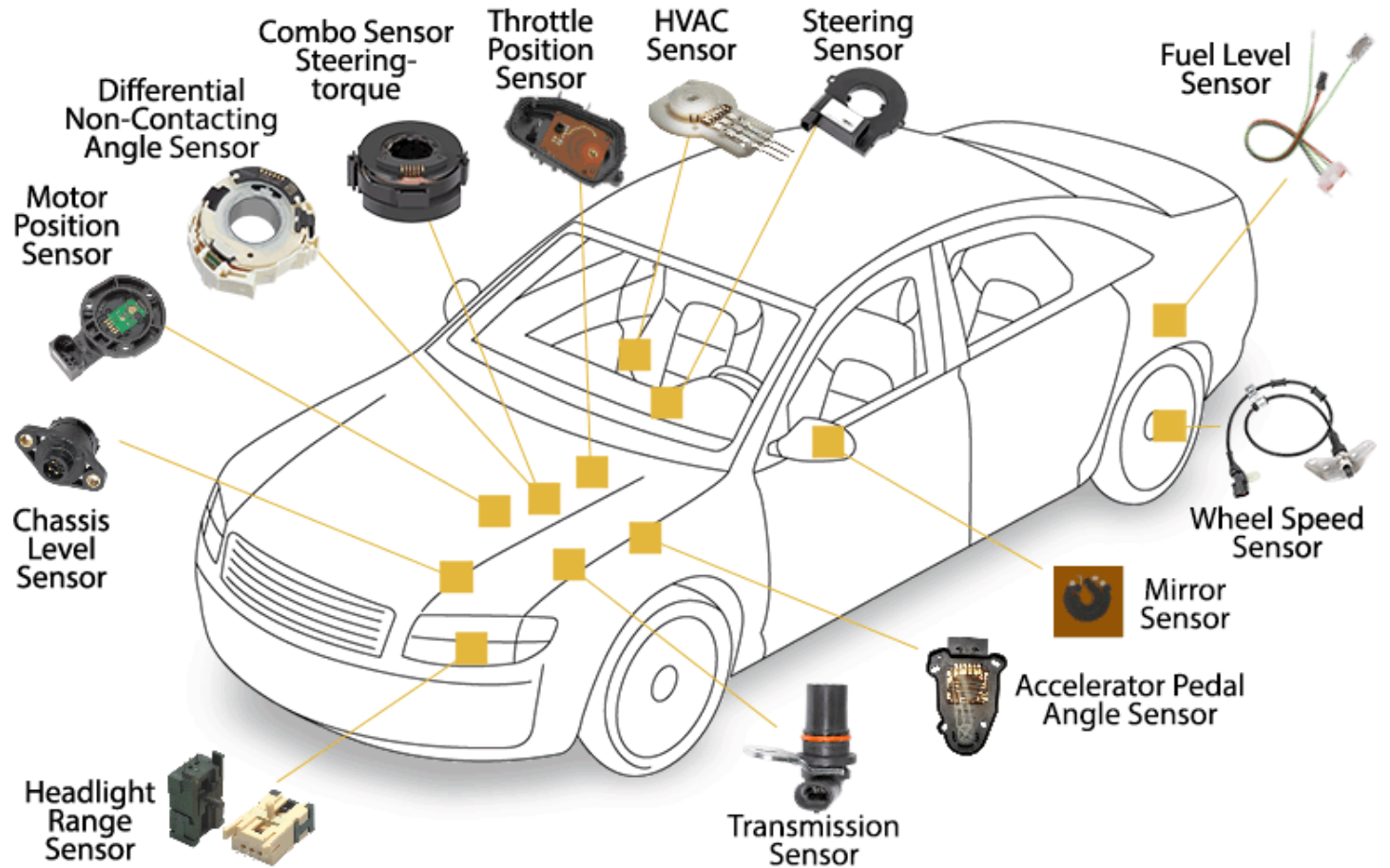
- Recently, many systems are utilized with image sensors or display for vehicular systems due to treat much information at once.
 - Speed meter, fuel monitor and tachometer also notify by visual images. Around view monitors and car navigation shows the environments by a monitor.
 - In the case of remote-control vehicles such as Unmanned Aerial Vehicle (UAV), information such as landscape and objects around the vehicle is shown by a display.
 - By the visual image, people can intuitively understand the information.
 - Moreover, in non-Global Navigation Satellite System (GNSS) environment, that is indoor, visual navigation system such as Simultaneous Localization and Mapping (SLAM) is generally used.
 - Because of many systems utilize visual images, people such as driver, rider, and operator may confuse because they must check visual information from many displays and indicators at once.
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Introduction

- We will focus on non-visual notification and navigation system.
 - To avoid confusing the driver, we considered creating a different sound, pitch and pattern for each type of obstacle; however, these would not be intuitive.
 - Additionally, notifying the driver using speech would take too long. It is also difficult to apply the system by sound in the case of late-night bus with long distance, because passengers will concern to the alert.
 - On the other hand, in an environment such as dark plant, we cannot use visual navigation system.
 - Therefore, the systems that use the infrastructure devices of such as pseudolites[2] or radio waves have been also investigated.
 - The non-visual system have possible to develop conventional notification
 - By combination with visual and non-visual system, more intuitive and real-time notification and navigation may be realized.
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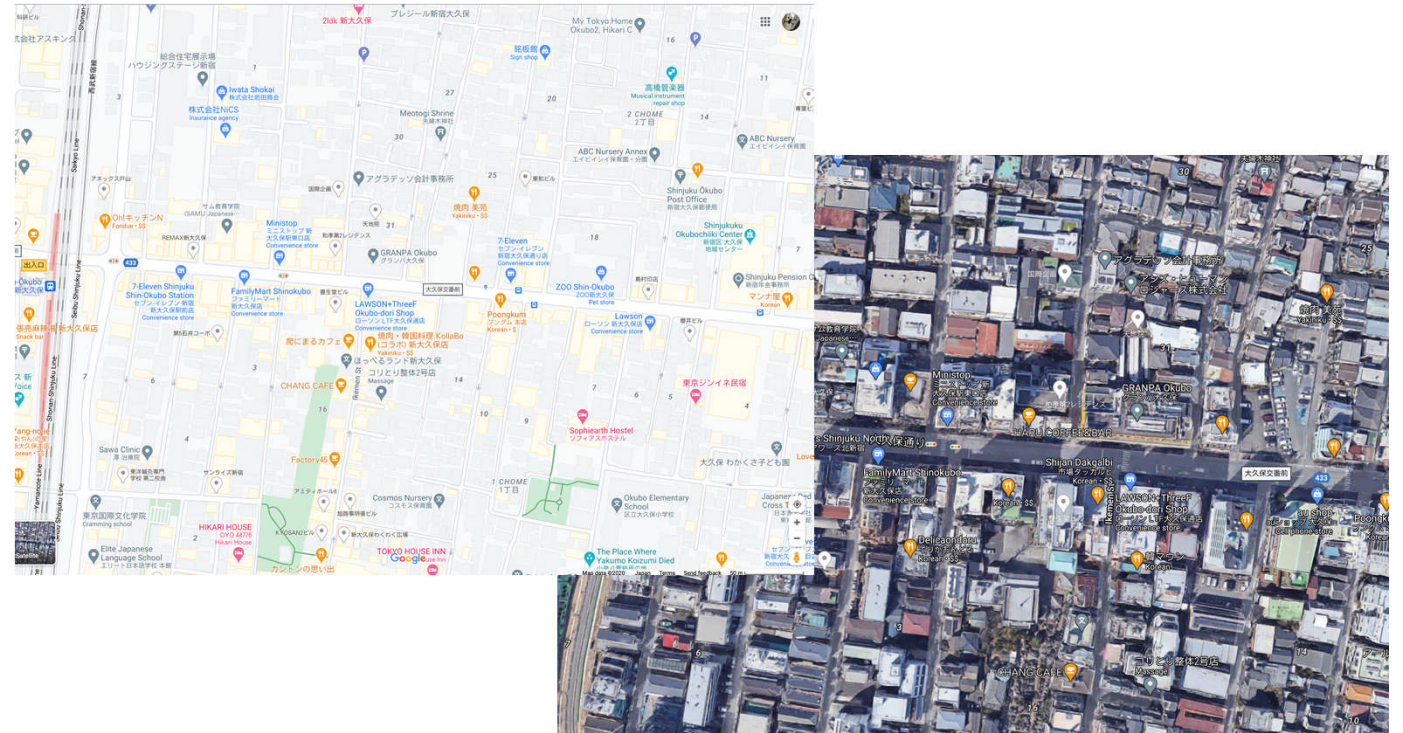
Submissions

- Work in the dark place
- Non-visual notification
- Higher accurate sensing than sensing by image sensors
- Sensing with keeping privacy



Proposal of Guidance Method in Car Navigation System

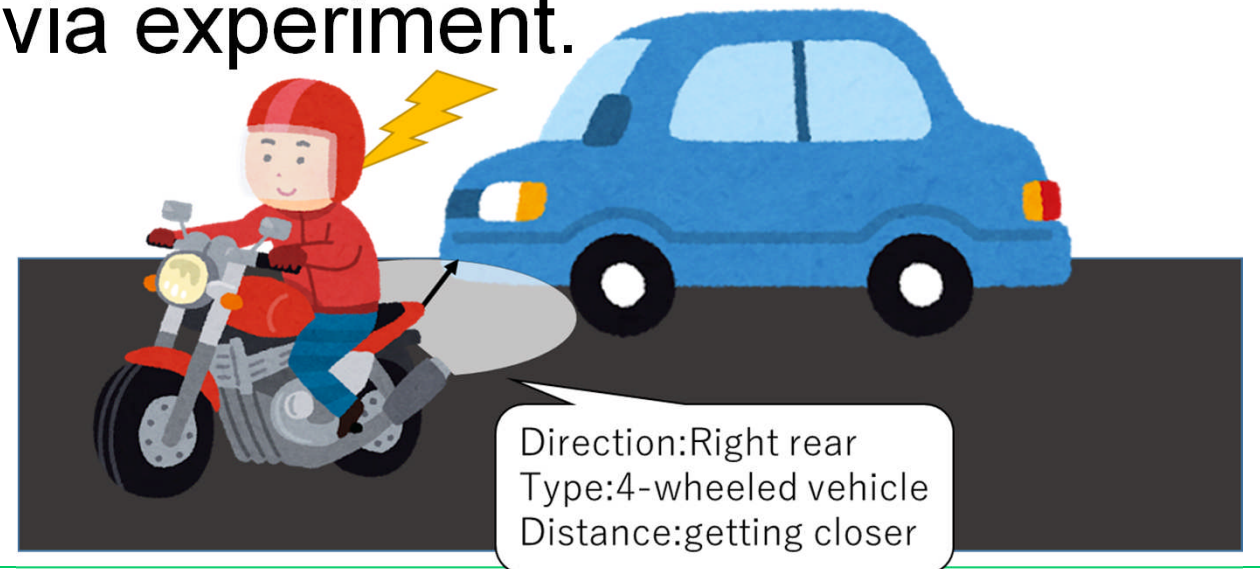
- Discussion on sound guidance for car navigation systems
- A new guidance method that “turning on the right/left blinker.” is proposed



Especially urban Asian street intervals are dense

Vibro-tactile Notification in Different Environments for Motorcyclists

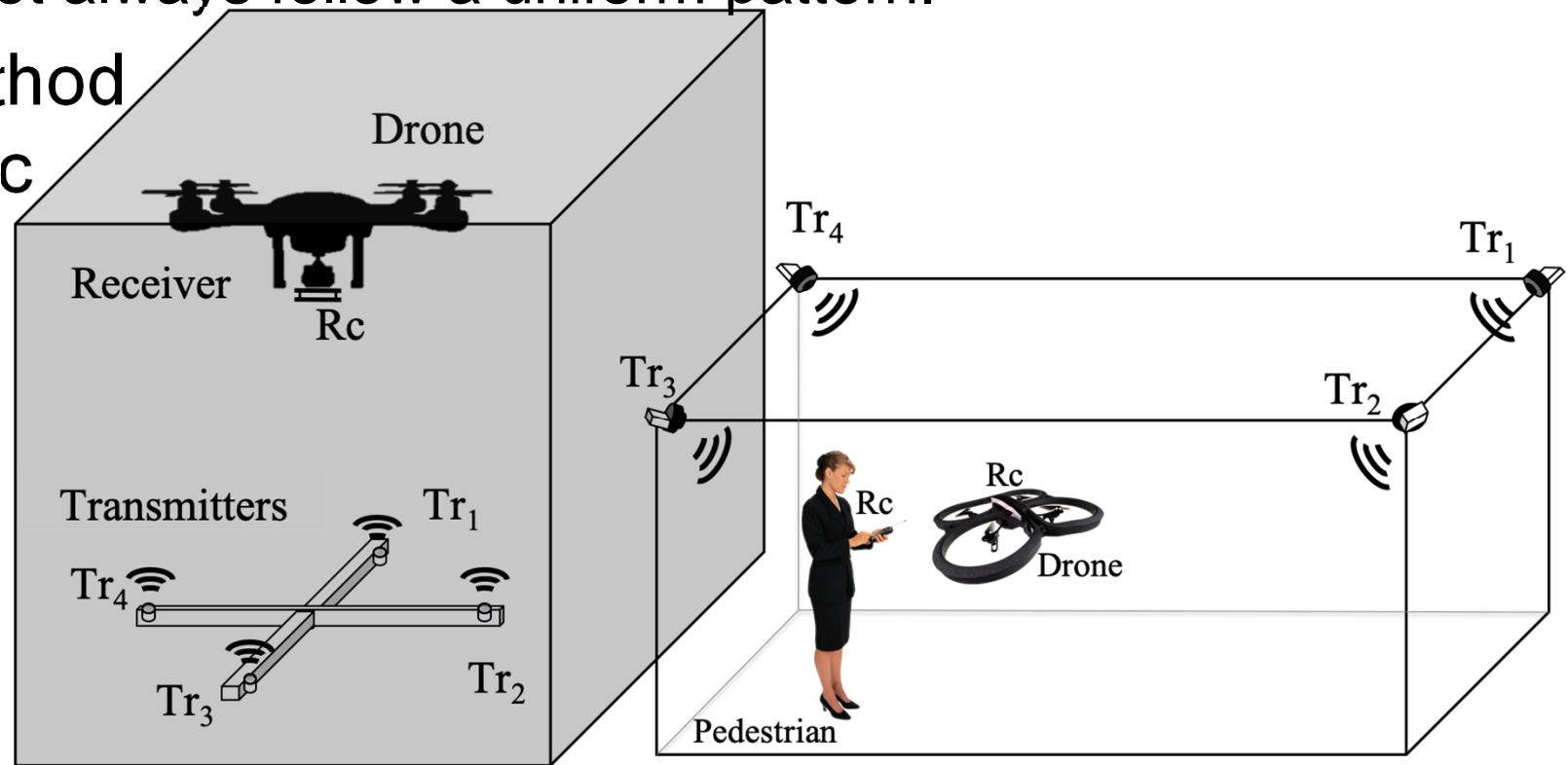
- A system that uses haptic sensations to quickly notify drivers of possible hazards or obstacles surrounding the vehicle have been proposed.
- The system is evaluated under windy and engine vibration conditions and examine accuracy of notification via experiment.



Indoor Positioning System Using SS Ultrasonic Waves for Drone Applications

- Positioning by visual estimation is difficult in the drone where...
 - Large errors on absolute coordinates.
 - The flight path of routine inspections is often in a dark place.
 - The walls do not always follow a uniform pattern.

- Positioning method by SS ultrasonic waves is discussed



(a) Situation for a dark plant

(b) Situation for a room

Conclusion

- The NVNN special track includes a broad range of topics related to automotive research and development.
 - It contains both academic research papers as well as studies from industry introducing interesting ideas for future work in this thriving research domain.
 - Projection on future challenges
 - Notification for real-time response by non-visual actuators.
 - Natural feeling notifications.
 - Very high accurate sensing with privacy.
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