

“Displaying safety information that passengers need at the optimal time in a fully autonomous vehicle” GIST Professor SeungJun Kim’s team wins the IMWUT Top 1% Paper Award from the International Computer Society (ACM)

- Professor SeungJun Kim of GIST's School of Integrated Technology - Joint research team of Professor Daniela Rus of MIT, presents research on autonomous driving AI that explains safety information when passengers are anxious at the international academic conference 'UbiComp 2024'

- Based on external environment, driving situation, passenger behavior, and state context information, it determines the optimal explanation provision time itself... Received ACM IMWUT Distinguished Paper Award, which is given to the top 1% of papers



▲ Professor SeungJun Kim's research team poses for a commemorative photo upon receiving the IMWUT Distinguished Paper Award at the UbiComp 2024 conference dinner held in Melbourne, Australia on October 9.

As expectations for the commercialization of autonomous driving technologies such as robotaxis increase, a Korean-American research team has developed an artificial intelligence technology that comprehensively considers the driving situation and the condition of the passengers and explains the situational judgment and decision-making of autonomous vehicles at the most appropriate time so that passengers do not feel anxious.

The potential for its use is expected ahead of the opening of the era of fully autonomous driving.

The Gwangju Institute of Science and Technology (GIST, President Kichul Lim) announced that a research team led by Professor SeungJun Kim of the School of Integrated Technology and jointly presented with Professor Daniela Rus of the Massachusetts Institute of Technology (MIT) Computer Science and Artificial Intelligence Laboratory (CSAIL) has won the 'IMWUT (Interactive, Mobile, Wearable, and Ubiquitous Technologies)

Distinguished Paper Award', an award selected by the Editorial Board of the Association for Computing Machinery (ACM).

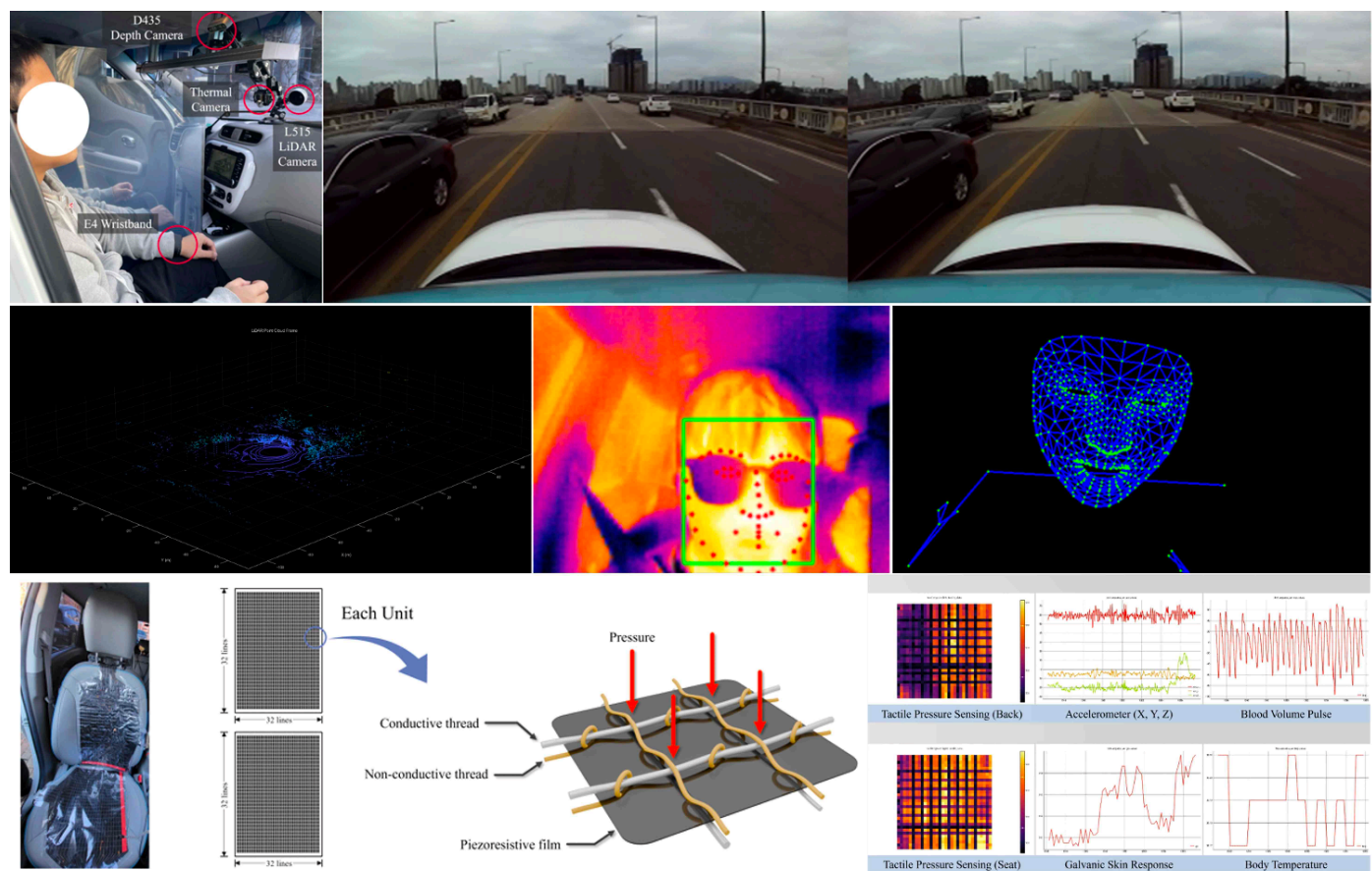
* ACM (Association for Computing Machinery): Founded in 1947, it is the world's first association of academic societies in the field of computer science for academic and educational purposes.

* ACM IMWUT Distinguished Paper Award: Awarded to the best paper that is within 4% of the regular papers published in the ACM UbiComp academic conference and 1% of the total submitted papers. In the case of 2024, 8 papers will be selected and awarded out of 205 papers presented in 2023 (last year).

Professor SeungJun Kim and researchers Gwangbin Kim, Seokhyun Hwang, Minwoo Seong, and Dohyeon Yeo implemented a framework that integrates augmented reality and machine learning to simulate how real vehicles perceive and pay attention to other vehicles on the road.

By conducting various user studies on safety visualization, the research team found that showing relevant and timely information about how vehicles perceive their surroundings and assess traffic risks increases user trust.

In autonomous driving situations, we collected data such as LiDAR, stereo vision, GPS (positioning information system), OBD (on-board diagnostic device), IMU (inertial measurement unit), and passenger bio-signal data, and built a dataset on explanation requests from passengers in autonomous vehicles based on the timing and content of explanation requests from passengers who are not driving, such as those reading or using mobile phones.



▲ Example of an AI dataset providing descriptions of passengers in autonomous vehicles

Based on driving and passenger context data, the AI model developed by the research team is expected to play a role in reducing anxiety and increasing trust by accurately determining the optimal timing for explanation when passengers feel anxious during driving situations and providing appropriate explanations to passengers in autonomous vehicles at the right time.

The editorial committee of the academic society that decided on the paper award stated the significance of the award at the awards ceremony, saying, "This is a timely and important study that can significantly improve user experience through virtual reality (VR)-based user simulation in future autonomous vehicle research."

Professor SeungJun Kim said, "Unlike previous studies that have focused only on the accurate generation of driving tasks such as steering wheels and pedals, this study focuses on accurately determining the match with passenger needs, the timing of explanations, etc., so that it can be applied to services in actual commercial vehicles to help passengers understand and relieve anxiety. By extending this framework, explainable AI methods can be safely evaluated and their impact on passenger experience in real driving scenarios."

This study, supervised by Professor SeungJun Kim of the School of Integrated Technology at GIST and conducted by Researchers Gwangbin Kim, Seokhyun Hwang, Minwoo Seong, and Dohyeon Yeo in collaboration with Professor Daniela Russ of MIT, was supported by the GIST-MIT Joint Research Project, the National Research Foundation of Korea's Mid-career Researcher Support Project, and the GIST AI Graduate School Support Project, and the paper award was announced at the ACM UbiComp 2024 academic conference held in Melbourne, Australia this month.

