Approach to Make Stations More Comfortable

A full-scale simulated model of an over-track station (a Station Simulator)

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Current State and Change of Train Station Environment

Recently, some of the concourses at terminal stations in Japan are beginning to have shopping and dining facilities. This gives them the characteristics of a space for staying instead of a space for passing through, as in the past. In addition, railway operators are trying to expand businesses at stations to increase the number of visitors. This is needed because, in this age of declining population, the number of passengers is expected to decrease in the long-term.

The introduction of escalators and elevators has made it easier for visitors to move around concourses and other

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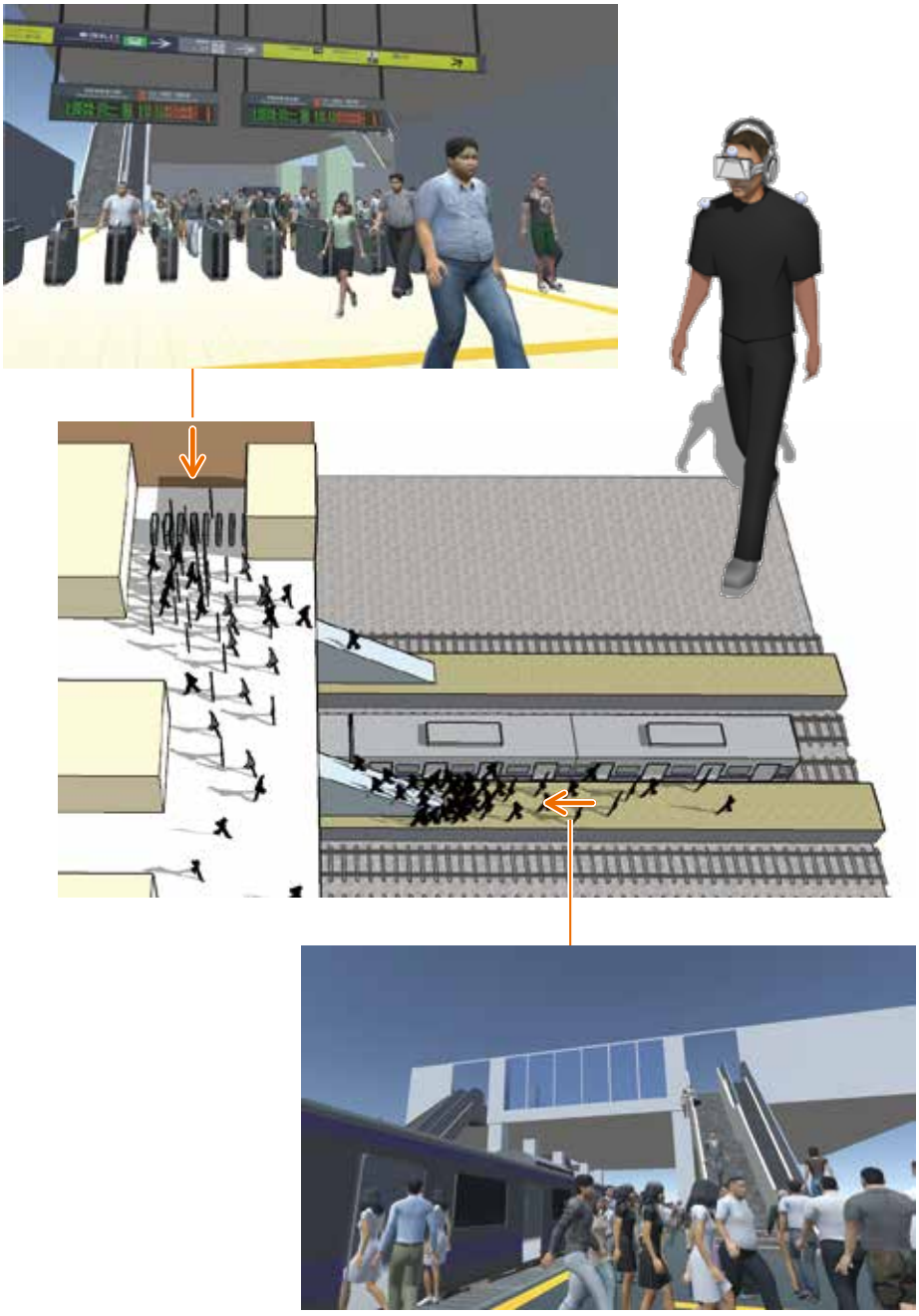
station spaces. However, they have not yet necessarily formed a comfortable environment for staying.

Approach to Building a Comfortable Train Station

"Comfort" is becoming an essential element in enhancing the appeal of a train station. However, no sufficient discussion or study has been conducted yet on how to realize comfort in designing a station because of the difficulty in quantitative measurement of human senses in an indoor or semi-outdoor station space.

To solve this problem, RTRI has built a full-scale simulated model of an over-track station (a Station Simulator) and is using it to conduct experiments for evaluation of a station space.

One example is the evaluation of train overcrowding. To reduce train overcrowding during morning rush hour, which is recognized as a problem in Japan, we are developing a simulation that visually reproduces passenger flows on station premises. Regarding passenger behaviors, data such as walking speeds vary according to changes in the social environment such as the age of the population and widespread use of smartphones when walking. Therefore, we are conducting walking experiments and complicated passenger flow experiments on the Station Simulator to accumulate and update the database on passenger behaviors. Furthermore, we are conducting Station-Simulator experiments and developing evaluation methods on public announcement (difficulty in understanding public address) and thermal environments, which are both important to the comfort of a station space.



VR(Virtual Reality) simulation of walk-through in a station wearing a head mount display

Future Prospects

We are in an age when a station environment can be easily digitalized by construction of a station space using virtual reality (VR) technologies and used to forecast passenger flows and thermal environments through IT-based information collection. The Station Simulator has an advantage of allowing us to conduct experiments that are hard to conduct in an actual station space (due to difficulties in reproducing the same conditions and making long-term measurements). There are also restrictions in using a real space due to its fixed size and difficulties in changing the environmental conditions.

In the future, we intend to develop experimental methods that integrate factors that can only be reproduced in a real space (such as overcrowding and oppressive feelings) and those which can be digitalized by VR technologies. Finally, we will pursue development of a system that allows us to evaluate a station environment by implementing various evaluation methods such as thermal environment, overcrowding, and ease of understanding of public address as digital inputs to simulated passengers.