

Evaluation of Pedestrian’s Sensitivity to the Trajectory of Ultra-Compact Mobility Using Biometric Measurement

Toshiyuki SUGIMACHI¹⁾ **Yuichi SUESHIGE**²⁾ **Hideo MIYACHI**³⁾ **Toshiaki SAKURAI**⁴⁾
Tetsuo MAKI⁴⁾

1) Tokyo City University, Mechanical Engineering
 1-28-1 Tamazutsumi, Setagaya, Tokyo, 158-8557, Japan (E-mail:tsugi@tcu.ac.jp)

2) Tokyo City University, Faculty of Urban Life Studies
 1-28-1 Tamazutsumi, Setagaya, Tokyo, 158-8557, Japan

3) Tokyo City University, Faculty of Informatics
 3-3-1 Ushikubo-Nishi, Tsuzuki-Ku, Yokohama, Kanagawa, 224-8551, Japan

4) Tokyo City University, Mechanical Engineering
 1-28-1 Tamazutsumi, Setagaya, Tokyo, 158-8557, Japan

KEY WORDS: human engineering, bioinstrumentation, mental workload Personal mobility vehicle, Mental model (C2)

Ultra-compact mobility is expected to be the next generation of mobility. The trajectory of a narrow track vehicle with a lean mechanism was evaluated using subjective evaluations and biometric measurements in this study. Though there are several evaluation factors, this study focused on pedestrian receptivity. We conducted an emotional evaluation based on Russell’s circumplex model to evaluate the acceptance of a lean vehicle in subjective evaluations. Russell’s circumplex model classifies the valence and arousal dimensions of affective states. The maximum value of the sweating waveform was used to evaluate acceptability in the biometric measurements.

In this study, we evaluated the change in the psychological load of pedestrians from a party and objective perspective with respect to the relative distance between pedestrians and PMVs in a simulation experiment, assuming a situation in which pedestrians and PMVs are mixed in the road space. The subjective evaluation results showed that under the condition of approaching obstacles, the evaluation was sensitively high in proportion to the relative distance between the observer and the PMV from the party and objective viewpoints. In addition, the condition in which the relative distance between the pedestrian and the PMV is intermediate is the boundary value at which the center of gravity of the subjective evaluation moves to the second quadrant of Russell’s circle model from the results of this experiment is (2.57 m).

Because of the mental changes that occurred not only in the parties involved but also in the objective viewpoint, it is necessary to ensure the acceptability of PMVs in the entire mixed space. The results of the perspiration evaluation suggested that the momentary mental load increases from the party's perspective when the relative distance between the PMV and the person or obstacle decreases. Therefore, when designing a target route, it is important not only to evaluate the physical risk but also the pedestrian's sensitivity model to ensure pedestrian acceptability in situations where people's activities coexist with automated vehicles and PMVs. In the future, we plan to conduct evaluations when the PMV avoidance target is replaced by a person, as well as evaluations using actual equipment experiments and biometric measurements.

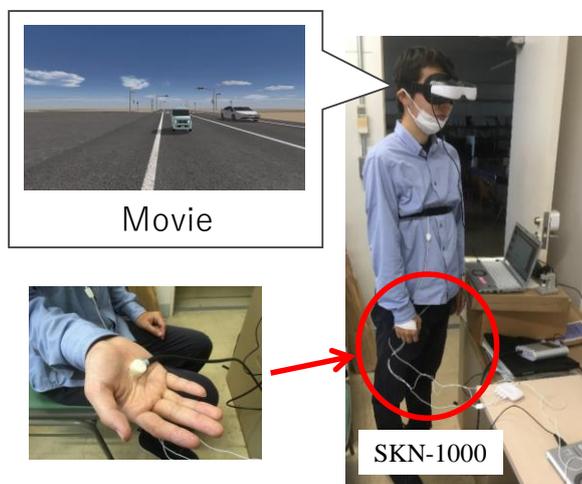


Fig. 1 Attachment of special capsule

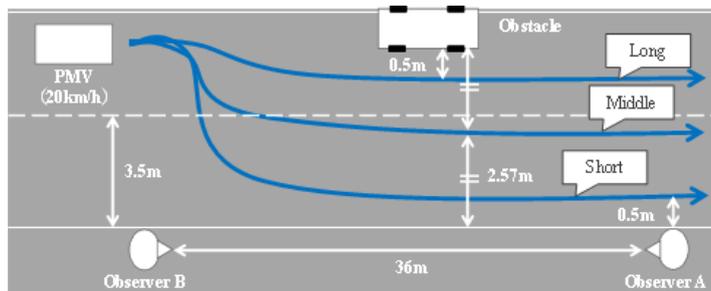


Fig. 2 Experimental condition