Development of Statistical Models
for Predicting a Driver's Hip and Eye Locations

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ABSTRACT

Background: Regression equations for estimation of a driver's hip location (HL) and eye location (EL) using the driver's anthropometric and posture variables have been developed for US drivers. However, those equations are limited to US drivers and do not include seat adjustment variables (e.g., cushion angle) that may affect a driver's HL and EL. **Objective:** The present study developed statistical models for prediction of a driver's HL and EL using seat configurations including (1) fore-aft seat position, (2) seat height, (3) seat back recline angle, and (4) seat cushion angle. **Method:** Driving postures of 23 Korean drivers (10 females and 13 males) were measured in a seating buck after adjusting seat configurations according to their preferences. The seat configurations, HLs, ELs, and joint angles of the participants were collected by a motion capture system. HL and EL prediction models based on the seat configurations and driving postures were developed by stepwise regression. **Results:** The proposed models showed high accuracy (adj. R^2 = .83 ± .13, RMSE = 19.1 ± 4.2 mm) in prediction of HL and EL. The performance difference between the seat configuration- and posture-based models was not statistically significant. **Conclusion:** The proposed seat configuration-based models can be used for accurate estimation of a driver's HL and EL for occupant packaging layout design.

Keywords: Driver, Hip location, Eye location, Occupant Packaging Design, Regression Model