

Supplementary Information

Title and Descriptions of Supplementary Data Files

Supplementary Data 1: Kansei Semantic Evaluation Matrix

Legend: Contains 60 PVMUI samples with user ratings (5-point Likert scale) across 10 Kansei words (Immersive, Trendy, Mysterious, etc.), serving as the primary dataset for factor analysis.

Supplementary Data 2: Design Feature-Kansei Correlation Matrix

Legend: Scores quantifying the relationship between 12 PVMUI design elements and three core Kansei dimensions (Technological, Innovative, Fancy) from expert evaluations.

Supplementary Data 3: Morphological Design-Kansei Mapping Dataset

Legend: Records 60 PVMUI samples' design parameters (a1-a10) and their corresponding Kansei scores (Technological, Innovative, Fancy) used for PSO-SVR modeling.

Supplementary Data 4: TOPSIS-Weighted Design Combinations

Legend: Complete enumeration of 37,800 design combinations with TOPSIS-weighted scores, identifying optimal configuration (row 3175: a1=1, a2=3, a5=5, a7=3, a9=7, a10=6).

Supplementary Data 5: PSO-SVR Training Set Predictions

Legend: Training dataset showing actual vs. predicted Kansei values (Technological, Innovative, Fancy) for 48 samples used in model development.

Supplementary Data 6: PSO-SVR Test Set Validation

Legend: Test dataset with 12 samples comparing predicted and actual Kansei values, demonstrating model generalization capability.