We evaluate how gamification influences situational motivation, performance, and biosignals and their relationships using a mixed approach involving machine learning and traditional, inferential statistics.

Data Collection

Gamified vs. Non-Gamified passing drill in an immersive environment

Video-Data
Questionnaires
ECG
Eye-Tracking
Performance

Data Processing & Feature Extraction

Generic features
Mean, Std., Min., Max.

Expert features
(Low/High) Index of pupillary activity, fixations, blinks

Algorithm Training

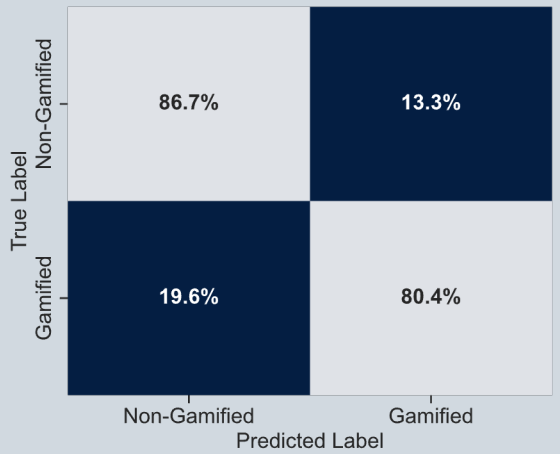
ML-based classification

Explainable AI

Results

No statistical results but ML and XAI approach revealed underlying patters

✓ kNN performs best (F1-Score = 82.75 %)
✓ Eye-Tracking dominated feature importance



We demonstrate the feasibility of sensor-based classification of scenarios.

Revealing implicit, physiology-driven effects of gamification through ML.

Lennartz, R., Stoeve, M., Kumarampulakka, N., Attri, K., Wittmann, L., Witte, M., Eskofier, B. M., & Dorschky, E. (2026). Integrating machine learning and statistical analysis to examine the effect of gamification on biosignals, performance, and motivation in soccer . *Current Issues in Sport Science*, *11*(3), Article 003. https://doi.org/10.36950/2026.3ciss003

Current Issues in Sport Science

Friedrich-Alexander-Universität
Technische Fakultät