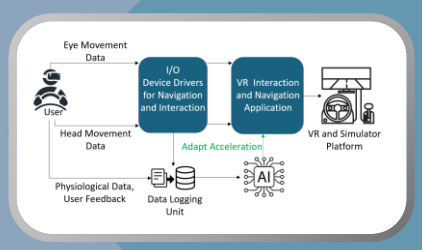
Intelligent Virtual Platform for Real-time Cybersickness Detection and Adaptation

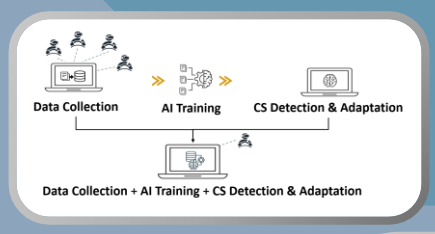
Motivation

- Offline training for Cybersickness detection limitations: Lack of individualization, Potential data bias, Difficulty in adapting to new users or scenarios.



Contribution

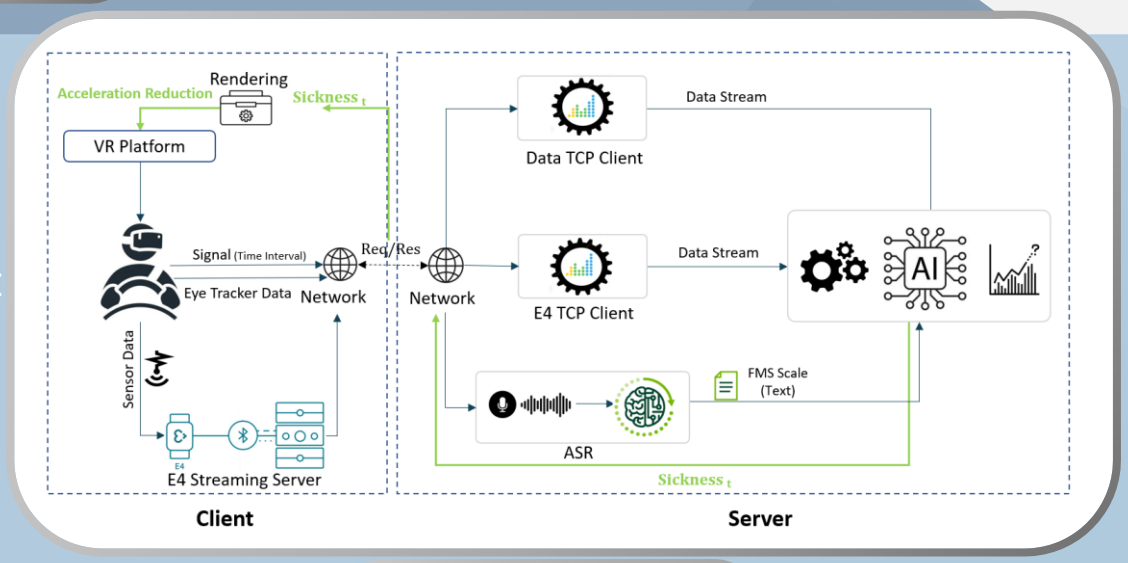
- Real-time training of the AI model using minimal user-specific data, enabling personalized Cybersickness detection and dynamic adjustment of the VR simulation.



- Operating the entire process, including data collection, training, Cybersickness detection, and adaptation within a closed-loop system, optimizing efficiency.

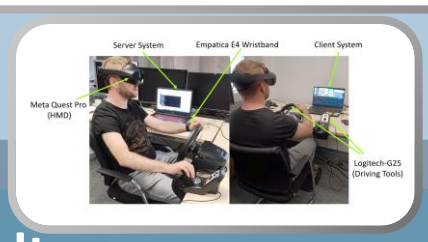
Data

- **Objective Data**
  - Eye Tracker
  - Head Movement
  - Physiological
- **Subjective Data**



Experiment Setup

- Driving Simulator



Pre-Study Results

- Decrease in the slope coefficient of the EDA signal in the adaptation phase, in contrast to the accumulative effect of motion sickness.
  - EDA slope coefficient: $p = 0.044$
- Improved stability and consistency of eye movements during the adaptation phase.
  - Eye velocity p =1.3922e − 19
  - Eye angular velocity $p = 5.676e{-}11$
  - Eye movement distance $p = 0.0049$

TABLE I
COMPARISON OF SLOPE COEFFICIENT OF THE EDA SIGNAL

Phase	EDA Slope Coefficient mean
Training	9.8e-3
Adaptation	6.0e-3

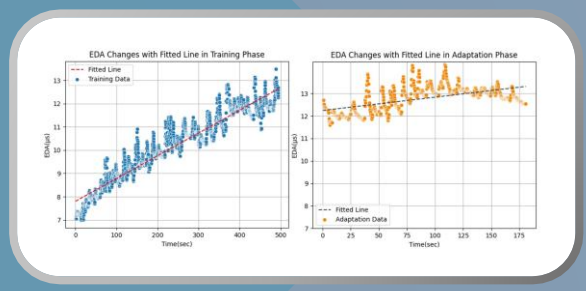


TABLE II
COMPARISON OF EYE MOVEMENT SIGNAL

Phase	Velocity Variance	Angular Velocity Variance	Movement Distance mean
Training	1.47e-4	8.4e-3	6.3820e-2
Adaptation	3.06e-5	2.0e-3	6.3818e-2

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