

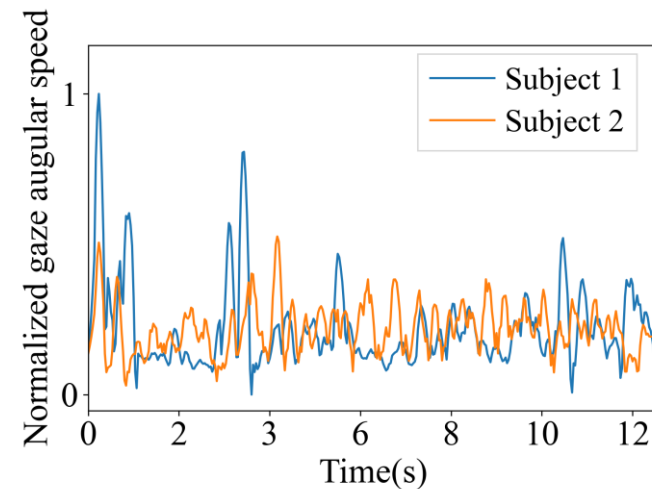
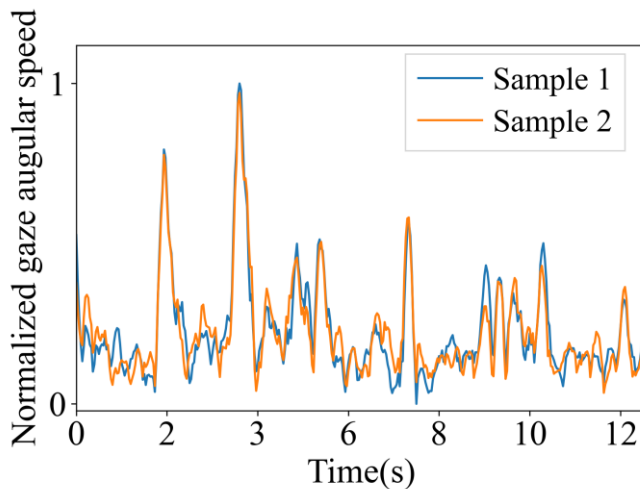
EyeAuth: Smartphone User Authentication via Reflexive Eye Movements

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Problems & Ideas

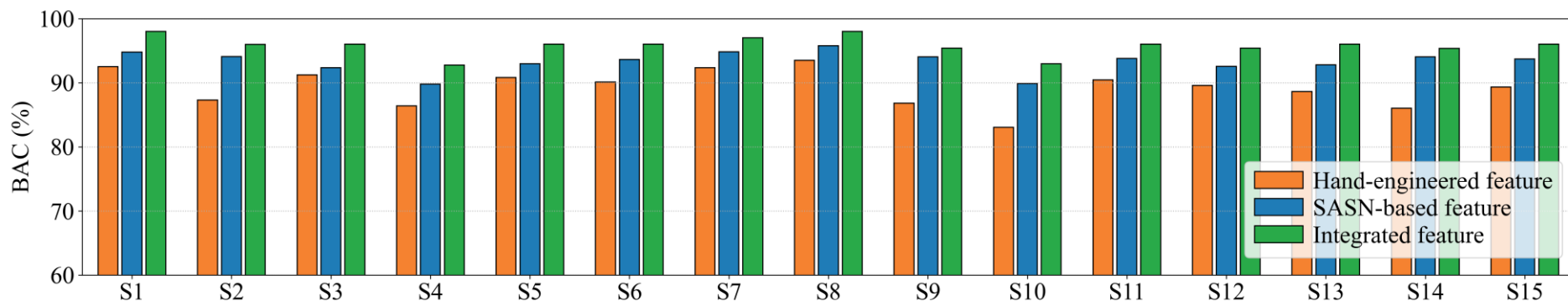
- Problems of authentication methods:
 - Two widely deployed schemes, i.e., face and fingerprint authentication, rely on users' sensitive physiological traits, raising serious privacy concerns.
 - Existing eye movement authentication methods require dedicated eye trackers and are vulnerable to replay attacks.
- Ideas: A replay-resistant smartphone authentication system that verifies users through reflexive eye movements.



Gaze angular speed under the same visual stimulus. Left: two samples from the same user. Right: samples from different users. It is evident that gaze patterns are similar within the same user, while distinct differences appear between users.

Main Contributions

- Contributions:
 - They propose EyeAuth, a smartphone authentication system based on reflexive eye movements. They design OTGC, a unique gaze challenge that ensures a clear gaze trajectory under gaze estimation errors, enabling replay attack resistance;
 - They design SASN, a model that extracts dot position-irrelevant features based on self-attention and Siamese network. Incorporating hand-engineered features, EyeAuth can achieve reliable user authentication under random gaze challenges;
 - They conduct extensive experiments with two smartphones and verify EyeAuth's effectiveness under different scenarios.



Authentication performance of 15 different subjects. By combining manually extracted features with features based on SASN, EyeAuth achieves an average BAC of 95.56%.