Who do you look like? Gaze-based authentication for workers in VR

Karina LaRubbio[1], Jeremiah Wright[2], Brendan David-John[1], Dr. Andreas Enqvist[2], Dr. Eakta Jain[1]

[1] - Department of Computer & Information Science & Engineering, University of Florida, Gainesville, FL, [2] - Department of Materials Science and Engineering, University of Florida, Gainesville, FL

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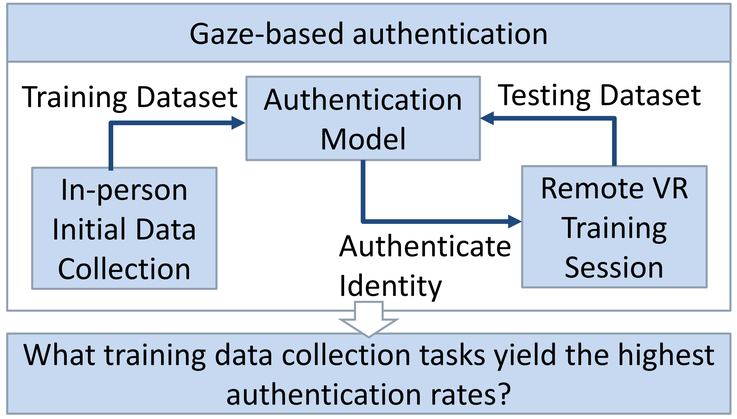
Overview

- Gaze cues offer the promise of seamless and continuous authentication.
- Gaze behavior varies based on task.
- We compared authentication performance using gaze data from three tasks.
- Within-task authentication performed best for image viewing.

Problem

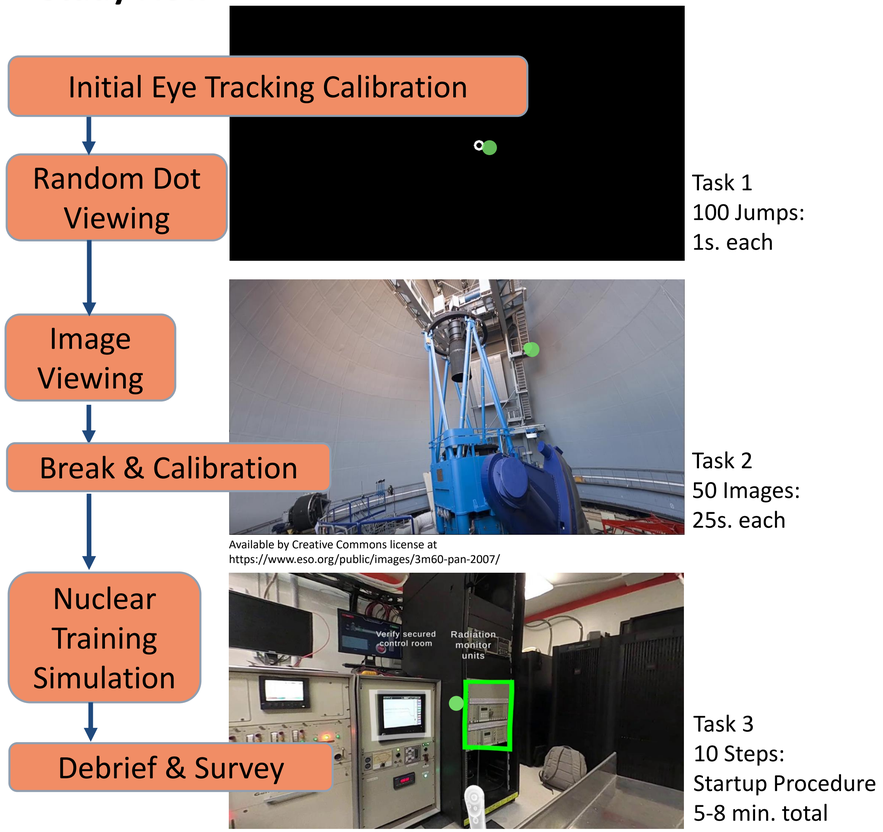


Methodology

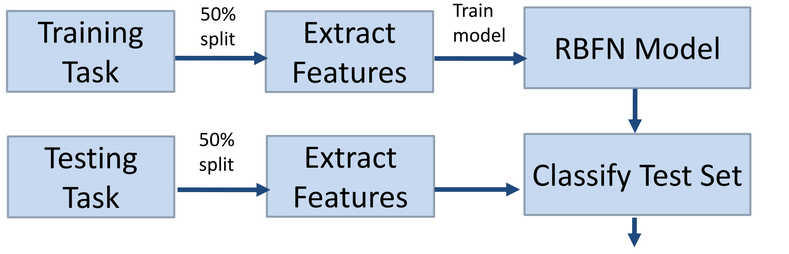
- Pico Neo 2 Eye Headset.
(90 Hz integrated eye tracking)
- Ten Nuclear Engineering undergraduate students.
- Fixation and saccade features extracted for authentication with an RBFN model [1,2,3].

https://vr.tobii.com/wp-content/uploads/2019/12/pico-neo2.png

Study Flow



Authentication Model



Results

Identification Rate

	Test: Dots		Test: Images		Test: Sim.	
	50/50	80/20	50/50	80/20	50/50	80/20
Train: Dots	15%	18%	8%	9%	9%	10%
Train: Images	10%	9%	**72%**	82%	**25%**	38%
Train: Simulation	11%	11%	15%	14%	12%	18%

Conclusions

- Evaluated within-task and between-task authentication using eye movements in a VR environment.
- Within-task authentication performed best.
- The highest within-task identification rates were for the image viewing task (72%/82%).
- The highest between-task identification rates were between image viewing and simulation tasks (25%/38%).
- Tasks with larger volume of data positively impacted authentication performance.

Future Work

- Standardize volume of data across tasks.
- Use expanded feature sets from eye movements.
- Explore feature distributions by task.

References

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[2] A. George and A. Routray. A score level fusion method for eye movement biometrics. Pattern Recognition Letters, 82:207–215, 2016
[3] B. David-John, D. Hosfelt, K. Butler, and E. Jain. A privacy-preserving approach to streaming eye-tracking data. IEEE Transactions on Visualization and Computer Graphics, 27(5):2555–2565, 2021.