Daniel A. Afergan

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Professional and Research Experience

Google Inc. Mountain View, CA & San Bruno, CA
Staff Software Engineer *May 2015 - Present*

- YouTube Conversational AI & Personalized Recommendations *Jan. 2025 - Present*
  - Tech Lead Manager, orchestrating a cross-stack team to architect and scale Generative AI components and LLM-driven recommendation products. Driving the rapid 0-to-1 execution of multiple novel AI initiatives.
- YouTube User Understanding *Apr. 2021 - Jul. 2025*
  - Technical Lead for YouTube in-app surveys. Engineered a high-throughput, multi-million QPS survey platform. Built the full-stack infrastructure to transform user sentiment into a core signal for YouTubes recommendation models.
  - Engineered ML pipelines for YouTube Homepage recommendations. Executed critical infrastructure modernization to boost system reliability and authored long-term technical roadmaps.
- YouTube Posts *Jan. 2017 - Apr. 2021*
  - Architected the backend infrastructure to launch and scale YouTube Community Tab, enabling lightweight content creation for millions of users.
  - Developed novel UIs and fan feedback mechanisms, leveraging experimentation and user research to drive measurable improvements in engagement.
- Vanadium (v.io) & Fuchsia (fuchsia.dev) *May 2015 - Jan. 2017*
  - Prototyped cross-device applications and researched automated UI generation systems.
  - Built large-scale Android app crawlers to curate the Rico dataset (interactionmining.org/rico)the largest repository of mobile app designs used for data-driven design research.

Tufts University Human-Computer Interaction Lab Medford, MA
Research Assistant & Teaching Assistant *Jan. 2011 - May 2015*

- Developed adaptive Brain-Computer Interfaces (BCI) utilizing functional near-infrared spectroscopy (fNIRS) as a passive input to enhance user task performance.
- Constructed and optimized machine learning frameworks to improve the accuracy of real-time cognitive state predictions.
- Created a Google Glass framework that dynamically adjusted notification intrusiveness based on physiological data and environmental context.

United States Naval Research Laboratory Washington, DC
Advisory Cognitive Scientist, Strategic Analysis Inc. *Jun. 2005 - Dec. 2010*

- Delivered scientific analysis of virtual training environments for the Warfighter Human System Integration Laboratory, directly influencing automated training protocols.
- Designed and executed experiments assessing immersive locomotion, augmented reality, and neurophysiology to optimize US Marine Corps infantry training.
- Engineered software for real-time virtual environment adaptation based on physiological feedback.

Education

Tufts University Medford, MA
PhD in Computer Science *May 2015*

The George Washington University Washington, DC
Master of Science in Computer Science *May 2009*

University of Pennsylvania Philadelphia, PA
Bachelor of Arts in Cognitive Science, concentration in Computation and Cognition *May 2005*
Minors in Psychology and Computer Science and Engineering

Skills

Programming: Python, C++, Java, JavaScript, TypeScript, Go

Conference Proceedings

[1] Afergan, D. Using brain-computer interfaces for implicit input. *Proceedings of the adjunct publication of the 27th annual ACM symposium on User interface software and technology*, ACM Press, 2014.

[2] Afergan, D., Hincks, S.W., Shibata, T. and Jacob, R.J.K. Phylter: a system for modulating notifications in wearables using physiological sensing. *International conference on augmented cognition*, Springer, 2015.

[3] Afergan, D., Peck, E.M., Solovey, E.T., Jenkins, A.J., Hincks, S.W., Brown, E.T., Chang, R., and Jacob, R.J.K. Dynamic Difficulty Using Brain Metrics of Workload. *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI) 2014*, ACM Press, 2014. **Best Paper Award Honorable Mention (top 5%)**.

[4] Afergan, D., Shibata, T., Peck, E.M., Hincks, S.W., Yuksel, B.F., Chang, R., and Jacob, R.J.K. Brain-Based Target Expansion. *Proceedings of ACM Symposium on User Interface Software and Technology (UIST) 2014*, ACM Press, 2014.

[5] Bailey, S.P., Pfluger, K.C., Holt, C., La Budde, Z., Afergan, D., Bartlett, S., Stripling, R., Miller, P.C., and Hall, E.E. Changes in Performance of a Virtual Reality Task Subsequent to Prolonged Exercise in the Heat and Carbohydrate Supplementation. *Proceedings of American College of Sports Medicine National Meeting*, 2006. Abstract published in *Medicine and Science in Sports and Exercise*, 38 (5 Supp.), S269-270.

[6] Deka, B., Huang, Z., Franzen, C., Hibschman, J., Afergan, D., Li, Y., Nichols, J. and Kumar, R. Rico: A mobile app dataset for building data-driven design applications. *Proceedings of ACM Symposium on User Interface Software and Technology (UIST) 2017*, ACM Press, 2017.

[7] Dong, T., Nebeling, M., Afergan, D., Churchill, E.F., Nichols, J., Goodman, E., Chi, P.Y.P., Li, Y. and Wigdor, D., 2016, June. The Making of Cross-Device Experiences: A Hands-on Workshop. *Proceedings of the 2016 ACM Conference Companion Publication on Designing Interactive Systems*, ACM Press, 2016.

[8] Hincks S.W., Afergan D., and Jacob R.J.K. Using fNIRS for real-time cognitive workload assessment. *International Conference on Augmented Cognition 2016*, Springer, 2016.

[9] Peck, E.M., Afergan, D., and Jacob, R.J.K. Investigation of fNIRS Brain Sensing as Input to Information Filtering Systems. *Proceedings of Augmented Human 2013*, 2013.

[10] Sibert, L.E., Templeman, J.N., Stripling, R., Page, R.C., Coyne, J.T., La Budde, Z., and Afergan, D. Comparison of Three Virtual Environment Locomotion Interaction Techniques In Terms of Path Integration Performance. *Proceedings of Human Factors and Ergonomics Society Annual Meeting 2008*, 2008.

[11] Stripling, R., Templeman, J.N., Sibert, L.E., Afergan, D., Cole, A., Cohn, J.V., Coyne, J.T., and La Budde, Z. Creating Effective First Person Training Tools: Evaluating Locomotion Interfaces. *Proc. American Psychological Association Conference 2005*, 2005.

[12] Yuksel, B.F., Afergan, D., Peck, E.M., Griffin, G., Harrison, L., Chen, N.W., Chang, R. and Jacob, R.J.K.. Braahms: a novel adaptive musical interface based on users' cognitive state. *International Conference on New Interfaces for Musical Expression*, 2015.

[13] Yuksel, B.F., Oleson, K.B., Harrison, L., Peck, E.M., Afergan, D., Chang, R. and Jacob, R.J.K. Learn piano with BACh: An adaptive learning interface that adjusts task difficulty based on brain state. *Proceedings of ACM Conference on Human Factors in Computing Systems (CHI) 2016*, ACM, 2016. **Best Paper Award (top 1%)**.

Book Chapters

[14] Afergan, D. and Davis, J.L. Promising Directions for Improved Training, Learning, and Memory. *Foundations of Augmented Cognition, 4th Ed.* Schmorrow, D.D., Nicholson, D.M., Drexler, J.M., and Reeves, L.M. (Eds.) California: Falcon (2007), pp. 198-204. Presented at *Augmented Cognition International 2007*, 2007.

[15] Deka, B., Doosti, B., Huang, F., Franzen, C., Hibschman, J., Afergan, D., Li, Y., Kumar, R., Dong, T. and Nichols, J., 2021. An Early Rico Retrospective: Three Years of Uses for a Mobile App Dataset. *Artificial Intelligence for Human Computer Interaction: A Modern Approach*, pp. 229-256. Springer, Cham.

[16] Peck, E.M., Afergan, D., Yuksel, B.F., Lalooses, F., Jacob, R.J.K. Using fNIRS to Measure Mental Workload in the Real World. *Advances in Physiological Computing.* Springer 2013.

[17] Stripling, R., Coyne, J.T., Cole, A., Afergan, D., Barnes, R.L., Rossi, K., Reeves, L., and Schmorrow, D.D. Automated SAF Adaptation Tool (ASAT). *Foundations of Augmented Cognition, 3rd Ed.* Schmorrow, D.D., and Reeves, L.M. (Eds.) Heidelberg, Germany: Springer-Verlag, pp. 346-353, 2011. Presented at *Proceedings of the Third International Conference on Foundations of Augmented Cognition*, 2007.

[18] Tognoli, E., Kovacs, A., Suutari, B., Afergan, D., Coyne, J.T., Gibson, G., Stripling, R., and Kelso, J.A.S. Behavioral and Brain Dynamics of Team Coordination Part I: Task Design. *Foundations of Augmented Cognition. Directing the Future of Adaptive Systems.* Schmorrow, D.D. and Fidopiastis, C. (Eds.) Heidelberg, Germany: Springer-Verlag, pp. 257-264, 2011. Invited paper at *Human-Computer Interaction International 2011.*

[19] Tognoli, E., Kovacs, A., Suutari, B., Afergan, D., Coyne, J.T., Gibson, G., Stripling, R., and Kelso, J.A.S. Behavioral and Brain Dynamics of Team Coordination Part II: Neurobehavioral Performance. *Foundations of Augmented Cognition. Directing the Future of Adaptive Systems.* Schmorrow, D.D. and Fidopiastis, C. (Eds.) Heidelberg, Germany: Springer-Verlag, pp. 376-382, 2011. Invited paper at *Human-Computer Interaction International 2011.*

Journal Articles

[20] Bailey, S.P., Holt, C., Pfluger, K.C., La Budde, Z., Afergan, D., Stripling, R., Miller, P.C., and Hall, E.E. Impact of Prolonged Exercise in the Heat and Carbohydrate Supplementation on Performance of a Virtual Environment Task. *Military Medicine*, 173(2), pp. 187-192, 2008.

[21] Ottley, A., Peck, E.M., Harrison, L.T., Afergan, D., Ziemkiewicz, C., Taylor, H.A., Han, P.K. and Chang, R. Improving Bayesian reasoning: The effects of phrasing, visualization, and spatial ability. *IEEE transactions on visualization and computer graphics*, 22(1), pp. 529-538, 2016.

[22] Solovey, E.T., Afergan, D., Peck, E.M., Hincks, S.W., Jacob, R.J.K. Designing Implicit Interfaces for Physiological Computing: Guidelines and Lessons Learned using fNIRS. *ACM Transactions on Computer-Human Interaction (TOCHI)*, 2014.

Poster Presentations

[23] Belyusar, D., Reimer, B., Mehler, B., Afergan, D., Coughlin, J.F., and Solovey, E.T. Utilizing functional near-infrared spectroscopy to identify cognitive processes contributing to workload in a dual-task environment. *Society for Neuroscience Annual Meeting*, 2014.

[24] Kovacs, A.J., Tognoli, E., Afergan, D., Coyne, J., Gibson, G., Stripling, R., and Kelso, J.A.S. Behavioral and brain dynamics of team coordination. *Society for Neuroscience Annual Meeting*, 2011.

[25] Kovacs, A.J., Tognoli, E., Afergan, D., Coyne, J., Gibson, G., Stripling, R., and Kelso, J.A.S. Brain dynamics of coordinated teams. *Society for Neuroscience Annual Meeting*, 2010.

[26] Shibata, T., Peck, E.M., Afergan, D., Hincks, S.W., Yuksel, B.F., and Jacob, R.J.K. Building Implicit Interfaces for Wearable Computers with Physiological Inputs: Zero Shutter Camera and Phylter. *Adjunct proceedings of ACM Symposium on User Interface Software and Technology (UIST) 2014*, ACM Press, 2014.

[27] Yuksel, B.F., Peck, E.M., Afergan, D., Hincks, S.W., Shibata, T., Kainerstorfer, J., Tgavalekos, K., Sassaroli, A., Fantini, S., Jacob, R.J.K. Functional near-infrared spectroscopy for adaptive human computer interfaces. *SPIE Photonics West*, 2015.

Other Papers

[28] Afergan, D. Speed-Accuracy Comparison of Navigational Interfaces. Master's Thesis, The George Washington University, 2009.

[29] Afergan, D., Peck, E.M., Chang, R., and Jacob, R.J.K. Using Passive Input to Adapt Visualization Systems to the Individual. *ACM CHI 2013 Workshop, Many People, Many Eyes: Aggregating Influences of Visual Perception on User Interface Design*, 2013.

[30] Coyne, J.T., Stripling, R., Pfluger, K.C., LaBudde, Z., and Afergan, D. Company and Below Command and Control Information Exchange Study. *U.S. Naval Research Laboratory*, N0001406WX20812, 2007.

[31] Crouser, R.J., Harrison, L., Afergan, D. and Peck, E.M., Beyond detection: investing in practical and theoretical applications of emotion+ visualization. *Proceedings of the 2016 EmoVis Conference on Emotion and Visualization*, pp. 35-38. Linkoping University, 2016.

[32] Stripling, R., Templeman J.N., Sibert, L.E., Coyne, J.T., Page, R.G., La Budde, Z., and Afergan, D. Identifying Interface Limitations for Virtual Environment Training Systems. *Department of Defense Human Factors Engineering Technical Group Meeting 2006*, 2006.

Patents

[33] Drifting Keyboard. Tomoki Shibata, Robert J K Jacob, Daniel Afergan, Danielle Kong, U.S. Patent 15046584.

[34] Automated Interface Design. Emily R Shack, Jeffrey W Nichols, Daniel A Afergan, Christian Robertson, U.S. Patent 15464279.