Kenneth C. Arnold
Assistant Professor of Computer Science and Data Science
Calvin University, 3201 Burton St SE, Grand Rapids MI 49546, USA

kcarnold@alum.mit.edu
kenarnold.org, 443-310-4002
ken.arnold@calvin.edu

Research Interests

Vision: AI should help people work better with other people.

I design and study interactive AI for *thoughtful written communication* and for *teaching and learning*.

Education

Harvard University — Cambridge, MA USA
Ph.D., Computer Science — May 2020
Research: Impacts of Predictive Text on Writing Content
Advisor: Krzysztof Z. Gajos, Intelligent Interactive Systems group

Massachusetts Institute of Technology — Cambridge, MA USA
S.M., Media Arts and Sciences (MIT Media Lab) — February 2010
Research: natural-language code search, commonsense reasoning
Advisor: Henry Lieberman, Software Agents Group, MIT Media Lab

Cornell University — Ithaca, NY USA
B.S., Electrical and Computer Engineering, magna cum laude — June 2007

Grants

- NSF: CRII: HCC: Interactive Natural Language Technology for Supporting Writers in Structuring and Revising Documents. $175,000. 2023–2025.
- Calvin Research Fellowship course releases (approx. $10,000 per year), 2020–2023.

Archival Publications (Conference and Journal Papers)

Kenneth C. Arnold, Krysta Chauncey, and Krzysztof Z. Gajos. 2020. Predictive Text Encourages Predictable Writing. In *Proceedings of the 25th International Conference on Intelligent User Interfaces* (IUI '20), 128–138. https://doi.org/10.1145/3377325.3377523

Kenneth C. Arnold, Krysta Chauncey, and Krzysztof Z. Gajos. 2018. Sentiment Bias in Predictive Text Recommendations Results in Biased Writing. In *Graphics Interface 2018*, 8–11. http://graphicsinterface.org/wp-content/uploads/gi2018-7.pdf

Kenneth C. Arnold, Kai-Wei Chang, and Adam Kalai. 2017. Counterfactual Language Model Adaptation for Suggesting Phrases. In *Proceedings of the Eighth International Joint Conference on Natural Language Processing (Volume 2: Short Papers)*, 49–54. https://aclanthology.org/I17-2009

Katherine E. Boronow, Herbert P. Susmann, Krzysztof Z. Gajos, Ruthann A. Rudel, Kenneth C. Arnold, Phil Brown, Rachel Morello-Frosch, Laurie Havas, and Julia Green Brody. 2017. DERBI: A Digital Method to Help Researchers Offer "Right-to-Know" Personal Exposure Results. *Environmental health perspectives* 125, 2.

Kenneth C. Arnold, Krzysztof Z. Gajos, and Adam T. Kalai. 2016. On Suggesting Phrases vs. Predicting Words for Mobile Text Composition. In *Proceedings of the 29th Annual Symposium on User Interface Software and Technology - UIST '16*, 603–608. https://doi.org/10.1145/2984511.2984584

Pao Siangliulue, Kenneth C. Arnold, Krzysztof Z. Gajos, and Steven P. Dow. 2015. Toward Collaborative Ideation at Scale: Leveraging Ideas from Others to Generate More Creative and Diverse Ideas. In

Proceedings of the 18th ACM Conference on Computer Supported Cooperative Work & Social Computing (CSCW '15), 937–945. https://doi.org/10.1145/2675133.2675239

Cheng-Zhi Anna Huang, David Duvenaud, Kenneth C. Arnold, Brenton Partridge, Josiah W. Oberholtzer, and Krzysztof Z. Gajos. 2014. Active learning of intuitive control knobs for synthesizers using gaussian processes. In *Proceedings of the 19th International Conference on Intelligent User Interfaces* (IUI '14), 115–124. https://doi.org/10.1145/2557500.2557544

Kevin Gold, Catherine Havasi, Michael Anderson, and Kenneth C. Arnold. 2011. Comparing Matrix Decomposition Methods for Meta-analysis and Reconstruction of Cognitive Neuroscience Results. In *Florida Artificial Intelligence Research Society Conference*. https://aaai.org/papers/flairs-2011-2561/

Kenneth C. Arnold and Henry Lieberman. 2010. Managing ambiguity in programming by finding unambiguous examples. In *Proceedings of the ACM International Conference on Object Oriented Programming Systems Languages and Applications* (OOPSLA '10), 877–884. https://doi.org/10.1145/1869459.1869531

Robyn Speer, Jayant Krishnamurthy, Catherine Havasi, Dustin Smith, Henry Lieberman, and Kenneth C. Arnold. 2009. An interface for targeted collection of common sense knowledge using a mixture model. In *Proceedings of the 14th International Conference on Intelligent User Interfaces* (IUI '09), 137–146. https://doi.org/10.1145/1502650.1502672

Posters and Workshop Papers

*Jiho Kim, *Ray C. Flanagan, *Noelle E. Haviland, *ZeAi Sun, *Souad N. Yakubu, *Edom A. Maru, and Kenneth C. Arnold. 2024. Towards Full Authorship with AI: Supporting Revision with AI-Generated Views. In *Joint Proceedings of the ACM IUI 2024 Workshops, IUI Workshop on Human-AI Co-Creation with Generative Models (HAI-GEN)*. https://ceur-ws.org/Vol-3660/paper17.pdf

Kenneth C. Arnold, April M. Volzer, and Noah G. Madrid. 2021. Generative Models Can Help Writers without Writing for Them. In *2nd Workshop on Human-AI Co-Creation with Generative Models - HAI-GEN 2021* (CEUR Workshop Proceedings). http://ceur-ws.org/Vol-2903/IUI21WS-HAIGEN-1.pdf

Kenneth C. Arnold, Kai-Wei Chang, and Adam T Kalai. 2017. Learning to Suggest Phrases. In *AAAI Workshop on Human-Centered AI*.

Norden E. Huang, Zhaohua Wu, Steven R. Long, Kenneth C. Arnold, Xianyao Chen, and Karin Blank. 2009. ON INSTANTANEOUS FREQUENCY. *Advances in Adaptive Data Analysis* 1, 2: 177–229. https://doi.org/10.1142/S1793536909000096

Others:

- K.C. Arnold. **AI and Writing: Do we speak the words of stochastic parrots?**. *Journal and Proceedings of the Association of Christians in the Mathematical Sciences*, 2022.
- K.C. Arnold and K.Z. Gajos. **Effective Interactions for Personalizing Spatial Visualizations of Collections**. *UIST 2015*.
- K.C. Arnold and H. Lieberman. **Embracing Ambiguity**. *FSE/SDP Workshop on the Future of Software Engineering Research*, 2010.
- K.C. Arnold and H. Lieberman. **Scruffy Cross-Domain Inference**. *AAAI Fall Symposium on Common Sense Knowledge*, 2010.
- J.B. Alonso, K.C. Arnold, and C. Havasi. **Envisioning a Robust, Scalable Metacognitive Architecture Built on Dimensionality Reduction**. *AAAI-10 Workshop on Metacognition for Robust Social Systems*, 2010.

- C. Havasi, R. Speer, K.C. Arnold, H. Lieberman, J. Alonso, J. Moeller. **Open Mind Common Sense: Crowd-sourcing for Common Sense**. *AAAI-10 Workshop on Collaboratively-Built Knowledge Sources and Artificial Intelligence*, 2010.
- K.C. Arnold **Reusing Code by Reasoning About its Purpose**. Master's thesis, MIT, 2010.
- D. Smith and K.C. Arnold. **Learning hierarchical plans by reading simple English narratives**. *Commonsense Workshop at the ACM International Conference on Intelligent User Interfaces (IUI)*, 2009.

Indicates *undergraduate student researcher.

Talks and Other Publications

- "Does Data + Math = AI?" talk at Calvin Mathematics/Statistics Colloquium, February 2024
- "Redeeming the Parrots: Using Language Models Responsibly." Annual meeting of American Scientific Affiliation (professional society of Christians in science), Toronto CA, July 2023. Three student researchers contributed to the presentation and presented more details at a pre-conference workshop.
- Organized and led a one-day faculty development workshop on generative AI and Christian faith, May 2023
- Panelist at Calvin Philosophy Club roundtable discussion on AI, February 2023
- "ChatGPT is not Magic" talk at a Grand Rapids-area professional meetup ("Big Data Ignite"), January 2023
- "AI and Writing: Laziness or Thoughtfulness?" talk at Association of Christians in the Mathematical Sciences (ACMS) conference, June 2022
- Ceballos-Zapata, Abraham, Arnold, K.C., and *McCallion, Emma, "Future Visions in Language Pedagogy", talk at Calvin World Languages Forum, Spring 2021
- Kenneth C. Arnold. *Faithful Text Prediction*. Christian Courier, September 13, 2021.
- J. Nathan Matias, Lydia Manikonda, Scott Hale, Kenneth C. Arnold. Artificial Intelligence in Christian Thought and Practice https://medium.com/ai-and-christianity/artificial-intelligence-in-christian-thought-and-practice-20ec8635a94f. 2017

Software, Prototypes, and Teaching Demos

Click the links below:

- Writing Tools Prototypes (https://huggingface.co/spaces/kcarnold/writing-prototypes):
  - **Rewrite with Predictions**: re-imagines the chatbot interface as a predictive text interface
  - **Highlight Edit Locations**: shows where a model thinks you should edit your text
- ReLU interactive show preview, open in Colab
- Softmax / Cross Entropy
- Next-Token Distribution Visualization for seq2seq translation models
- Moodle-Palette:
  - a keyboard-based interface for Moodle
  - a playground for incorporating privacy-sensitive AI into instructors' workflows
- zylabs-libs: a collection of Python shim code to help instructors develop ZyLabs questions that give students better feedback

- Calgen: a tool for helping instructors (and eventually students) import their course schedules into their calendars
- Channel Mover: a Streamlit app for moving channels around on a Behringer X32 soundboard.
- Nanomixer: A digital audio mixer, with ADAT I/O and processing on FPGA and web-based control

Patents

From my internship at Microsoft Research:

Interactive context-based text completions. Kenneth C. Arnold, Kai-Wei Chang, Adam Tauman Kalai. (US20180101599A1, pending).

From my internship at IBM (all list inventors as: Jacob C. Albertson, Kenneth C. Arnold, Steven D. Goldman, Michael A. Paolini, Anthony J. Sessa):

Controlling resource access based on user gesturing in a 3D captured image stream of the user. (US7971156 issued Jun, 28 2011).

Informing a user of gestures made by others out of the user's line of sight. (US7725547 issued May, 25 2010).

Tracking a range of body movement based on 3D captured image streams of a user. (US7840031 issued Nov, 23 2010).

Warning a vehicle operator of unsafe operation behavior based on a 3D captured image stream. (US7792328 issued Sep, 7 2010).

Controlling a document based on user behavioral signals detected from a 3D captured image stream. (US7877706 issued Jan 25, 2011).

Controlling a system based on user behavioral signals detected from a 3D captured image stream. (US7801332 issued Sep, 21 2010).

Warning a user about adverse behaviors of others within an environment based on a 3D captured image stream. (US8269834 issued Sep 18, 2012).

Adjusting a consumer experience based on a 3D captured image stream of a consumer response. (US8295542 issued Oct 23, 2012).

Teaching

Calvin University — Grand Rapids, MI
Assistant Professor — Aug 2019–present

Courses taught:
- CS 108 *Introduction to Computing*
- CS 106 *Introduction to Scientific Computing and Modeling*
- DATA 202 *Data Wrangling and Predictive Analytics*
- DATA 303 *Applied Modeling and Visualization*
- CS 375 *Artificial Intelligence* and CS 376 *Machine Learning* (formerly CS 344)
- CS 300 *Human-Computer Interaction*
- INFO 602 *Predictive Analytics*
- DATA 501 *Data Wrangling*
- informal "bootcamp" on deep learning and web development technology
- Senior Project mentoring
- Assisted in developing online Masters in Data Science program

CS 109A: Introduction to Data Science — Harvard University
Teaching Fellow (with Pavlos Protopapas and Kevin Rader) — Fall 2018

CS 282r: Decision-Making Under Uncertainty — Harvard University
Teaching Fellow (with Prof. Finale Doshi-Velez) — Spring 2015

CS 179: Design of Usable Interactive Systems — Harvard University
Teaching Fellow (with Prof. Krzysztof Z. Gajos) — Spring 2013

CS 314: Computer Organization — Cornell University
Head Consultant (with Prof. Sally A. McKee) — Spring 2006

Johns Hopkins Center for Talented Youth — St. Mary's City, MD USA
Computer Science Teaching Assistant — Summer 2005

Work Experience

Calvin University — Grand Rapids, MI
Assistant Professor — Aug 2019–present

Microsoft Research New England — Cambridge, MA USA
Research Internship — Fall 2015

Luminoso — Cambridge, MA USA
Co-founder, Researcher, Developer — 2011 and Summer 2013

MIT Media Lab — Cambridge, MA USA
Research Assistant — August 2007–August 2011

IBM — Austin, TX USA
Extreme Blue Intern — Summer 2006

NASA Goddard Space Flight Center — Greenbelt, MD USA
Nonlinear Signal Analysis Research Programmer — Summer 2003 and 2004

Mentoring

- Undergraduate Summer Researchers: 2020 (2 students), 2022 (4 students), 2023 (7 students), 2024 (4 students)
- Computer Science Senior Projects: 2024–25 (4 students across 3 projects), 2023–24 (2 students), 2022–23 (2 students), 2021–22 (7 students split into 2 projects), 2020–21: (2 students), 2019–20 (1 student)
- Academic advising: 30–40 students per year

Reviewing

- Technology, Mind, and Behavior (2024)
- Transactions on Intelligent Interactive Systems (2024)
- Nature Human Behaviour (2024)
- ACM Technical Symposium on Computer Science Education (SIGCSE TS) (2023)
- ACM SIGCHI Conference on Computer-Supported Cooperative Work & Social Computing (CSCW) (2022)
- Workshop on Intelligent and Interactive Writing Assistants (2022, 2023)
- Transactions on Computer-Human Interaction (ACM ToCHI) (2021)
- NSF Improving Undergraduate STEM Education (IUSE) Panelist (2021)
- ACM CHI conference on Human Factors in Computing Systems (2012, 2017, 2018, 2019, 2020, 2021, 2025)

- ACM Conference on Intelligent User Interfaces (2012, 2014, 2025) (Awarded "Special recognition" for CHI 2017 reviewing.)
- ACM Symposium on User Interface Software and Technology (UIST) (2020)
- IEEE Intelligent Systems (2012)
- Journal of Statistics Education (JSE) (2020)
- International Journal of Christian Education (IJCE) (2023).

Memberships

- Association for Computing Machinery
  - ACM SIGCSE Special Interest Group for Computer Science Education
  - ACM SIGCHI Special Interest Group on Computer-Human Interaction
- American Scientific Affiliation (professional society of Christians in science)

Miscellaneous

- **Languages**: Spanish (intermediate), Haitian Creole (beginner), Arabic (beginner)
- New City Fellowship church (Grand Rapids): lead of tech team (sound reinforcement, livestream video production), piano, singing in choir (2020–present)
- Citylife Presbyterian Church (Boston): sound reinforcement, video production, operations and logistics, diaconal service (2011–2019)
- Indigitous Global Hackathon for Christian Missions, Boston site (2016): organizer
- **Student group leadership**: Harvard Aikido club, MIT Graduate Christian Fellowship, MIT Cross Products (a cappella group)
- Teaching with MIT's Educational Studies Program (2007, 2010).
- Teaching with Clubes de Ciencia Ensenada, Summer 2016: Deep Learning and Remote Sensing
- **Student Volunteer**: CHI 2014