

## Kenneth C. Arnold

Assistant Professor of Computer Science and Data Science  
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## Research Interests

**AI should help people think better about (and with) other people.** I design and study interactive AI for *thoughtful written communication* and for *teaching and learning*.

## Institutions

### Calvin University

Assistant Professor (soon to be Associate)

**Research:** AI for thoughtful writing, teaching, and learning

Grand Rapids, MI  
since August 2019

### Harvard University

*Ph.D., Computer Science*

**Research:** Impacts of Predictive Text on Writing Content

**Advisor:** Krzysztof Z. Gajos, Intelligent Interactive Systems group

Cambridge, MA USA  
May 2020

### Massachusetts Institute of Technology

*S.M., Media Arts and Sciences (MIT Media Lab)*

**Research:** natural-language code search, commonsense reasoning

**Advisor:** Henry Lieberman, Software Agents Group, MIT Media Lab

Cambridge, MA USA  
February 2010

### Cornell University

*B.S., Electrical and Computer Engineering, magna cum laude*

Ithaca, NY USA  
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.

## Publications

\*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> (*non-archival*)

**Kenneth C. Arnold**. **2023**. AI and Writing: Do we speak the words of stochastic parrots?. In *Journal and Proceedings of the Association of Christians in the Mathematical Sciences*. <https://acmsonline.org/wp-content/uploads/2023/05/journal-and-proceedings-2023.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> (*non-archival*)

**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, Kai-Wei Chang, and Adam T Kalai. **2017**. Learning to Suggest Phrases. In *AAAI Workshop on Human-Centered AI. (non-archival)*
- 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>
- Kenneth C. Arnold and Krzysztof Z. Gajos. **2015**. Effective Interactions for Personalizing Spatial Visualizations of Collections. In *Adjunct Proceedings of the 28th Annual ACM Symposium on User Interface Software & Technology*. <https://doi.org/10.1145/2815585.2815727> (non-archival)
- 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>
- Norden E. Huang, Zhaohua Wu, Steven R. Long, Kenneth C. Arnold, Xian Yao Chen, and Karin Blank. **2009**. On Instantaneous Frequency. *Advances in Adaptive Data Analysis* 1, 2: 177–229. <https://doi.org/10.1142/S1793536909000096>
- 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>
- Others:
- 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* <<https://www.christiancourier.ca/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) <<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
- [Softmax / Cross Entropy](https://observablehq.com/@kcarnold/softmax) interactive explanation <<https://observablehq.com/@kcarnold/softmax>>
- [Next-Token Distribution Visualization](https://huggingface.co/spaces/kcarnold/next-token) <<https://huggingface.co/spaces/kcarnold/next-token>> for seq2seq translation models
- [Moodle-Palette](https://github.com/kcarnold/Moodle-Palette) <<https://github.com/kcarnold/Moodle-Palette>>:
  - a keyboard-based interface for the Moodle LMS
  - a playground for incorporating privacy-sensitive AI into instructors' workflows
- [zylabs-lib](https://github.com/kcarnold/zylabs-lib) <<https://github.com/kcarnold/zylabs-lib>>: a collection of Python shim code to help instructors develop ZyLabs questions that give students better feedback
- [Calgen](https://github.com/kcarnold/calgen) <<https://github.com/kcarnold/calgen>>: a tool for helping instructors (and eventually students) import their course schedules into their calendars

- Livethon <<https://github.com/kcarnold/livethon>>: Python in browser for in-class live coding, emphasizing comparisons between code. Uses: meteor, pyodide, ace.
- Textrec <<https://github.com/kcarnold/textrec>>: software for running experiments on text recommendations (custom mobile keyboard, NLP backend, experiment management and analysis infrastructure)
- Counterfactual Language Model Learning <<https://github.com/kcarnold/counterfactual-lm>>: Code and data for counterfactual language model learning from implicit writer feedback (for the IJCNLP paper) – an early example of reinforcement learning from human feedback (RLHF)
- Channel Mover <<https://github.com/kcarnold/channel-mover>>: a Streamlit app for moving channels around on a Behringer X32 soundboard.
- Nanomixer <<https://github.com/nanomixer/nanomixer>>: A digital audio mixer, with ADAT I/O and processing on FPGA and web-based control (Verilog, Python, TCL, HTML/CSS/JavaScript, and a custom DSP assembly language)

## Press and Media

- (2023-09-11) AI Will Shape Your Soul <<https://www.christianitytoday.com/ct/2023/october/artificial-intelligence-robots-soul-formation.html>>. Christianity Today.
- (2019-08-12) How ‘smart’ email could change the way we talk <<https://www.bbc.com/future/article/20190812-how-ai-powered-predictive-text-affects-your-brain>>. BBC Future.

## 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

Assistant Professor

Grand Rapids, MI

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

*Teaching Fellow (with Pavlos Protopapas and Kevin Rader)*

Harvard University

Fall 2018

### CS 282r: Decision-Making Under Uncertainty

*Teaching Fellow (with Prof. Finale Doshi-Velez)*

Harvard University

Spring 2015

### CS 179: Design of Usable Interactive Systems

*Teaching Fellow (with Prof. Krzysztof Z. Gajos)*

Harvard University

Spring 2013

### CS 314: Computer Organization

*Head Consultant (with Prof. Sally A. McKee)*

Cornell University

Spring 2006

### Johns Hopkins Center for Talented Youth

*Computer Science Teaching Assistant*

St. Mary's City, MD USA

Summer 2005

## Work Experience

### Calvin University

Assistant Professor

Grand Rapids, MI

Aug 2019–present

### Microsoft Research New England

Research Internship

Cambridge, MA USA

Fall 2015

### Luminoso

Co-founder, Researcher, Developer

Cambridge, MA USA

2011 and Summer 2013

### MIT Media Lab

Research Assistant

Cambridge, MA USA

August 2007–August 2011

### IBM

Extreme Blue Intern

Austin, TX USA

Summer 2006

### NASA Goddard Space Flight Center

Nonlinear Signal Analysis Research Programmer

Greenbelt, MD USA

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. Scope includes course selection as well as broader considerations (e.g., portfolios, internships, research projects).

An incomplete list of Calvin undergraduate students who participated substantially in research:

#### **2022-24**

- Jiho Kim
- Ray C. Flanagan

#### **2024**

- Daniel Kim
- Daniel Kwon
- Hannah Yoo
- Jason Chew

#### **2023**

- Edom A. Maru
- Noelle E. Haviland
- Saron Melesse
- Souad N. Yakubu
- ZeAi Sun

#### **2023-24**

- Connor Broekhuizen
- Matthew Van Harn

#### **2022**

- Ael Lee
- Gwendolyn Fulkerson
- Lexi Sharp
- Lucia Skuldt

#### **2020-21**

- April M. Volzer
- Emma McCallion
- Hyechan Jun
- Noah G. Madrid

## **University Service**

- 2019-present: Data Science program steering committee
  - Undergraduate program development
  - Graduate program development
  - Faculty recruiting and hiring
- 2021-present: Computer Science department facilities committee
- 2024-present: Calvin University Gender Equity Committee
- 2024-present: Calvin University AI in the Classroom Task Force

## **Conference and Journal Reviewing**

When appropriate, I often invite students to contribute their perspectives to my reviews.

### **Journals**

- Technology, Mind, and Behavior (2024)
- Transactions on Intelligent Interactive Systems (2024)
- Nature Human Behaviour (2024)
- Transactions on Computer-Human Interaction (ACM ToCHI) (2021)
- IEEE Intelligent Systems (2012)
- Journal of Statistics Education (JSE) (2020)
- International Journal of Christian Education (IJCE) (2023).

### **Conferences**

- ACM Technical Symposium on Computer Science Education (SIGCSE TS) (2023)
- ACM SIGCHI Conference on Computer-Supported Cooperative Work & Social Computing (CSCW) (2022)
- ACM CHI conference on Human Factors in Computing Systems (2012, 2017, 2018, 2019, 2020, 2021, 2025) (Awarded “Special recognition” for CHI 2017 reviewing.)
- ACM IUI Conference on Intelligent User Interfaces (2012, 2014, 2025)
- ACM Symposium on User Interface Software and Technology (UIST) (2019, 2020)

### **Workshops**

- Workshop on Intelligent and Interactive Writing Assistants (2022, 2023)

## Other

- NSF Improving Undergraduate STEM Education (IUSE) Panelist (2021)

## Professional Organization 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)
- **Programming Languages:** have taught or work daily in Python, JavaScript/TypeScript, R, SQL, Java, HTML/CSS; have worked in many others.
- 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