ZACHARY EBERHART

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EDUCATION

Ph.D. | University of Notre Dame |Notre Dame, IN   *Spring 2023 (Expected)*
Computer Science and Engineering
      Thesis Title: Enabling Dialogue Systems for On-Demand Software Documentation
      Advisor: Collin McMillan, Ph.D.
      Committee: Jane Cleland-Huang, Ph.D., Ron Metoyer, Ph.D., Reid Holmes, Ph.D.

M.S. | University of Notre Dame |Notre Dame, IN   *Spring 2021*
Computer Science and Engineering

B.A. | Colorado College |Colorado Springs, CO   *Spring 2017*
Major in Chemistry, Minor in Computer Science, *cum laude*

RESEARCH EXPERIENCE

My research focuses on the application of **natural language processing** to **software engineering tasks**, including **conversational API search**, **source code summarization**, and **virtual assistants** for developers.

Department of Computer Science and Eng. | University of Notre Dame | Notre Dame, IN   *2017 - Present*
Doctoral thesis research conducted with Dr. Collin McMillan
- Trained dialogue policies for conversational API search using reinforcement learning. Demonstrated that policies trained with a user simulator significantly outperformed handcrafted policies
- Built an encoder-decoder model to classify and extract summaries from source code comments using an annotated dataset of 100k function/comment pairs from open-source projects
- Developed an approach to generate clarifying questions for query refinement in source code search, increasing engagement and decreasing search duration relative to a keyword recommendation baseline
- Designed 6 custom web interfaces to conduct empirical user studies

Department of Chemistry and Biochemistry | Colorado College | Colorado Springs, CO   *2017*
Undergraduate capstone thesis research conducted with Dr. Sally Meyer
- Created a diffusion quantum Monte Carlo simulator to solve the Schrödinger equation for 1-D systems

TEACHING EXPERIENCE

Teaching Assistant | University of Notre Dame | Notre Dame, IN   *Spring 2021, Spring 2022*
Course: Dialogue Systems (undergraduate), taught by Dr. Collin McMillan

Student Mentor | Illinois School for the Visually Impaired| Jacksonville, IL   *Fall 2018*
Mentored high school seniors on semester-long CS projects using accessibility-oriented technology

Teaching Assistant | University of Notre Dame | Notre Dame, IN   *Spring 2018*
Course: Data Structures (undergraduate), taught by Dr. Dhreya Kumar

Teaching Assistant | University of Notre Dame | Notre Dame, IN   *Fall 2017*
Course: Database Concepts (undergraduate), taught by Dr. Tim Weninger

Teaching Assistant | Colorado College | Colorado Springs, CO   *Spring 2016*
Course: Computer Organization (undergraduate), taught by Dr. Ben Ylvisaker

REFEREED PUBLICATIONS

JOURNAL ARTICLES:

Eberhart, Zachary, Aakash Bansal, and Collin McMillan. "A Wizard of Oz Study Simulating API Usage Dialogues with a Virtual Assistant." IEEE Transactions on Software Engineering, Accepted. (2020).

CONFERENCE PROCEEDINGS:

Eberhart, Zachary, and Collin McMillan. "Generating Clarifying Questions for Query Refinement in Source Code Search." In Proceedings of the 29th IEEE International Conference on Software Analysis, Evolution and Reengineering (SANER), Preprint. IEEE, 2022.

Eberhart, Zachary, and Collin McMillan. "Dialogue Management for Interactive API Search." In Proceedings of the 37th International Conference on Software Maintenance and Evolution (ICSME), pp. 274-285. IEEE, 2021.

Bansal, Aakash, **Zachary Eberhart**, Lingfei Wu, and Collin McMillan. "A Neural Question Answering System for Basic Questions about Subroutines." In Proceedings of the 28th International Conference on Software Analysis, Evolution and Reengineering (SANER), pp. 60-71. IEEE, 2021.

Wood, Andrew, **Zachary Eberhart**, and Collin McMillan. "Dialogue Act Classification for Virtual Agents for Software Engineers during Debugging." In Proceedings of the 42nd International Conference on Software Engineering Workshops, pp. 462-469. IEEE/ACM, 2020.

Stapleton, Sean, Yashmeet Gambhir, Alexander LeClair, **Zachary Eberhart**, Westley Weimer, Kevin Leach, and Yu Huang. "A human study of comprehension and code summarization." In Proceedings of the 28th International Conference on Program Comprehension (ICPC), pp. 2-13. IEEE, 2020.

Eberhart, Zachary, Alexander LeClair, and Collin McMillan. "Automatically extracting subroutine summary descriptions from unstructured comments." In Proceedings of the 27th International Conference on Software Analysis, Evolution and Reengineering (SANER), pp. 35-46. IEEE, 2020.

Wang, Daheng, Meng Jiang, Qingkai Zeng, **Zachary Eberhart**, and Nitesh V. Chawla. "Multi-type itemset embedding for learning behavior success." In Proceedings of the 24th International Conference on Knowledge Discovery & Data Mining (KDD), pp. 2397-2406. ACM, 2018.

LeClair, Alexander, **Zachary Eberhart**, and Collin McMillan. "Adapting neural text classification for improved software categorization." In Proceedings of the 34th International Conference on Software Maintenance and Evolution (ICSME), pp. 461-472. IEEE, 2018.

PRESENTATIONS

RESEARCH TALKS – EXTERNAL:

Int. Conference on Software Maintenance and Evolution | Luxembourg City (Virtual)   *September 2021*
Title: Dialogue Management for Interactive API Search

Int. Workshop on Realizing Artificial Intelligence Synergies in S.E. | Seoul (Virtual)   *July 2020*
Title: Dialogue Act Classification for Virtual Agents for Software Engineers during Debugging

Int. Conference on Software Analysis, Evolution and Reengineering | London, Ontario   *February 2020*
Title: Automatically Extracting Subroutine Summary Descriptions from Unstructured Comments

Int. Conference on Software Analysis, Evolution and Reengineering | London, Ontario   *February 2020*
Title: Enhancing Source Code Refactoring Detection with Explanations from Commit Messages
(Presented on behalf of Rrezarta Krasniqi and Dr. Jane Cleland-Huang)

RESEARCH TALKS – INTERNAL:

Notre Dame Natural Language Plus Working Group| Notre Dame, IN   *October 2021*
Title: Dialogue Management for Interactive API Search

Notre Dame CSE Seminar Series| Notre Dame, IN   *September 2021*
Title: Dialogue Systems for On-Demand Software Documentation

UNIVERSITY SERVICE

Graduate Student Government | University of Notre Dame | Notre Dame, IN   *2022-Present*
Vice President

Graduate Student Government | University of Notre Dame | Notre Dame, IN   *2020-2022*
Social Committee Chair

Graduate Student Orientation Committee | University of Notre Dame | Notre Dame, IN   *2021*
Committee Member

Society of Schmitt Fellows | University of Notre Dame | Notre Dame, IN   *2017-Present*
Committee Member

HONORS AND AWARDS

Arthur J. Schmitt Leadership Fellowship in Science and Engineering | Univ. of Notre Dame   *2017-Present*
Full tuition scholarship and annual $35,000 stipend awarded to 7 of 113 CS Graduate Students

Dean's List | Colorado College   *2016-2017*
Honor awarded to students with a minimum GPA of 3.75

OTHER PROFESSIONAL EXPERIENCE

IT Technician | Colorado Hi-Tech Solutions | Colorado Springs, CO   *2014-2017*
- Performed data entry, reception, and technical support, digitizing over 3 decades of financial records
- Transported and set up medical office workstations

CREATIVE WORKS

Mystery Wizard!? | GMT Games   *Awaiting Publication*
An asymmetrical strategy board game about spell slingers and sand witches
- Currently in development at GMT Games with >600 preorders
- Created game concept and developed unique capture-the-flag-style spell-slinging gameplay
- Designed playable wizard characters each with unique abilities (spells, companions, traps, etc.)
- Created orthogonal questing mechanic to earn equipment and one-time-use spells
- Wrote and edited rulebook, card text, wizard descriptions, and anything else with words
- Directed visual style, creating artwork for the characters, cards, boards, and anything else that is visible
- Ran playtest groups and iterated upon the game's design based on player feedback

Ghost in the Cell | GhostInTheCell.io   *2020*
A cooperative deduction game for the web written in JavaScript and Python
- Created, developed and deployed the game's SPA frontend and Flask backend
- Adapted existing mechanics from the deduction board game "Mysterium" for remote play
- Added feature allowing users to upload custom images to replace suspects and clues

TSŪKU | Google Play Store   *2019*
An abstract strategy game for Android devices developed with React Native
- >1000 downloads on Google Play