Hannah K. Bako | PhD Student

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Research Interests

Empirical Studies of Visualization Design and Prototyping, Low-Code Visualization Authoring Tools, Human-Computer Interaction, Design, Designer Mental Models and Processes, Program Synthesis and Generation.

Education

University of Maryland — **College Park, MD**
Doctor of Philosophy, Computer Science — *2019-Present*
Advised by Dr. Zhicheng (Leo) Liu

Stevens Institute of Technology — **Hoboken, NJ**
Master of Science, Software Engineering — *2017–2019*

Babcock University — **Ogun, NG**
Bachelor of Science, Computer Information Systems — *2011–2015*

Experience

Research

University of Maryland — **College Park, MD**
Research Assistant, Advised by: Zhicheng Liu — *Fall 2021–Present*

- **Supporting Example-Aided Visualization Design**: Investigating how to support the design of diverse data visualizations based on existing exemplar designs.
  - Current work on leveraging Generative AI to support the generation of design candidates based on existing example designs.
  - Conducted an exploratory experiment to quantitatively measure what factors modulate the influence examples have on design outcomes. We derive metrics to measure idea transfer and reveal factors not considered in prior literature. (Target, VIS'24)
  - An Interview with data visualization designers to understand their example usage practices. We contribute techniques designers use to extract ideas from examples unsupported by current visualization authoring tools.(VIS'22 Paper).

University of Washington — **Seattle, WA**
Research Assistant, Advised by: Leilani Battle — *Fall 2019–Fall 2023*

- **Understanding Designers Decomposition Strategies**: Conducted a qualitative analysis investigating the code organizational patterns of D3 users toward developing techniques to decompose D3 code into composable code structures automatically. (Target: VIS'24)
- **Automated Development Environment for Rapid Visualization Authoring in D3**: Investigated techniques and approaches used by D3.js users to create interactive visualizations on the internet. Developed *Mirny*, a web-based tool using **Flask and React** to support visualization prototyping using a **Markov Decision Model** to power interaction recommendation and **AST transformations** to facilitate code generation and augmentation. (IUI'23, VIS'22)

Industry

Salesforce/Tableau — **Seattle, WA**
User Research Intern, Mentor: Bruce Phillips — *May 2022– Aug 2022*

- Performed analysis on user telemetry. Discovered key insights on the unmet needs of business users and provided guidelines to help direct product development.

Apple — **Cupertino, CA**
Design & Visualization Intern, Mentor: Donghao Ren — *May 2021– Aug 2021*

- Collaborated with broader teams across Apple to research and develop APIs for SwiftChart, a powerful SwiftUI framework for transforming data into informative visualizations.

Systems Engineering Research Center (SERC) — **Hoboken, NJ**
Graduate Assistant — *Sept 2017–May 2019*

- Developed a web-based data collection and processing tool for the World Wide Directory using Flask, Python, and SQL.
- Improved SERC website user experience by redesigning the site pages (HTML & CSS).
- Reduced data maintenance cost by introducing effective data management measures.

Teaching

University of Maryland — **College Park, MD**
Teaching Assistant — *Fall 2019– Spring 2023*

- CMSC 471: Introduction to Data Visualization
- CMSC 434: Introduction to Human-Computer Interaction
- CMSC 433: Programming Technologies and Paradigms
- CMSC 320: Introduction to Data Science

Publications

Unveiling how Examples Shape Data Visualization Design Outcomes — *Under Review*
Hannah K. Bako, Xinyi Liu, Grace Ko, Hyemi Song, Leilani Battle and Zhicheng Liu

User-Driven Support for Visualization Prototyping in D3 — *ACM IUI 2023*
Hannah K. Bako, Alisha Varma, Anuoluwapo Faboro, Mahreen Haider, Favour Nerrise, Bissaka Kenah, John P. Dickerson, and Leilani Battle

Understanding how Designers Find and Use Data Visualization Examples — *IEEE VIS 2022*
Hannah K. Bako, Xinyi Liu, Leilani Battle, and Zhicheng Liu

Streamlining Visualization Authoring in D3 Through User-Driven Templates — *IEEE VIS 2022*
Hannah K. Bako, Alisha Varma, Anuoluwapo Faboro, Mahreen Haider, Favour Nerrise, Bissaka Kenah, and Leilani Battle

Tweets and Social Network Data for Twitter Bot Analysis — *SBP-BRiMS 2021*
Jennifer Golbeck, Niloofarsadat Alavi, **Hannah K. Bako**, Saptarashmi Bandyopadhyay, Calvin Bao, et al.

Awards

2023: Special Recognition for Outstanding Reviews (IEE VIS, ACM CHI)
2023: UMD Summer Research Fellowship ($5,000)
2023: NSF Travel Grant
2022: CRA-WP Grad Cohort for Women Workshop Fellowship
2019 - 2020: Dean's Fellowship, University of Maryland
2015: Eagle Leadership award

Mentorship

Fall 2022–Present: *Arshnoor Buthai*, Undergraduate Student, working on current projects.
Fall 2022–Spring 2024: *Xinyi Liu*, MSc student, worked on "Example Aided Visualization Design" project.
Fall 2022–Spring 2023: *Grace Ko*, Undergraduate student, worked on "Example Aided Visualization Design" project.
Spring 2020–Summer 2022: *Alisha Varma*, Undergraduate Student, worked on "User-Driven Support..." project.
Fall 2021–Summer 2022: *Bissaka Kenah*, Undergraduate student, worked on "User-Driven Support..." project.
Spring 2020–Fall 2021: *Anuoluwapo Faboro*, Undergraduate student, worked on "User-Driven Support..." project.
Spring 2021: *Favor Nerrise*, Undergraduate student, worked on "User-Driven Support..." project.
Spring 2020–Summer 2021: *Mahreen Haider*, Undergraduate Student, worked on "User-Driven Support..." project.

Service

2023-2024: Reviewer IEEE VIS, Reviewer ACM CHI
2023: Student volunteer at the ACM IUI Conference
2022: Reviewer ACM conference on Creativity & Cognition
2021: Student volunteer at the IEEE VIS Conference
2020: Student volunteer at the Very Large Databases Conference(VLDB)
2019: Student volunteer at the Conference on Systems Engineering (CSER)
2015: Served as Financial Secretary on the 2015 Babcock University graduating class executives