HANNAH K. BAKO

Website: hannahbako.github.io ◇ Email: hbako@cs.umd.edu

RESEARCH INTERESTS

My research is broadly focused on understanding how individuals conceptualize visualization designs and developing tools that leverage emergent technologies to improve the visualization generation and implementation process. Particularly, I focus on example-aided visualization design, i.e., the process of identifying, synthesizing, and implementing design ideas extracted from existing design artifacts.

EDUCATION

University of Maryland — **College Park, MD**
PhD. in Computer Science (Advisor: Zhicheng Liu) — *May 2025 (expected)*

Stevens Institute of Technology — **Hoboken, NJ**
M.Sc. in Software Engineering — *May 2019*

Babcock University — **Ogun, Nigeria**
B.Sc. in Computer Information systems — *June 2015*

PROFESSIONAL AND RESEARCH EXPERIENCE

Graduate Researcher — **Human Data Interaction Lab**
University of Maryland — *Aug 2021 - Present*
Example-aided data visualization design and generation.
Investigating how to support the design of diverse data visualizations based on existing visualization artifacts. Conducted empirical studies to identify and measure the factors that influence how designers find and use examples. Developing tools that leverage generative AI to generate diverse design candidates based on natural language queries.

Graduate Researcher — **BAttle Data (BAD) Lab**
University of Maryland — *Aug 2019 - Dec 2023*
Automated support for programmatically implementing data visualizations.
Conducted a qualitative analysis of the techniques and approaches used by D3.js users to create interactive visualizations. Created Mirny, a web-based tool leveraging Flask and React to support visualization prototyping. Integrated a Markov Decision Model (MDP) to provide interaction recommendations and Abstract Syntax Tree (AST) transformations to facilitate code generation and augmentation.

User Research Intern — **SalesForce/Tabeau**
Mentor: Bruce Phillips — *Summer 2022*
Performed analysis on user telemetry. Discovered key insights on the unmet needs of business users and provided guidelines to help direct product development.

Design and Visualization Intern — **Apple**
Mentor: Donghao Ren — *Summer 2021*
Collaborated with broader teams across Apple to research and develop APIs for SwiftChart, a powerful SwiftUI framework for transforming data into informative visualizations.

Graduate Assistant — **Systems Engineering Research Center**
Sep 2017 - May 2019
Developed a web-based data management, collection, and processing tool for the World Wide Directory of System Engineering programs.

AWARDS AND RECOGNITION

Fellowships

UMD Summer Research Fellowship ($5000)	*2023*
NSF Travel Grant ($2850)	*2023*
CRA-WP Grad Cohort for Women Fellowship	*2022*
Dean's Fellowship, University of Maryland ($2,500)	*2019, 2020*

Service

Special recognition for outstanding reviews	*ACM CHI 2023*
Special recognition for outstanding	*IEEE VIS 2023*
Eagle Leadership Award, Babcock University	*2015*

PUBLICATIONS

Journal Papers

J2. **Unveiling how Examples Shape Data Visualization Design Outcomes** doi
H.K. Bako, Xinyi Liu, Grace Ko, Hyemi Song, Leilani Battle and Zhicheng Liu
IEEE Transactions on Visualization and Computer Graphics
Proceedings of IEEE Visualization and Visual Analytics Conference (VIS '24).

J1. **Understanding how Designers Find and Use Data Visualization Examples** doi
H.K. Bako, X. Liu, L. Battle and Z. Liu
IEEE Transactions on Visualization and Computer Graphics
Proceedings of IEEE Visualization and Visual Analytics Conference (VIS '22).

Conference Papers

C3. **Evaluating the Semantic Profiling Abilities of LLMs for NL Utterances in Data Visualization** doi
H.K. Bako, Arshnoor Bhutani, Xinyi Liu, Kwesi Cobinna, and Zhicheng Liu
Proceedings of IEEE Visualization and Visual Analytics Conference (VIS '24)

C2. **User-Driven Support for Visualization Prototyping in D3** doi
H.K. Bako, Alisha Varma, Anuoluwapo Faboro, Mahreen Haider, Favour Nerrise, Bissaka Kenah, John P Dickerson, and Leilani Battle
In Proceedings of the 28th International Conference on Intelligent User Interfaces (IUI '23)

C1. **Streamlining Visualization Authoring in D3 Through User-Driven Templates** doi
H.K. Bako, Alisha Varma, Anuoluwapo Faboro, Mahreen Haider, Favour Nerrise, Bissaka Kenah, and Leilani Battle
Proceedings of IEEE Visualization and Visual Analytics Conference (VIS '22)

Workshop Papers

W1. **Tweets and Social Network Data for Twitter Bot Analysis** link
Jennifer Golbeck, Niloofarsadat Alavi, *H.K. Bako*, Saptarashmi Bandyopadhyay, Calvin Bao, et al.
Proceedings of SBP-BRiMS 2021: International Conference on Social Computing, Behavioral-Cultural Modeling and Prediction and Behavior Representation in Modeling and Simulation.

TEACHING EXPERIENCE

Guest Lecture
Visualization Languages and Toolkits Apr 2023
CMSC 471: Introduction to Data Visualization

Teaching Assistant
CMSC 471: Introduction to Data Visualization Fall 2024, Spring 2023, Spring 2022
Graded labs, assignments, and exams, held office hours

CMSC 434: Introduction to Human-Computer Interaction Fall 2022
Provide feedback on student projects, Graded assignments and exams, held office hours

CMSC 433: Programming Technologies and Paradigms Fall 2019 - Spring 2021
Designed and graded mid-terms and finals, Held office hours

CMSC 320: Introduction to Data Science Summer 2020
Designed and graded mid-terms and finals, Held office hours

MENTORSHIP

Arshnoor Buthani, Undergrad Student, worked on C3	Fall 2022 - Present
Xinyi Liu, Masters Student, worked on J1, J2, & C3	Fall 2022 - Spring 2024
Grace Ko, Undergrad Student, worked on J2	Fall 2022 - Spring 2023
Alisha Varma, Undergrad Student, worked on C1 & C2	Spring 2020 - Summer 2022
Bisaka Kenah, Undergrad Student, worked on C1,& C2	Fall 2022 - Spring 2023
Anuoluwapo Faboro, Undergrad Student, worked on C1 & C2	Spring 2020 - Fall 2021
Mahreen Haider, Undergrad Student, worked on C1 & C2	Spring 2020 - Summer 2021
Favor Nerrise, Undergrad Student, worked on C1 & C2	Spring 2021

SERVICE

Reviewing

2024	IEEE VIS: Visualization and Visual Analytics (Short Paper)
2023	ACM Conference on Human Factors in Computing Systems (CHI)
	IEEE VIS: Visualization and Visual Analytics (Full & Short Papers)
2022	ACM Creativity & Cognition

Service

2023	ACM Intelligent User Interfaces Conference (IUI)	Student Volunteer
2021	IEEE VIS: Visualization and Visual Analytics	Student Volunteer
2020	Denson Summer Enrichment Program	Volunteer Trainer
	ACM Very Large Databases Conference (VLDB)	Student Volunteer
2019	Conference on Systems Engineering (CSER)	Student Volunteer
	African Students Association (Stevens Institute of Technology)	Founding Member
2015	Graduating Class Student Representatives (Babcock University)	Financial Secretary

PRESENTATION & TALKS

2023 **User-Driven Support for Visualization Prototyping in D3**

ACM IUI, March 31, 2023, Sydney, Australia.

2022 **Understanding how Designers Find and Use Data Visualization Examples**

IEEE VIS, October 20, 2022, Oklahoma City, Oklahoma.

Streamlining Visualization Authoring in D3 Through User-Driven Templates

IEEE VIS, October 19, 2022, Oklahoma City, Oklahoma.

2021 **Innovation or Imitation? Measuring the influence of examples on visualization design**

HCIL (Lightning Talk), October 21, 2021, Virtual.