Christopher Flathmann

Curriculum Vitae

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Education

2019–2022 **PhD, Human Centered Computing**, *Clemson University, Clemson, South Carolina*.
Advisor: **Nathan McNeese**

2018 **BS Computer Science**, *GPA: 3.89*, *Clemson University, Clemson, South Carolina*.

Work Experience

2019–Present **Clemson University** Graduate Research Assistant, **Team Research Analytics in Computational Environments (TRACE)**. Senior Lead PhD student researching human-AI teamwork in contexts from swarm intelligence to ethical decision making

2018 **Clemson University** Undergraduate Research Assistant, **Data Intensive Computing Ecosystems Lab**. Researched the effects of latency on high performance computing clusters in commercial cloud environments

2018 **Amazon** Software Development Engineer Intern, Financial Technology. Created and evaluated a system for email matching payments and responses for financial collections using AWS EC2, S3, and Lambda

2017 **Clemson University** Undergraduate Teaching Assistant for Algorithms and Data Structures in C++ for **Dr. Brian Dean.** Taught labs, held office hours for undergraduate students, and helped design and proctor programming exams.

2017 **Michelin** Software Development Engineer Intern for Research and Development. Designed software in C# to manage Agile Teams' members, software responsibilities, and skills.

Funding and Awards

2019 NSF **Technology-Human Integrated Knowledge Education and Research** Fellow

2019 Clemson **Three Minute Thesis** Finalist for the College of Computing, Engineering, and Applied Science

2017 DuPont Undergraduate Project of the Year: Smart Aiding Application for Travel Safety

Research Interests

Human-Centered Artificial Intelligence, Ethical Design of AI, Swarm Intelligence, Human-AI Teamwork, Human Control Alongside AI, Trust in AI

Current Research Projects

Human Perceptions of AI Trained on Human Derived Moral Theories
Collaborators: Nathan McNeese, Bekk Blando, Dylan Cathapermal, Casey Hird

- Implementing the ethical frameworks of Utilitarianism, Deontology, and Virtue Ethics in Reinforcement Learning and examining human preference towards agents built on each framework. Humans are tasked with collaborating with these AI agents to make ethical decisions. Human preference and influence of AI on human decision making will be evaluated.

Effects of Artificial Intelligence Aggressive Language and Behavior on Human-AI Collaboration
Collaborators: Nathan McNeese, Beau Schelble, Casey Hird

- Designing artificial agents to speak and act aggressively, such as being impatient and attempting to usurp other users work. Experiment seeking to observe if humans prefer a more active AI agent that can be viewed as combative or a passive agent that only responds to human commands.

Human-Machine Teamwork in Artificial Swarm Intelligence
Collaborators: Nathan McNeese, Geoff Musick, Lorenzo Barberis Canonico, Steve Russell

- Designing artificial agents using reinforcement learning to learn how to play hands of poker. These agents are then placed in a cooperative environment alongside well-performing humans and other agents to bet on each hand of poker cooperatively. The goal of the study is to determine the practical viability and performance of swarms when dealing with only humans, humans and AI agents, and only AI agents.

Collective Intelligence in Human-Machine Teaming
Collaborators: Lorenzo Barberis Canonico, Nathan McNeese

- Utilizing prediction markets to elicit collective intelligence in human-machine teams with the goal of enhancing human-machine performance in predictive tasks. Enhances the effectiveness of predictive markets by framing their design around human-machine teamwork. Evaluates AI's potential at being a network aggregator and a teammate using Reinforcement Learning.

Skills

Programming	Python, C#, SQL, Java, C++, R, JavaScript
Tools	Tensorflow, Tensorforce, GitHub, AWS, Node.js, Qualitrics
Research	Quantitative Analysis, Qualitative Analysis, Focus Groups, Wizard of Oz, Experiment Design

Relevant Coursework

- The Science of Teamwork and Technology
- Measurement and Evaluation of Human Centered Computing Systems
- Human Perceptions and Behaviors

- Research Methods for Human Centered Computing
- Applied Data Science
- Artificial Intelligence
- Database Management Systems
- Smart Manufacturing

Publications

Conference Papers

[C.6] **Christopher Flathmann**, Beau Schelble, Brock Tubre, Nathan McNeese, and Paige Rodoghero. Accepted. Invoking Principles of Groupware to Develop and Evaluate Present and Future Human-Agent Teams. In *Proceedings of the 8th International Conference on Human-Agent Interaction (HAI '20), November 10–13, 2020, Virtual Event, NSW, Australia.* ACM, New York, NY, USA

[C.5] Schelble, B., McNeese, N. & **Flathmann, C.**,(Accepted). Accepted. Towards Meaningfully Integrating Human-Autonomy Teamingin Applied Settings. In *Proceedings of the 8th International Conference on Human-Agent Interaction (HAI '20), November 10–13, 2020, Virtual Event, NSW, Australia.* ACM, New York, NY, USA

[C.4] Musick, G., Maloney, D., **Flathmann, C**, McNeese, N., Walton, J. (Accepted) Differentiated Instruction further Realized through Teacher-Agent Teaming. *2020 Annual Metting of Human Factors and Ergonomics Society.* Seattle, WA. Sage CA: Los Angeles, CA: SAGE Publications

[C.3] **Flathmann, C.**, McNeese, N., & Barberis Canonico, L. Using Human-Agent Teams to Purposefully Design Multi-Agent Systems. *2019 Annual Meeting of Human Factors and Ergonomics Society.* Seattle, WA. Sage CA: Los Angeles, CA: SAGE Publications.

[C.2] Barberis Canonico, L., McNeese, N., & **Flathmann, C.** Collectively Intelligent Teams: Integrating Team Cognition, Collective Intelligence, and AI for Future Teaming. *2019 Annual Meeting of Human Factors and Ergonomics Society.* Seattle, WA. Sage CA: Los Angeles, CA: SAGE Publications

[C.1] Barberis Canonico, L., McNeese, N., & **Flathmann, C.** The Wisdom of the Market: Using Human Factors to Design Prediction Markets for Collective Intelligence. *2019 Annual Meeting of Human Factors and Ergonomics Society.* Seattle, WA. Sage CA: Los Angeles, CA: SAGE Publications.

Research Posters

[P.2] **Flathmann, C.**, Schelble, B., & McNeese, N. (2019) Creating Human-Oriented Multi-Agent Teams. *Insights @ BMW Manufacturing Co. LLC.* 12 September 2019

[P.1] **Flathmann, C.** & McNeese, N. (2019) Using Human-Agent Teams to Purposefully Design Multi-Agent Teams. *Clemson 2019 Research Symposium* 12 April 2019

Under Review

[U.2] **Flathmann, C.**, Schelble, B. & McNeese, N. (Submitted). The Need to Prioritize the Integration of Artificial Intelligence Into Multi-Cultural Human-Agent Teams *Journal of Artificial Intelligence Research*

[U.1] Schelble, B., **Flathmann, C.**, Canonico, L., & McNeese, N. (Submitted). Understanding Human-AI Cooperation Through Game-Theory and Reinforcement Learning Models *The 2020 Hawaii International Conference on System Sciences*

Works in Progress

[W.4] **Flathmann, C.**, Hird, C., McNeese, N., & Schelble, B. (In Progress). Effects of Artificial Intelligence Combative Language and Behavior on Human-AI Collaboration *International Journal of Human Computer Interaction*

[W.3] **Flathmann, C.**, Cathapermal, D., Hird, C., & McNeese, N., Canonico, L.,& Russell, S. (In Progress). Human Perceptions of AI Trained on Human Derived Moral Theories

[W.2] **Flathmann, C.**, Canonico, L., Musick, G., McNeese, N., & Russell, S. (In Progress). Human-Machine Teamwork in Artificial Swarm Intelligence

[W.1] **Flathmann, C.**, Canonico, L., & McNeese, N. (In Progress). Collective Intelligence in Human-Machine Teaming

Grant and Award Contribution

As a senior Ph.D. student in TRACE Research Group, I have had the opportunity to contribute to the writing of multiple grant and funding opportunities.

Funded Considerations of Ethical and Unethical Behavior on Trust in Human-Autonomy Teaming. AFOSR. **$586,538**

Under Review Leveraging Multi-Culturalism and Swarm Intelligence for the Development of Ethical and Fair Artificial Intelligence. National Science Foundation. **$1,248,494**

Under Review Promoting Human Interpretation and Interaction to Mitigate Bias in Artificial Intelligence Assisted Decision Aids. ONR. **$415,000**

Under Review Accessing the Interactions Between Cyber-Social and Cyber-Physical Teaming. ONR DURIP. **$320,000**

Professional Activities

Student Mentoring

Recently, I have designed and created a mentor program for **Clemson THINKER** with the goal of getting undergraduate students more involved in STEM research.

THINKER Mentor Program

Steven Russell- BS Computer Science, *Clemson University, Fall 2020 - Present*

TRACE Research Group

Casey Hird- BS Math, *Clemson University,Fall 2019 - Present*

Dylan Cathapermal- BS Computer Science, *Clemson University, Fall 2019 - Present*

Reviewing

Conferences

Human Factors and Ergonomics Society Annual Meeting (HFES), since 2020
Winter Simulations Conference (WSC), since 2020
Military Health System Research Symposium (MHSRS), since 2020