Emma Cunningham | CV

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EDUCATION

Penn State University
B.S. Cybersecurity Analytics & Operations (May 2026)

- Minor: Information Sciences & Technology
- Relevant coursework: Data Analytics, Research, Database Management (SQL), Statistical Modeling, Machine Learning, Cybersecurity Principles

TECHNICAL SKILLS

- **Languages & Tools:** Python (Panda, Matplotlib, Seaborn), SQL, React Native, MS Access
- **Data Analytics:** Statistical modeling, hypothesis testing
- **Platforms:** Visual Studio Code , Jupyter Notebook, GitHub, R Studio
- **Other:** Technical writing, research documentation, presentations, data visualization

PUBLICATIONS

1. **Explainable Data-Driven Digital Twin for Stress Management**
   Sandra Kumi, Richard K. Lomotey, Madhurima Ray, Emma Cunningham, Ralph Deters
   - Proposed a stress-management digital twin integrating machine learning, explainable AI (SHAP), and large language models to improve transparency and trust in healthcare decision support.
   - Contributed to model development, evaluation, and analysis of explainability results in healthcare digital twins.

2. **A Data-Driven Digital Twin for Student Engagement Prediction in e-Learning Systems**
   Sandra Kumi, Richard K. Lomotey, Madhurima Ray, Emma Cunningham, Stephanie Milovich, Ralph Deters IEEE World AI IoT Congress (AIIoT), 2025
   - Developed a digital twin framework to model student engagement using synthetic

data while preserving missingness patterns in LMS data.

- Demonstrated improved engagement prediction accuracy and reduced bias using synthetic data generative models and XGBoost.

3. **Blockchain-Based Access and Usage Control of Government, Educational, and Electronic Health Record Systems**
   Emma Cunningham et al.
   - Proposed a blockchain-enabled framework for fine-grained access and usage control across sensitive data domains.
   - Analyzed privacy, security, and deployment trade-offs for regulated environments including education and healthcare.
4. **Advances in Social Networks Analysis and Mining (ASONAM 2025 Proceedings)**
   - Credited contributing author in an international conference proceedings volume.
   - Recognized for research contributions in social network analysis and data-driven systems.

PERSONAL AI PROJECT

AI Agent for Discrete Mathematics-Independent Project

- Designed and implemented a custom AI agent using Visual Studio Code and OpenAI resources to support learning in a discrete mathematics course.
- Trained the agent exclusively on professor-provided coursework and class materials, ensuring strict alignment with course-specific concepts.
- Created tailored practice problems and step-by-step explanations based only on topics covered in lectures and labs.
- Focused on responsible AI use by limiting data sources, preventing overgeneralization, and avoiding external knowledge leakage.
- Used the project to explore structured reasoning, explanation quality, and AI-assisted learning in constrained educational settings.

ADDITIONAL PROJECTS

Mobile Health Application (Android & iOS)

- Developed a cross-platform mobile app for stress monitoring using React Native.
- Designed the user interface and implemented data visualizations and charts.
- Collected cross-national surveys and wearable health data from participants in Ghana and the United States.

Inventory Management Application for Local Farmers

- Built an inventory management application to help local farmers track products and stock levels.
- Designed user-friendly interfaces focused on simplicity and real-world usability.
- Supported data entry, updates, and basic reporting to improve inventory organization.

KEY STRENGTHS

- Strong background in applied research and peer-reviewed publication.
- Ability to translate complex technical concepts into clear, structured explanations.
- Experience working at the intersection of AI, privacy, and real-world systems.
- Highly self-motivated researcher with strong documentation and communication skills.