Fitzroy D. **Nembhard**

RESEARCH PROFESSIONAL · ADJUNCT PROFESSOR · IEEE SENIOR MEMBER

L3Harris Institute for Assured Information
Florida Tech
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Education

Florida Institute of Technology
PH.D. IN COMPUTER SCIENCE
Melbourne, Florida
August 2014 - July 2018

- Research Interests: mining and extracting knowledge from code repositories to improve security of programs, applying machine learning and data mining to solve cybersecurity and bioinformatics problems, data visualization
- Title of Dissertation: *A Recommender System for Improving Program Security Through Source Code Mining and Knowledge Extraction* (Advisor: Dr. Marco M. Carvalho)

Morgan State University
MASTER'S DEGREE IN BIOINFORMATICS
Baltimore, MD
2010 - 2012

- Core subjects: Biostatistics, Data Mining, Modern Research Techniques, Mathematical Modeling, Current Topics in Bioinformatics, and Supercomputing.
- Research: Processed large datasets using cluster, distributed, and parallel computing (Hadoop/MapReduce), engaged in high performance computing using Oklahoma Sooner Supercomputer and Intel Many-Core Testing Laboratory
- *Title of Thesis:* Parallel sorting of biological sequences using the Intel Concurrent Collections. *(Advisor: Dr. Vojislav Stojkovic)*

Morgan State University
BACHELOR'S DEGREE IN COMPUTER SCIENCE
Baltimore, MD
2005 - 2009

- Senior Project: *Development of a database-driven website and Content Management System*

Skills

Programming	Java, C/C++, Perl/BioPerl, Python, Fortran, SQL, CUDA, Microsoft Visual Basic (Macros), C#, LaTeX
Web Technologies	React.js (MERN stack), Spring Framework, Django with Python, HTML5/CSS, JavaScript/JQuery, PHP/Apache, ASP
Data Analytics	Jupyter, Pandas, Numpy, Dask, Apache Spark, Tableau, AWS S3, AWS DynamoDB, MySQL Workbench, Hadoop, MongoDB, Neo4j, SQL, NoSQL, ElasticSearch, Statsmodels, Bokeh/Plotly, Matplotlib/Seaborn, NLTK
Machine Learning	Scipy, Sci-kit Learn, ML-extend
Workflows/Automation	Microsoft Power Automate, SharePoint, Microsoft Forms

Experience

L3Harris Institute for Assured Information, Florida Tech
ADJUNCT FACULTY AND RESEARCH PROFESSIONAL
Melbourne, FL
December 2018 - Present

- Developed and managed complex automated workflows using Microsoft Power Automate and SharePoint to streamline curriculum requests and approvals including creation and closure of and making changes to courses, programs, facilities, etc, and interfacing requested changes with third-party databases and systems.
- Created or revised curriculum for several courses by adding state-of-the-art components including the use of AWS Academy and Amazon PaaS (AWS EC2, EMR, S3, DynamoDB, etc.) and modern, high-demand frameworks such as Apache Spark, Apache Hadoop, HDFS, Dask, Jupyter, MongoDB, etc.
- Taught several graduate and undergraduate courses including: Data Analysis Methods with Python (CIS 5400, CSE 5150), Software Metrics (SWE 5620), Web Applications (CSE 4324, CSE 5324), Big Data (CSE 4510, CSE 5310), Python Programming (CSE 1100, CSE 2050), Data Mining (CSE 4510, 5400), and Database Systems (CSE 4020, CSE 5260)
- Designed novel AI-based application that uses Google's voice assistant to assist programmers with scanning software for vulnerabilities resulting in several peer-reviewed publications
- Collaborated with faculty and published research about the formulation of software metrics for promoting high quality software development and the evaluation of agent-oriented methodologies.
- Co-designed a fast and exact algorithm for enumerating motifs/graphlets in dynamic networks that led to the publication of a research paper published in the Future of Information and Communications Conference (FICC) 2021
- Worked on team to create 2 AI-based digital twins: one system allows university personnel to use voice commands to interact with a simulation to navigate the campus and answer queries, and the other allows Palm Bay city officials to perform city operations using virtual agents

L3Harris Institute for Assured Information, Florida Tech

Melbourne, FL

GRADUATE RESEARCH ASSISTANT

August 2014 - August 2018

- Set up Hadoop cluster to process data from source code repositories for knowledge extraction
- Extracted knowledge from large source code datasets to create a recommender system to help programmers write more secure code
- Converted a file-based 3-D visualization system written in Three.js to a live streaming platform for visualizing network traffic to aid in network security as part of patented research (US8803884) sponsored by the U.S. Department of Defense.
- Engaged in designing software agents to stream high volume, live data to visualization
- Explored the use of WebGL to improve visualization performance
- Participated in research to analyze high volume malware signatures

Morgan State University

Baltimore, MD

COMPUTER SCIENCE LECTURER

July 2012 - August 2014

- Taught Computer Literacy, Technology, Human and Social Values course to over 800 undergraduate students, resulting in stellar commendation letter from department chairperson.
- Assisted in redesign of curriculum, and team-taught Scientific Visualization course to graduate students
- Assisted students in thesis writing centered on parallel computing using C++, CUDA, and MPI
- Taught students to use productivity and desktop publishing software to prepare technical reports, documents, spreadsheets, websites, and databases
- Taught programming in C++, Java and JavaScript, web development, and robotics using the Finch robot to underrepresented students

University of Illinois Data Sciences Summer Institute

Urbana-Champaign, IL

COMPUTER PROGRAMMER

May 2011 - June 2011

- Interned as programmer at Multimodal Information Access and Synthesis (MIAS) Center at the Data Science Summer Institute and created expert search engine in collaboration with the Department of Homeland Security (DHS)
- Created web crawler using Python programming language
- Preprocessed large volumes of data(13,609 documents) for 4,445 experts
- Created user interface in HTML/JQuery and led project integration to create functional search engine

Extracurricular Activity

Florida Tech

Melbourne, FL

FACULTY ADVISOR

2021-2022

- Advise 4 groups of computer science students on the design, development, and deployment of software for their senior projects

IEEE Try Engineering Together

IEEE and Cricket Media Online

EMENTOR

October 2020

- Registered eMentor to help mentor students in under-resourced communities and get them excited about STEM

Hackerthon team

Melbourne, FL

CORE MEMBER

April 2018

- Participated in Southern Data Science Hackathon 2018 (SDSC18)
- Initiated system to target homelessness through data science

House Calls on Wheels

Baltimore, MD

WEBSITE DESIGNER

2015

- Incorporated Health Records Management Software (OpenEMR) into WordPress Website on Amazon EC2
- Created a system that was designed to help doctors in Africa to set up their own practice to better assist patients

Honors & Awards

2020	**IEEE Senior Member**, Nominated to senior membership role in IEEE	*Melbourne, FL*
2019	**Third place**, RFID solution for the national IEEE 2019 RFID Mega Challenge	*Phoenix, Arizona*
2018	**Best Concept**, Florida Tech ACM Hackathon 2018	*Melbourne, FL*
2017	**Travel Award**, Dr. Elizabeth Hayes Travel Award for presentation at the 81st Meeting of Florida Academy of Sciences	*St. Petersburg, Florida*
2016	**Study.com Scholarship**, Winner of national engineering competition on application of STEM in solving challenging problems	*Mountain View, CA*
2012	**1st place**, Computer Science, 18th Graduate Science and Research Symposium	*Baltimore, MD*
2008	**1st place**, Computer Science, 14th Graduate and Undergraduate Science and Research Symposium	*Baltimore, MD*

Presentations

Computer Science Careers and Disciplines, Florida Tech   *Melbourne, FL*

Invited Presenter   *October 5, 2020*

- Invited to talk to students about careers and research in the field of data analytics and data science

**Mapping Research Requirements to Software Tools (Panelist with Mahmood M.
Shad, Prasad Maddumage, Diego Menéndez, Zak Sakoglu)**   *University of Oklahoma*

Invited Panelist: Virtual Residency Intermediate/Advanced Workshop 2020   *June 4, 2020*

- Participated on panel with members from Harvard, University of Houston, Pennsylvania State University, and Florida State University to discuss how to map research requirements to software tools

Interdisciplinary Students Research Association (ISRA) at Florida Tech   *Melbourne, FL*

Guest Speaker: Research Council Meeting   *March 21, 2019*

- Invited to talk to students about publishing research and experiences gained while pursuing a Ph.D

Publications

An Agent-Based Approach Toward Smart Software Testing
Fitzroy Nembhard, K. Slhoub, and Marco Carvalho

Accepted for Publication
Future Technologies Conference 2023

Teaming Humans with Virtual Assistants to Detect and Mitigate Vulnerabilities
Fitzroy Nembhard, Marco Carvalho

Accepted for Publication
Computing Conference 2023

A Smart and Defensive Human-Machine Approach to Code Analysis
Fitzroy Nembhard, Marco Carvalho

August 2021
IJCAI-ACD 2021

Conversational Code Analysis: The Future of Secure Coding (book chapter)

Fitzroy Nembhard, Marco Carvalho

Book: Coding Theory - Recent Advances, New Perspectives and Applications
IntechOpen, London

A Fast and Exact Motif Enumeration Algorithm for Dynamic Networks - accepted for presentation and publication

Abbas Al-Thaedan, Marco Carvalho, Fitzroy Nembhard

Future of Information and Communications Conference (FICC) 2021
29-30 April 2021

Towards the application of recommender systems to secure coding
Nembhard, F.D., Carvalho, M.M. and Eskridge, T.C.

EURASIP J. on Info. Security
June 2019

The Impact of Interface Design on the Usability of Code Analyzers
F. Nembhard, M. Carvalho

IEEE-SoutheastCon2019
April 2019

A Metrics Tracking Program for Promoting High-Quality Software Development
K. Slhoub, F. Nembhard and M. Carvalho

IEEE-SoutheastCon2019
April 2019

Evaluation and Comparison of Agent- Oriented Methodologies: A Software Engineering Viewpoint
K. Slhoub, M. Carvalho and F. Nembhard

IEEE-SYSCON2019
April 2019

Extracting knowledge from open source projects to improve program security
F. Nembhard, M. Carvalho and T. Eskridge

2018 IEEE SoutheastCon
April 2018

A hybrid approach to improving program security

F. Nembhard, M. Carvalho and T. Eskridge

2017 IEEE Symposium Series on Computational Intelligence (SSCI)
November 2017

The Deployment of RFID Technology on Small Farms in Holopaw, FL: A Community-Centered Effort
F. Nembhard, M. Carvalho and Kleanthis Zisis Tegos

IEEE International Conference on RFID
April 2019

Interactive Visualization of Netflow Traffic

Thomas C. Eskridge, Marco Carvalho, Fitzroy Nembhard, Hari Thotempudi, Peter J. Polack

2015 European Intelligence and Security Informatics Conference (EISIC)
September 2015

Program Committees

Dec 2021   **Invited Committee Member**, IEEE International Conference on Bioinformatics and Biomedicine   *Rare Diseases Virtual Workshop*

Nov 2021   **Invited Reviewer**, Computers & Security (COSE) Journal   *Elsevier Online*

Oct 2021   **Invited Reviewer**, Computers & Security (COSE) Journal   *Elsevier Online*

June 2021   **Invited Reviewer**, Computers & Security (COSE) Journal   *Elsevier Online*

Mar 2021   **Invited Reviewer**, IEEE SoutheastCon2021   *Atlanta, GA*

Oct 2020   **Invited Guest Editor**, Special Issue of International Conference on Artificial Intelligence and Advanced Manufacturing (AIAM2020)   *Manchester, UK*

Oct 2020   **Invited Committee Member**, 6th International Conference on Artificial Intelligence and Soft Computing (AISO 2020)   *Dubai, UAE*

Jun 2020   **Invited Committee Member**, 6th International Conference on Data Mining and Applications (DMAP)   *Dubai, UAE*

Apr 2020   **Invited Reviewer**, IEEE SoutheastCon2020   *Raleigh, NC*

Apr 2019   **Invited Reviewer**, IEEE SoutheastCon2019   *Huntsville, AL*

Apr 2018   **Invited Reviewer and Session Vice Chair**, IEEE SoutheastCon2018   *Tampa Bay Area, FL*