Kaleel Mahmood

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EDUCATION

University of Connecticut, Storrs, CT
PhD in Computer Science, January 2018-Present
Masters of Science in Computer Science and Engineering, August 2017
Masters of Science in Electrical Engineering, August 2016
Bachelor of Science in Electrical Engineering, May 2013

PROJECTS

IoT Cybersecurity Defense: Developed a moving target defense based on context aware coding, code partitioning and code diversity for embedded systems and IoT devices. Implemented and tested defense system on a Pixhawk Px4 based unmanned aerial vehicle.

Counterfeit Integrated Circuit Detection: Developed a complete software package to analyze and authenticate x-rays of integrated circuits using image registration techniques, Local Binary Patterns, Principal Component Analysis, Autoencoders, Deep Neural Networks and Support Vector Machines.

Flexible 3D Imaging: Designed and implemented a 3D imaging system for randomly distributed sensors placed on non-planar surfaces. Estimation of the sensor position for 3D imaging was accomplished through parallelized Perspective-n-Point Solvers and Particle Swarm Optimization.

Localization Software System: Developed localization algorithms and software using Java, C and C# to interface with commercial OFDM acoustic modems to extract information and conduct real time position estimation in an underwater environment.

Artificial Intelligence: Developed a customizable feed forward neural network program for character recognition. Implemented backpropagation training algorithm for the network which was programmed in both Java and Matlab.

EXPERIENCE

Secure Computing Laboratory Graduate Researcher December 2015-Present

- Researched deep learning and methods for heuristic determination of optimal neural network structure. Worked on machine learning attacks on physically unclonable functions (PUFs).

Cyber Security Internship at United Technologies Research Center May 2016-August 2016

- Developed a cyber security defense for IoT and embedded devices based on code partitioning. Implemented moving target defense based security measures on unmanned aerial vehicles.

Optical Imaging Laboratory Graduate Researcher April 2013-December 2015

- Worked on image processing and computer vision research projects including

3D integral imaging with unknown sensor poses, counterfeit integrated circuit detection using x-ray imaging and deep neural networks and 3D infrared face detection using anisotropic diffusion and adaptive boosting.

Underwater Sensor Network Laboratory Researcher May 2012-August 2013

- Implemented asynchronous localization algorithms in C language. Conducted real time testing and analysis of algorithms in aquatic environments using digital signal processing boards and acoustic modems.
- Contributed to localization research and PWM wave sampling research for journal papers. Assisted in design and testing of power amplifiers for acoustic modems.

PUBLICATIONS

P. Nguyen, D. Sahoo, C. Jin, K. Mahmood and M. van Dijk, "The Interpose PUF: Secure PUF Design against State-of-the-art Machine Learning Attacks", (in submission to CHES 2018).

K. Mahmood, D. M. Shila, "Moving target defense for Internet of Things using context aware code partitioning and code diversification", 2016 IEEE 3rd World Forum on Internet of Things, pp. 329-330, 2016.

K. Mahmood, P. Carmona, S. Shahbazmohamadi, F. Pla, and B. Javidi, "Real-time automated counterfeit integrated circuit detection using x-ray microscopy", in *Applied Optics*, vol. 54, D25-D32, 2015. Citations: 14

K. Mahmood, K. Domrese, P. Carroll, H. Zhou, X. Xu, S. Zhou, "Implementation and Field Testing of On-Demand Asynchronous Localization", in *Asilomar Conference on Signals, Systems and Computers,* Pacific Grove, California, Nov. 3-6, 2013. Citations: 5

P. Carroll, K. Mahmood, S. Zhou, H. Zhou, X. Xu, J.-H. Cui, "On-Demand Asynchronous Localization for Underwater Sensor Networks", in *IEEE Transactions on Signal Processing*, vol.62, no.13, pp.3337-3348, July 1, 2014. Citations: 39

X. Xu, S. Zhou, K. Mahmood, L. Wei, J.-H. Cui, "Study of Class-D Power Amplifiers for Underwater Acoustic OFDM Transmissions", in *Oceans/IEEE,* San Diego, Sept. 23-27, 2013. Citations: 5

P. Carroll, S. Zhou, K. Mahmood, H. Zhou, X. Xu, and J.-H. Cui, "On-Demand Asynchronous Localization for Underwater Sensor Networks", in *Proc. of IEEE/MTS OCEANS conference*, Hampton Roads, Virginia, Oct. 14-19, 2012.

LEADERSHIP /AWARDS

Graduate Assistance in Areas of National Need (GAANN) Fellowship- Awarded full funding from August 2013 to December 2016 to work at the University of Connecticut in a U.S. department of education designated area of national need (computer security).

Underwater Network Localization Senior Design Team Leader- Leader of senior design team to create hardware solutions for localization algorithms. Setup weekly meetings between team members and the overseeing professor to make sure deadlines were met. Assigned group roles in the team for hardware and software development. Took

3rd place in the University of Connecticut Senior Design Competition.

Graduate mentor- Taught C#, Java and C, as well as basic research techniques to undergraduate researchers for the NSF funded 2013 Cyber Aquatic Systems program.

PERSONAL United States Citizen (Born in the U.S), Native English Speaker

Member of:

Institute of Electrical and Electronic Engineers (IEEE)	January 2010-Present
Optical Society of America	2014-2017
UConn Badminton Club Vice President	2014-2017
Tennis Instructor	2010-Present