Woosub Jung

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EDUCATION

William & Mary, Williamsburg, Virginia
Ph.D., Computer Science, Graduation: May 2023
Dissertation Title: *Learning-based Ubiquitous Sensing for Solving Real-world Problems*
Advisor: Prof. Gang Zhou, Professor of Computer Science

Hanyang University, Seoul, Korea (the Republic of)
M.S., Electronics and Computer Engineering Feb 2011
B.S., Electronics and Computer Engineering Feb 2009

ACADEMIC POSITIONS

Towson University, Towson, Maryland
Assistant Professor, Computer and Information Sciences 2023~present

PUBLICATIONS

Referred Journal Articles

1. **Woosub Jung**, Amanda Watson, Scott Kuehn, Erik Korem, Ken Koltermann, Minglong Sun, Shuangquan Wang, Zhenming Liu, Gang Zhou, "LAX-Score: Quantifying Team Performance in Lacrosse and Exploring IMU Features towards Performance Enhancement," in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT),* volume 3, 2021.
2. Shuangquan Wang, Gang Zhou, Amanda Watson, Lei Xie, Minglong Sun, **Woosub Jung**, "Wearable Motion Sensor-Based Chewing Side Detection," *Elsevier Smart Health*, May 2021.
3. Shuangquan Wang, Gang Zhou, Jiexiong Guan, Yongsen Ma, Zhenming Liu, Bin Ren, Hongyang Zhao, Amanda Watson, **Woosub Jung**, "Inferring food types through sensing and characterizing mastication dynamics," *Elsevier Smart Health*, April 2021.
4. **Woosub Jung,** Hongyang Zhao, Minglong Sun, Gang Zhou, "IoT Botnet Detection via Power Consumption Modeling," in *Elsevier Smart Health,* 2020, also appeared in *ACM/IEEE CHASE'19*, received **the 2020 Most Downloaded Paper Award**.
5. Shuangquan Wang, Gang Zhou, Yongsen Ma, Lisha Hu, Zhenyu Chen, Yiqiang Chen, Hongyang Zhao, **Woosub Jung**, "Eating Detection and Chews Counting through Sensing Mastication Muscle Contraction," in *Elsevier Smart Health,* pages 179-191, 2019, also appeared in *ACM/IEEE CHASE'18*.
6. Yongsen Ma, Gang Zhou, Shuangquan Wang, Hongyang Zhao, and **Woosub Jung**, "SignFi: Sign Language Recognition Using WiFi," in *Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT),* March 2018.

7. Dukyoung Kim, **Woosub Jung**, Sungho Cho, “An Efficient Shortcut Path Algorithm using Depth in ZigBee Network,” *Journal of the Korean Institute of Communications and Information Sciences*, 12(34):1475-1482, December 2009.

Referred Conference Papers

1. Kenneth Koltermann, **Woosub Jung,** GinaMari Blackwell, Abbott Pinney, Matthew Chen, Leslie Cloud, Ingrid Pretzer-Aboff, and Gang Zhou. "FoG-Finder: Real-time Freezing of Gait Detection and Treatment." In *2023 IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE)*, pp. 22-33, Orlando, FL, USA, June 2023.
2. Minglong Sun, **Woosub Jung,** Kenneth Koltermann, Gang Zhou, Amanda Watson, Ginamari Blackwell, Noah Helm, Leslie Cloud, and Ingrid Pretzer-Aboff. "Parkinson's Disease Action Tremor Detection with Supervised-Leaning Models." In *2023 IEEE/ ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE)*, pp. 1-10. Orlando, FL, USA, June 2023.
3. Abasi-amefon Obot Affia, Hilary Finch, **Woosub Jung**, Issah Abubakari Samori, Lucas Potter, and Xavier-Lewis Palmer. 2023. "IoT Health Devices: Exploring Security Risks in the Connected Landscape" *IoT* 4, no. 2: 150-182.
4. Hilary Finch, Abasi-Amefon Affia, **Woosub Jung,** Lucas Potter, and Xavier-Lewis Palmer. "Commentary on Healthcare and Disruptive Innovation." In *International Conference on Cyber Warfare and Security*, pp. 77-XII. Academic Conferences International Limited, 2023.
5. **Woosub Jung,** Kailai Cui, Kenneth Koltermann, Junjie Wang, ChunSheng Xin, Gang Zhou, “Light Auditor: Power Measurement can tell Private Data Leakage through IoT Covert Channels,” The *ACM conference on Embedded Networked Sensor Systems (SenSys)*, Boston, USA, November 2022.
6. **Woosub Jung,** Yizhou Feng, Sabbir A. Khan, ChunSheng Xin, Danella Zhao, Gang Zhou, “DeepAuditor: Distributed Online Intrusion Detection System for IoT devices via Power Side-channel Auditing,” The *ACM/IEEE international conference on Information Processing in Sensor Networks (IPSN)*, Milan, Italy, May 2022.
7. Minglong Sun, Amanda Watson, Gina Blackwell, **Woosub Jung,** Shuangquan Wang, Kenneth Koltermann, Noah Helm, Gang Zhou, Leslie Cloud, Ingrid Pretzer-Aboff, “TremorSense: Tremor Detection for Parkinson’s Disease Using Convolutional Neural Network,” *The IEEE/ACM international conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE 2021)*, Washington D.C., USA, December 2021.
8. Hongyang Zhao, Shuangquan Wang, Gang Zhou, **Woosub Jung**, “TennisEye: Tennis Ball Speed Estimation using a Racket-mounted Motion Sensor,” *ACM/IEEE IPSN*, April 2019.
9. **Woosub Jung**, Sungho Cho, “Load Balancing System with SUB-NETWORK Management in Wireless Sensor Networks,” *Proc. 2010 IEEE International Conference on Network Infrastructure & Digital Content*, Beijing, China, September 2010.

10. **Woosub Jung**, Sungho Cho, "Congestion Control for Efficient Transmission in ZigBee Networks," International Conference on Wireless Communications, Networking and Mobile Computing, Beijing, China, September 2009.

Referred Workshop/Demo/Poster/White Papers

1. **Woosub Jung**, "Distributed Online Intrusion Detection System for IoT devices via Power Side-channel Auditing," The *ACM conference on Embedded Networked Sensor Systems (SenSys)*, (PhD Forum), Boston, MA, November 2022, received the **Best PhD Forum Presentation Runner Up.**
2. **Woosub Jung**, Kenneth Koltermann, Noah Helm, GinaMari Blackwell, Ingrid Pretzer-Aboff, Leslie Cloud, and Gang Zhou, "IMU Sensing Data-based Kinetic Tremor Detection in Parkinson's Disease Patients," The *ACM conference on Embedded Networked Sensor Systems (SenSys)*, (Demo Paper), Boston, MA, November 2022.
3. **Woosub Jung**, Kenneth Koltermann, Noah Helm, GinaMari Blackwell, Ingrid Pretzer-Aboff, Leslie Cloud, and Gang Zhou, "Kinetic Tremor Measurement via IMU Sensing Data Analysis," ACM/IEEE International Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE 2022), (Poster Paper), Washington, DC, November 2022.
4. Ingrid A. Pretzer-Aboff, R.K. Elswick, Jr., Amanda A. Watson, Minglong Sun, **Woosub Jung**, Ken Koltermann, Gang Zhou, Leslie J. Cloud, "Impact of Vibration on Tremor in Older Adults with Parkinson's disease," Gerontological Society of America Annual Scientific Meeting (GSA 2022), (Poster Paper), Indianapolis, IN, November 2022.
5. **Woosub Jung,** Yizhou Feng, Sabbir A. Khan, ChunSheng Xin, Danella Zhao, Gang Zhou, "A Distributed Power Side-channel Auditing System for Online IoT Intrusion Detection," *ACM/IEEE IPSN*, (Demo Paper), Milan, Italy, May 2022.
6. **Woosub Jung,** Yizhou Feng, Sabbir A. Khan, ChunSheng Xin, Danella Zhao, Gang Zhou, "Securing IoT devices through Power Auditing and Privacy-preserving CNN," *CoVA CCI Symposium*, (Poster Paper), Richmond, Virginia, April 2022., also invited to the 9th Annual IC CAE & NSEP Colloquium, (Poster Paper), Blacksburg, Virginia, May 2022.

Patents (USA)

1. **Woosub Jung***, Gang Zhou*, ChunSheng Xin, Yizhou Feng, Danella Zhao, Sabbir A. Khan, "Privacy-preserving Online Botnet Classification System Utilizing Power Footprint of IoT Connected Devices," February 2022, Application No. 17/669,540.
2. **Woosub Jung***, Gang Zhou*, ChunSheng Xin, Kailai Cui, "Data Leakage Detection through Covert-channel Power Monitoring," October 2022, Provisional Application in progress.

Patents (Korea, the Republic of)

1. **Woosub Jung**, Sungho Cho, "Load Balancing Method by Configuring Sub-Network in Wireless Sensor Networks," 2011, Patent No. 2011-0005153.
2. **Woosub Jung**, Sungho Cho, Changsuk Yoon, "An Adaptive Human Cognition Synchronization Management Method in Interactive System Based on Sensor Network," 2010, Patent No. 2010-0018292.

3. **Woosub Jung**, Sungho Cho, Inwhee Cho, Dukyoung Kim, "Shortcut Routing Algorithm in Zigbee Network," 2010, Patent No. 2010-0004810.

FELLOWSHIPS & GRANTS

1. "Distributed Online Intrusion Detection System for IoT devices via Power Side-channel Auditing," Cyber Acceleration (Catapult) Fund: Awarded by the Northern Virginia Center for Cyber Innovation (NoVA CCI); In collaboration with Old Dominion University; W&M served as leading site; $50,000 in total. Jul 2022 - Jun 2023
2. "Tribe Venture Cohort," William & Mary Student Venture Incubator Program; Awarded by Alan B. Miler Entrepreneurship Center; Earned $1,000 in total, incredible workplace, and startup assistance from experienced entrepreneurs. Oct 2021 - May 2022
3. "Securing IoT Devices with AI-assisted Power Auditing," CoVA CCI Cybersecurity Dissertation Fellowship: Awarded by the Commonwealth Cyber Initiative (CCI) to assist in my Ph.D. dissertation; $50,000 in total. Jul 2021 - Jun 2023
4. "A Minimum Viable Product to Secure IoT Devices through Power Auditing and Privacy Preserved Convolutional Neural Networks," Cybersecurity Innovation Bridge Fund Grant: Awarded by the Commonwealth Cyber Initiative (CCI); In collaboration with Old Dominion University; W&M serves as leading site; $50,000 in total. Jul 2021 - Jun 2022
5. "Securing IoT Devices through Power Side-channel Auditing and Privacy Preserved Convolutional Neural Networks," Cybersecurity Research and Innovation Funding: Awarded by the Coastal Virginia Center for Cyber Innovation (COVA CCI); In collaboration with Old Dominion University; W&M served as leading site; $150,000 in total. Jul 2020 - Jun 2021

INVITED PRESENTATIONS

1. "Tremor Measurement via IMU Sensing Data Analysis," William & Mary Computer Science Symposium for Graduate Studies, Williamsburg, Virginia Oct 2022
2. "How Artificial Intelligence Can Boost Athletic Performance," William & Mary Emerging Scholar Series, Zoom, Williamsburg Regional Library
   Online Link; https://youtu.be/cbBm3sdkDg8 Oct 2021
3. "IoT Botnet Detection via Power Consumption Modeling," Guest Lecturer at CSCI 619 for William & Mary Computer Science Department, Williamsburg, Virginia Sep 2021
4. "Understanding of SIP Protocol," SK Telecom, Seoul, Korea (the Republic of) Sep 2013
5. "IMS Telecom Core Networks," SK Telecom, Seoul, Korea (the Republic of) Aug 2013

PROFESSIONAL SERVICE

Invited Reviewer

ACM Proceedings of the ACM on Interactive, Mobile, Wearable and Ubiquitous Technologies (IMWUT)	2022
ACM Transactions on Sensor Network	2022
ACM Transactions on Computing for Healthcare	2021-present
Elsevier Smart Health	2019-present
IEEE Transactions on Mobile Computing	2021
IEEE INFOCOM	2020-2021
IEEE International Conference on Body Sensor Networks (BSN)	2018-2019

IEEE PerCom Work in Progress on Pervasive Computing and Communication 2018
IEEE International Performance Computing and Communications Conference 2017

Web Chair

The 8th IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE) 2023
The 4th IEEE/ACM Conference on Connected Health: Applications, Systems and Engineering Technologies (CHASE) 2019

Student Volunteer

The 20th ACM Conference on Embedded Networked Sensor Systems (SenSys'22), Boston, MA, USA 2022
The 21st ACM/IEEE Conference on Information Processing in Sensor Networks (IPSN'22), Milan, Italy, (Virtual) 2022

COURSES TAUGHT

COSC 350: Data Communications and Computer Networks Fall 2023
COSC 732: Wireless Networks and Mobile Communications Fall 2023

TEACHING EXPERIENCE

CSCI 619: Ubiquitous & Mobile Computing (Guest Lecturer) Oct 2022
Enrollment: 12
Evaluation Rating (average): 4.44/5.00
CSCI 619: Ubiquitous & Mobile Computing (Guest Lecturer) Oct 2021
Enrollment: 9
Evaluation Rating (average): 4.33/5.00
CSCI 434: Network Systems and Design (Teaching Assistant) Fall 2018
CSCI 434: Network Systems and Design (Teaching Assistant) Spring 2018

UNDERGRADUATE ADVISING

Kailai Cui, Undergraduate research on IoT security and privacy, recipient of the 2022 Charles Center Summer Research Grant 2022-2023

HONORS & AWARDS

Distinguished Dissertation Award, the Graduate Studies Advisory Board (GSAB), William & Mary 2023
The Graduate Park Award, William & Mary Computer Science Department 2022
Best PhD Forum Presentation Runner Up, SenSys'22 2022
Recognized Reviewer, Elsevier Smart Health 2022
Student Travel Award, IEEE Technical Committee on the Internet 2022
Conference Fund Award, William & Mary Student Assembly 2022
International Student Financial Aid, William & Mary 2022
Conference Fund Award, William & Mary Graduate Student Association 2021-2022
International Student Opportunity Scholarship, William & Mary 2021
Most Downloaded Paper Award, Elsevier Smart Health 2020

NSF Student Travel Award for travel to CHASE'19 2019
Graduate Scholarship, William & Mary 2016-present
Graduate Scholarship, Hanyang University 2009-2010
Participation Award for the 70th anniversary of Hanyang University 2009
Hanyang University Honor (merit-based scholarship) 2007-2008
National Science and Engineering Scholarship;
Korea Student Aid Foundation 2004-2008

PROFESSIONAL EXPERIENCE

Cybersecurity Research Intern, Peregrine, Yorktown, Virginia Spring 2022
Healthcare Research Intern, Virginia Commonwealth University,
Richmond, Virginia Summer 2021
Linux Technical Administrative Assistant, Computer Science, William & Mary,
Williamsburg, Virginia Aug 2016-May 2020
Telecom Service Software Manager, Nable, Seoul, Korea (the Republic of) May 2014-Jul 2016
Telecom Service Software Engineer, Uangel, Seoul, Korea (the Republic of) Feb 2011-Feb 2014

COMMUNITY OUTREACH

STEP Teacher for Summer Camp, Horizons Greater Washington, Washington, D.C.
Summer 2023
Cutting Edge Technology and Science Research, Williamsburg Regional Library,
Williamsburg, Virginia Oct 2021
William & Mary Hackathon Field Trip for K-12, William & Mary,
Williamsburg, Virginia Feb 2019
Sensor Network Media Art Exhibition, Hanbit Street Gallery, Seoul,
Korea (the Republic of) Feb 2010

EXPERTISE & SKILLS

Deep Learning, Machine Learning Techniques in IoT applications
Network Protocol Implementation/Troubleshooting (TCP, UDP, SIP, Diameter, etc)
C/C++, Java, Android Programming, Matlab Python, Bash, JavaScript
System Programming (Unix/Linux), DBMS (MySQL, MariaDB)
English (Advanced), Korean (Native)

REFERENCES

Gang Zhou, Professor, Department of Computer Science, William & Mary, (757) 221-345, gzhou@cs.wm.edu

Weisong Shi, Professor & Chair, Department of Computer and Information Sciences, University of Delaware, (302) 831-2712, weisong@udel.edu

ChunSheng Xin, Program Director, National Science Foundation (NSF), cxin@nsf.gov & Professor, Department of Computer Science, Old Dominion University, (757) 683-5294, cxin@odu.edu

Ingrid Pretzer-Aboff, Associate Professor, Department of Adult Health and Nursing Systems, Virginia Commonwealth University, (804) 828-3340, iaboff@vcu.edu

Sarah Glosson, Director, Arts & Sciences Graduate Center, William & Mary, (757) 221-1876 sgglos@wm.edu