

## Daehee Kim, Ph.D.

Department of Computer Science, California State University-Stanislaus  
DBH 281, One University Circle, Turlock, CA 95382  
(209)667-3193, dkim10@csustan.edu, <https://www.cs.csustan.edu/~dkim/>

### EDUCATION

University of Missouri-Kansas City, Kansas City, MO  
Doctor of Philosophy in Computer Science and Electrical Engineering, May 2015, (GPA: 3.97)

State University of New York, Binghamton, NY  
Master of Science in Computer Science, May 2008, (GPA: 3.74)

Pusan National University, Pusan, South Korea  
Bachelor of Science in Computer Science, Feb 1995

### APPOINTMENTS

Aug 2023 - Present	Associate Professor, Computer Science, California State University-Stanislaus, Turlock, CA
Aug 2018 - July 2023	Assistant Professor, Computer Science, California State University-Stanislaus, Turlock, CA
Sep 2015 - May 2018	Assistant Professor, Computing and New Media Technologies, University of Wisconsin-Stevens Point, Stevens Point, WI
Jan 2015 - May 2015	Adjunct Faculty, University of Missouri-Kansas City, Kansas City, MO
Sep 2009 - May 2015	Research/Teaching Assistant, University of Missouri-Kansas City, Kansas City, MO
Sep 2011 - May 2012	Adjunct Faculty, Park University, MO
Sep 2008 - May 2009	Research/Teaching Assistant, Wichita State University, KS
Mar 2000 - Apr 2005	Software Architect/Project Manager, IBM, Korea
Mar 1995 - Feb 2000	Software Engineer/System Architect, Kolon Data Communication, Korea

### PUBLICATIONS

#### Books:

1. **Daehee Kim**, Sejun Song, Baek-Young Choi, “Data Deduplication for Data Optimization for Storage and Network Systems”, *Springer Book*, ISBN: 9783319422787, DOI: 10.1007/978-3-319-42280-0, 2016 <http://www.springer.com/us/book/9783319422787>

#### Journals:

1. **Daehee Kim**, Sejun Song, Baek-Young Choi, “BEAM: Branch-based Efficient and Adaptive Multicast for Wireless Sensor Networks”, *International Journal of Sensor Networks*, DOI: 10.1504/IJS-NET.2015.10001256, 2017.
2. **Daehee Kim**, Sejun Song, Baek-Young Choi, “EAGER: Energy-Efficient Adaptive Geo-Source Multicast Routing for Wireless Sensor Networks”, *Journal of Sensors*, Vol. 2013, Article ID 142078, doi:10.1155/2013/142078, 2013.

#### Conferences/Workshops:

1. **Daehee Kim**, Stephanie Gamboa, Vanessa Hernandez, Marlen Martinez-Lopez, Scott J Hebring,, John Mayer, Jamie Fox, “Medical Big Data Analysis System to Discover Associations between Genetic Variants and Diseases”, *IEEE International Conference on Communications (ICC)*, Pages:1-6, DOI:10.1109/ICC42927.2021.9500497, Montreal, Canada, June 2021.

2. Sejun Song, Baek-Young Choi, **Daehee Kim**, “Selective Encryption and Component-Oriented Deduplication for Mobile Cloud Data Computing”, *IEEE International Conference on Computing, Networking and Communications (ICNC)*, Hawaii, USA, February 2016.
3. Sejun Song, **Daehee Kim**, Hyungbae Park, Baek-Young Choi, Taesang Choi, “CO-REDUCE: Collaborative Redundancy Reduction Service in Software-Defined Networks”, *ACM SIGCOMM HotMiddleBox*, London, UK, August 2015.
4. **Daehee Kim**, Sejun Song, Baek-Young Choi, “APCP: Adaptive Path Control Protocol for Efficient Branch-based Multicast Routing in Wireless Sensor Networks”, *IEEE 10th International Conference on Mobile Ad-hoc and Sensor Networks (MSN)*, Hawaii, USA, December 2014.
5. **Daehee Kim**, Sejun Song, Baek-Young Choi, “SAFE: Structure-Aware File and Email Deduplication for Cloud-based Storage Systems”, *IEEE 2nd International Conference on Cloud Networking (CloudNet)*, San Francisco, USA, November 2013.
6. **Daehee Kim**, Baek-Young Choi, “HEDS: Hybrid De-duplication Approach for Email Servers”, *IEEE International Conference on Ubiquitous and Future Networks (ICUFN)*, Phuket, Thailand, July 2012.
7. Sejun Song, Baek-Young Choi, **Daehee Kim**, “MR.BIN: Multicast Routing with Branch Information Nodes for Wireless Sensor Networks”, *IEEE 19th International Conference on Computer Communications and Networks (ICCCN)*, Zurich, Switzerland, August 2010.
8. Sejun Song, **Daehee Kim**, Baek-Young Choi, “AGSMR: Adaptive Geo-Source Multicast Routing for Wireless Sensor Networks”, *International conference on Wireless Algorithms, Systems and Applications (WASA)*, Boston, MA, 2009.

#### Posters:

1. **Daehee Kim**, Sejun Song, “Efficient Big Data Transfer Service (BigDTS) using Data Oriented Forwarding”, *IEEE 2nd Conference on Network Softwarization (NetSoft)*, Seoul, Korea, June 2016.

#### Student Posters & Presentations:

1. Zahra Ghausi, Brian Flores, , and Nicholas Davies, (Faculty advisor: Daehee Kim), “Exploring Data Science with Microsoft Materials”, *California State University - Stanislaus, ASPIRE/STEM-CRU Reverse Career Fair*, Nov 2024.
2. Noah Betoshana and Isabella Zardo, (Faculty advisor: Daehee Kim), “Exploring Internet of Things (IoT) for Farming, Manufacturing, and Retail Domains”, *California State University - Stanislaus, ASPIRE/STEM-CRU Reverse Career Fair*, Nov 2024.
3. Jaime Suarez, Esteban Verdin, and Nina Tkachuk, (Faculty advisor: Daehee Kim), “Practical Hands-on Learning of Computer Networks Towards the Profession of Cybersecurity”, *California State University - Stanislaus, ASPIRE/STEM-CRU Reverse Career Fair*, Nov 2024.
4. Zahra Ghausi and Brian Flores, (Faculty advisor: Daehee Kim), “Exploring Data Science with Microsoft Materials”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2024.
5. Crystal Saini, Noah Betoshana, and Allen Rosales, (Faculty advisor: Daehee Kim), “Exploring Internet of Things (IoT) for Farming, Manufacturing, and Retail Domains”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2024.
6. Jaime Suarez, Esteban Verdin, and Nina Tkachuk, (Faculty advisor: Daehee Kim), “Practical Hands-on Learning of Computer Networks Towards the Profession of Cybersecurity”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2024.
7. Christian Alameda, Joshua Gonzalez-Leon, Ray Duenas, (Faculty advisor: Daehee Kim), “Case Study: Implementing a Big Data Analysis System on Cloud from User Interface to Spark Cluster”, *California State University - Stanislaus, College of Science Poster Celebration and ASPIRE/STEM-CRU (Accelerated STEM Pathways through Internships, Research and Engagement/STEM CareerReadyU)*, May 2023.
8. Crystal Saini, Noah Betoshana, and Allen Rosales, (Faculty advisor: Daehee Kim), “Exploring Internet of Things (IoT) with Microsoft Materials”, *California State University - Stanislaus, College of Science Poster Celebration and ASPIRE/STEM-CRU (Accelerated STEM Pathways through Internships, Research and Engagement/STEM CareerReadyU)*, May 2023.

9. Aristan Galindo and Sumedha Chand, (Faculty advisor: Daehee Kim), “Efficient Visualization of Big Data Analysis using Shiny Application”, *California State University - Stanislaus, Science in Our Community, Science Week*, April 2023.
10. Brittany Castaneda, Jerynne Mae Cenario, (Faculty advisor: Daehee Kim), “Artificial Intelligence Robot Programming with Cozmo”, *California State University - Stanislaus, Science in Our Community, Science Week*, April 2022.
11. Marlen Martinez-Lopez, (Faculty advisor: Daehee Kim), “Medical Big Data Analysis System to Discover Associations between Genetic Variants and Diseases”, *LSAMP (Louis Stokes Alliance for Minority Participation in Science, Engineering, Mathematics, and Technology) and 20th Honors Capstone Conference*, May, 2021.
12. Jaimit James, (Faculty advisor: Daehee Kim), “Medical Big Data Analysis System to Discover Associations between Genetic Variants and Diseases”, *California State University - Stanislaus, College of Science Poster Celebration and RISE (Research and Immersion for STEM Excellence)*, May 2021.
13. Crystal Saini, Jesus Gonzalez, (Faculty advisor: Daehee Kim), “Implementing Smart Farm Prototype with Internet of Things”, *RISE (Research and Immersion for STEM Excellence)*, May 2021.
14. Jashandeep Singh, Jorge Hernandez Ortega, (Faculty advisor: Daehee Kim), “Implementing Smart Farm Prototype with Internet of Things”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2021.
15. Christopher Todd, (Faculty advisor: Daehee Kim), “Game Development in Unity using Oculus Quest VR”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2020.
16. Jashandeep Singh, Samir Espinoza, Corey Edh, Jorge Hernandez Ortega, (Faculty advisor: Daehee Kim), “Smart Home using Internet of Things (IoT)”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2020.
17. Marlen Martinez Lopez, (Faculty advisor: Daehee Kim), “Exploring Efficient Visualization of Big Data using R Shiny Application”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2020.
18. Nikolai-Iraj Sanamrad, Giancarlo Garcia Deleon, Deep Gill, (Faculty advisor: Daehee Kim), “Efficient Visualization of Medical Big Data Using R Shiny Application”, *California State University - Stanislaus, College of Science Poster Celebration*, May 2019.
19. Brian Eam, John Rabang, (Faculty advisor: Daehee Kim), “Analysis of Data Privacy and Security in Commercial DJI Drones”, *California State University - Stanislaus, College of Science **Poster Celebration***, May 2019.
20. Krista Hepler, Marlen Martinez-Lopez, Gabriel Medina, Vanessa Hernandez, Stephanie Gamboa, Clark Xiong, John Rabang, (Faculty advisor: Daehee Kim), “Introducing Artificial Intelligence through Robot Programming at K-12 level”, *California State University - Stanislaus, College of Science **Poster Celebration***, May 2019.
21. Andres Perez, (Faculty advisor: Daehee Kim), “Analyzing Ransomware Attacks and Exploring Methods of Prevention”, *California State University - Stanislaus, College of Science **Poster Celebration***, May 2019.
22. Mark Newby, Jeanna VanLinn, Daniel Cronce, (Faculty advisor: Daehee Kim), “Medical Big Data Analysis based on High Speed Spark Cluster: Marshfield CURE (Big Data Search Query Tool)”, *University of Wisconsin-Stevens Point, College of Letters and Science Research Symposium*, May 2017.
23. Daniel Cronce, Joshua Krueger, Samuel Elzinga (Faculty advisor: Daehee Kim), “Cerberus: Centralized Authentication Service”, *University of Wisconsin-Stevens Point, College of Letters and Science Research Symposium*, May 2016.
24. Chase Jaime, Joseph Wilson, Jack Cooke (Faculty advisor: Daehee Kim), “UWSP Ease of Hours”, *University of Wisconsin-Stevens Point, College of Letters and Science Research Symposium*, May 2016.

## GRANTS

### Government:

1. From Learning to Leading: Cultivating the Next Generation of Diverse Food and Agriculture Professionals, United States Department of Agriculture (USDA), Oluwarotimi Odeh (PI), Augustine

Avwunudiogba, **Daehee Kim**, Ayuba Seidu, Agness Mzyece, Sofia Brizuela-Obando (**Co-PIs**, California Statue University Stanislaus), Steven Pao, Erin Dormedy, Sara Griffin (Co-PIs, California State University Fresno), “Innovative Career Preparation for the Next Generation of Diverse Food and Agriculture Professionals”, \$10,000,000, July 2021 - Nov 2022, rejected

2. Applied Research-WiSys Technology Advancement Grant (AR-WiTAG) (funded from Wisconsin state government), **Daehee Kim (PI)**, “Efficient Big Data Transfer Service (BigDTS) through Networks”, \$37,800, July 2017 - June 2018, granted,  
<https://www.wisconsin.edu/grants-awards/ignite-grant-program/ignite-grant-recipients/#2017-18>

#### **Company or Organization:**

1. **Google Cloud** Platform Education Grant (for CS3000, CS3100, CS4270, CS4280, CS4840, CS4960, CSU-Stan): **\$94,800** (\$6,200: Spring 2019, \$5,600: Fall 2019, \$6,000: Spring 2020, \$49,000: Fall 2018 and Fall 2020 - Spring 2025 (\$7000 per semester)
2. Shopify Grant: eCommerce Site accounts (for CS4270, CSU-Stan): \$14,000 (\$3,500 for each course), Fall 2018-2021,
3. IBM Cloud Grant: 26 Cloud public accounts, Spring, 2016
4. Microsoft Azure Cloud Grant: 26 Cloud public accounts, \$18,000, Spring, 2016
5. Google Cloud Grant: 29 public accounts, Fall, 2016

#### **University:**

1. Research, Scholarship, and Creative Activity (RSCA) Grant: 2021-2022, “Elastic High Speed Medical Big Data Analysis System to Discover Associations between Genetic Variants and Diseases”, \$10,000, December 2021
2. Student Engagement in Research, Scholarship, and Creative Activity (SERSCA) Undergraduate Assistantship Award
  - Noah Betoshana, \$2000, September 2024
3. Student Engagement in Research, Scholarship, and Creative Activity (SERSCA) Mini-Grant
  - Nina Tkachuk, \$500, November 2023
  - Christopher Todd, \$300, February 2020
  - Brian Eam, \$300, March 2019
4. New Faculty Start-Up Grant, \$ 20,000, September 2018
5. UWSP, 2015 - 2017
  - College of Letters and Science Information Technology Minigrant, “Medical Big Data Analysis Based on High Speed Spark Cluster”, \$ 2,809, March 2017
  - New Faculty Start-up Grant, \$ 10,000, September 2015

### **PROFESSIONAL SERVICES**

#### **Technical Program Committee (TPC)**

1. ICCCN: The International Conference on Computer Communications and Networks (Internet Of Things), 2020 - 2022
2. IWCMC: The International Wireless Communications and Mobile Computing Conference (Smart Cities Symposium), 2019

#### **Review for Professional Journals and Conferences**

1. SIGCSE: ACM Technical Symposium on Computer Science Education, 2019 - 2023
2. ICCCN, 2020 - 2022
3. Journal of Network and Systems Management (JONS), 2021
4. IWCMC, 2017, 2019, 2023
5. IEEE Internet of Things Journal, 2018
6. International Journal of Distributed Sensor Networks (IJDSN), 2018
7. International Journal of Network Management, 2017
8. Springer Journal of Telecommunication Systems, 2015

## Review for Books

1. "Superior Machine Learning": Korean version, ISBN13: 9788970504919, Publish: 7/5/2021, Authors: Yungmin Kang, Donggyu Park, Sungsu Kim, Pages: 528, June 2021  
<http://www.yes24.com/Product/Goods/102577953>

## University Service

1. Science in Our Community Steering Committee, **2021 - present**
2. Research Advising (**40 students**), **2018 - Present**
  - STEM CRU (CareerReadyU): 15 students: Jerynne Mae Cenario, Andrew Vega (Fall 2022 - Spring 2023), Anthony Castillo (Fall 2022), Matthew Pearson (Spring 2023), Joshua Gonzalez-Leon, Christian Alameda (Spring/Fall 2023), Noah Betoshana (Spring 2023 - present), Allen Rosales (Fall 2023 - Spring 2024), Zahra Ghausi, Jaime Suarez, Esteban Verdin (Fall 2023 - present), Brian Flores, Nina Tkachuk (Spring 2024 - present), Nicholas Davies, Isabella Zardo (Fall 2024 - present)
  - Science Week (Science in Our Community): 4 students: Brittany Castaneda, Jerynne Mae Cenario, Aristan Galindo, Sumedha Chand (Spring 2022)
  - Research and Immersion for STEM Excellence (RISE): 12 students: Aristan Galindo, Sumedha Chand (Fall 2021 - Spring 2022), Brittany Castaneda (Spring 2021 - Spring 2022), Jesus Gonzalez, Crystal Saini (Fall 2020 - Spring 2022), Jaimit James, Ethan Chau (Fall 2020 - Spring 2021), Jashandeep Singh, Samir Espinoza, Jorge Hernandez Ortega (Fall 2019 - Spring 2020), Giancarlo Garcia (Spring 2019 - Spring 2020), Ashley Whitemire (Fall 2018),
  - McNair Scholars Program: 1 student: Marlen Martinez Lopez (Spring 2020 - Spring 2021)
  - Louis Stokes Alliance for Minority Participation (LSAMP): 5 students: Jashandeep Singh, Andrew Rodriguez (Fall 2020/2021), Zahra Ghausi, Nina Tkachuk (Spring 2024 - present), Isabella Zardo (Fall 2024 - present)
  - 6 students: Stephanie Gamboa, Vanessa Hernandez (Spring/Fall 2020), Moises Ortega-Garcia (Fall 2020 - Fall 2021), Jashandeep Singh, Corey Edh (Fall 2019 - Spring 2022), Jeffin Abraham (Fall 2021 - Spring 2022)
3. Collaboration with Tongmyong University in South Korea, 2020 - 2021
  - Planned and implemented "Project-based Software Development Coding Camp" for students of CSU-Stanislaus and Tongmyong University. Organized and coordinated the coding camp Winter/Summer 2021: 43 students: (Winter-4weeks: students (CSU-Stan: 11, Tongmyong:11), (Summer-6weeks: students (CSU-Stan: 10, Tongmyong:11)
  - Helped signing exchange student program with Tongmyong University, March 2021
  - Helped signing Memorandum of Understanding (MOU) between CSU-Stanislaus and Tongmyong University (South Korea), June 2020
4. Campus Master Plan Committee, 2019 - 2020
5. Web Advisory Committee, 2019 - 2020
6. UWSP, 2016 - 2018
  - Advisor, Korean Culture Association, 2016 - 2018
  - Member, Information Technology Council, 2016 - 2018
  - Certified Education Trade Mission Trip to Nepal and India (recruiting), Nov 11-19, 2016

## Department Service

1. **Course Advising, 2018 - Present**
  - Advising approximate **50 students every semester** to guide them to register courses.
  - Working on approximately 10 to 20 graduation forms every semester to check graduation requirements.
2. Member, Faculty Search Committee, 2024
3. Helped creating "Cybersecurity Concentration" and "Cybersecurity Minor" programs, 2020
4. Individual Study Advising(CS4980): 9 students, 2018 - Present
  - "VR Real Estate Development Experience", Xiao Luo, Summer 2022

- “Smart Farm using IoT”, Jashandeep Singh, Fall 2021
- “Smart Farm using Drone”, Samir Espinoza, Corey Edh, Fall 2021
- “Exploring WebAssembly”, Brian Nguyen, Fall 2020
- “Game Development in Unity using Oculus Quest VR“, Christopher Todd, Spring 2020
- “Exploring Efficient Visualization of Big Data using R Shiny Application“, Marlen Martinez Lopez, Spring 2020
- “Inventory Management System 2020“, Ryan Burke, Spring 2020
- “Analyzing Ransomware Attacks and Exploring Methods of Prevention“, Andres Perez, Spring 2019
- “Learning Computer Network and Getting Cisco Network Certificate (CCENT)“, Justin Dye, Fall 2018

5. UWSP, 2015 - 2017

- Member, Curriculum Committee, 2015 - 2017
- Member, Search and Screen Committee, 2016, 2017
- Member, Marketing and Library Committee, 2016, 2017
- Member, Scholarship Committee, 2016, 2017

### Community Service

1. Working with Office of Service Learning to increase collaboration with the City of Manteca on building Web sites of businesses in Manteca, Fall 2021 - Spring 2023
2. Nominated to the Outstanding Community Service Award (2021-2022), November 2021
3. Nominated to the Science in Our Community Steering Committee, April 2021
4. Acknowledged as Faculty Stars of Service, Office of Service Learning, May 2020, <https://www.csustan.edu/service-learning/stars-service>
5. Web Site Development
  - The Nested Owl, Jashandeep Singh and Josue Rojas (Fall 2021 - Spring 2022), Kaitlyn Brianne Leon and Ethan Antonio Machado (Fall 2022 - Spring 2023)
  - Turlock Dry Cleaners, <https://turlockdrycleaners.com>, Sohail Nawabi, Gerrime Dioso, Demil Yonenpour, Fall 2021
  - United Samaritans Foundation, Electronic Survey Application, Karanjit Gill, Emma Van Hoogmoed, Fall 2020
  - United Samaritans Foundation, <https://unitedsamaritans.org/>, Mark Gamez, Mauricio Miranda, Fall 2019
  - We Care Program Turlock, <https://wecareturlock.org/>, Stephanie Gamboa, John Rabang, Fall 2019

### RESEARCH INTERESTS

My research interests lie in the broad areas of Mobile/Web/VR Application Development, Internet of Things, Big Data, Cybersecurity, and Computer Networks including:

- **Application Development:** Mobile/Web/Virtual Reality (VR)/Augmented Reality (AR) Application Development
- **Big Data Analysis** with MapReduce (Spark/Hadoop): Medical Big Data Analysis
- **Internet of Things:** Smart Farm, Smart Home
- **Big Data Transfer,** Networked Storage Systems, Software Defined Storage
- **Cybersecurity:** Cryptography, Web Security, Network Security
- **Machine Learning & Neural Networks:** TensorFlow, CNN (Convolutional Neural Network)
- **Data De-duplication** (in both storage and network)
- **Cloud computing,** distributed systems, mobile computing
- Software Defined Network (OpenFlow, OpenVSwitch, Controller)
- **Network Application** and Protocols, Wireless/Sensor Networks, Multicasting Protocols

## RESEARCH PROJECTS

### Projects on Big Data Analysis

#### **Elastic High Speed Medical Big Data Analysis System to Discover Associations between Genetic Variants and Diseases** **July 2021 - Present**

- Enhancing the existing medical big data analysis system with 10Gbps high speed network on Spark cluster and 10TB EHR and Genome data. Developing a solution to analyze the 10TB data with a limited memory resource (155GB RAM, not enough to load the data at a time) within a threshold time. Enhancing user interface using plot and table formats in Shiny application. Implementing dynamic user management including authentication and saving of users' credential information. Exploring multiple approaches for dynamic resource allocation. This research project is **supported with RSCA grant** (see "GRANTS" - "University" section).

#### **Medical Big Data Analysis System on Spark Cluster** **Jan 2017 - June 2021**

- Developed "Web Based Query Tool" system that analyzed medical information with large-sized 20,000 patients' Electronic Health Records (EHR) and Genome data. The goal of the system is to find correlation between diseases and genomes using PheWAS (Phenome Wide Association Studies) and GWAS (Genome Wide Association Studies). Deployed a high performance distributed network (Spark Cluster) where data are processed in multiple servers in parallel to speed up the performance. For rapid development of visualizing analysis results, Shiny application on R was used. To connect R and Spark Cluster, SparkR was used. This work has been **published** at an IEEE conference, **June 2021** (see "PUBLICATIONS" - "Conferences/Workshops" section).

### Projects on Internet of Things (IoT)

#### **Efficient Internet of Things (IoT) Smart Farm System** **Jul 2019 - Present**

- Designing and developing efficient Internet of Things (IoT) Smart Farm System that automates farming facilities, increases harvest productivity while reducing cost. Deploying many types of sensor devices including humidity, temperature, water, and more into farm. High quality image data of vegetables and plants are captured using drone to find diseases on farms. Collected data are stored to different types of Clouds including Google, IBM, and Amazon, and image data are analyzed using Tensorflow to find disease patterns. Developing solutions to visualize analyzed information and to actuate devices.

#### **Internet of Things (IoT) Smart Home System** **Jul 2019 - Present**

- Designing and developing efficient Smart Home solution. Data are collected from various sensor devices including current, gas, ultrasonic, water, vibration, temperature and humidity sensors. Assembled the sensor devices with Arduino Mega 2560 and Yun. Preprocessed collected data with Arduino Mega 2560 and sent to Cloud using Arduino Yun. Stored and monitored the collected data in Cloud. Visualizing the data through mobile and Web applications.

### Projects on Data Optimization on Storage and Network

#### **Efficient Big Data Transfer Service (BigDTS) through Networks** **Jul 2017 - Present**

- Designing and developing efficient Big Data Transfer Service (BigDTS) that removes the redundant data transfer by avoiding sending duplicate data from server to client. BigDTS reduces network traffic to Internet Service Provider (ISP) networks, as well as increases throughput and decrease time delay at end users. BigDTS consists of a centralized controller, virtual routers (called middle-boxes), and client/server programs. Implemented by Java.

#### **Software Defined In-Network De-duplication** **Jul 2013 - Sep 2015**

- Addressed that data transferred on network have excessive redundancies when duplicate data traverse same routers (or switches) to multiple destinations. Developed a paradigm to remove redundancies in networks (ultimately storages) by using de-duplication techniques in client, server, and network side. Implemented by C++ and Java.

#### **Mobile De-duplication** **Jul 2013 - Feb 2016**

- Address that image and video files are immensely generated in mobile devices and that those files have huge redundancies due to duplicate copy preferences of users or application characteristics (taking

multiple similar pictures of an object). Developing a light-weight image de-duplication in mobile devices considering security of separated chunks. Written in C++.

#### **Structure Aware File and Email De-duplication for Cloud-based Storage Systems (SAFE)**

Jul 2012 - Jun 2013

- Discovered that a slight change in Microsoft Office documents and PDF creates totally different binary files compared to the original documents. Explored the format of Office documents and PDF, and proposed how to de-duplicate the documents in files and emails for Cloud-based Storage systems like Dropbox. Designing and developing scalable de-duplication systems result in significant decrease in storage space and index overhead. Implemented experiments by C++ based on Cloud Storage System.

#### **Email De-duplication File System on Email Servers (HEDS)**

Sep 2010 - May 2012

- Proposed hybrid scheme that adaptively performs de-duplication at the granularity of either file-level or chunk-level. Designed and implemented the hybrid email de-duplication system and evaluated it with real email datasets. Evaluated that it achieves high data reduction rate while reducing CPU and memory overhead. Implemented in C++, Sendmail, along with Filesystem in User space (FUSE).

### *Projects on Multicast Routing Protocols for Wireless Sensor Networks*

#### **Branch-based Efficient and Adaptive Multicast for Wireless Sensor Networks (BEAM)**

Sep. 2012 - Dec. 2015

- Designed and Implemented algorithms for efficient data forwarding and membership establishment schemes for branch-based multicast routing protocols. Implemented by C++ and bash shell script. Evaluated with NS2 and MATLAB.

#### **Adaptive Path Control Protocol for Efficient Branch-based Multicast Routing in Wireless Sensor Networks (APCP)**

Sep. 2012 - Nov. 2014

- Proposed new method to measure efficiency of multicasting path. Designed and Implemented algorithms to run the method in C++. Evaluated with NS2 and MATLAB.

#### **Energy-Efficient Adaptive Geo-Source Multicast Routing for Wireless Sensor Networks (EAGER)**

May. 2012 - Sep. 2012

- Designed and Implemented energy-efficient and scalable multicast routing protocol. Optimized the location-based and source-based multicast in terms of energy, packet overhead, and computational overhead. Developed an encoding mechanism to optimize packet header. Written in C++ language and bash shell script. Evaluated with NS2 and MATLAB.

#### **Multicast Routing with Branch Information Nodes for Wireless Sensor Networks (MR.BIN)**

Jan. 2009 - May. 2010

- Investigated the various overhead issues of existing WSN multicast protocols. Implemented a hybrid approach of geographic unicast routing and state-based multicast routing. Evaluated optimal tradeoff among the overhead of the intermediate nodes states, packet header size, computation time, and energy consumption and balance. Implemented in C++ language. Simulated with NS2 and analyzed with scripting languages including bash shell script, TCL, and AWK.

#### **Adaptive Geo-Source Multicast Routing for Wireless Sensor Networks (AGSMR)**

Sep. 2008 - May. 2009

- Identified the scalability issue of previous location based stateless multicast protocols in Wireless Sensor Networks. Designed and implemented tree construction algorithm with LCRS (Left Child Right Sibling), algorithm to find common source routing path, and algorithm to select branch geographic information. Implemented in C++ on Linux. Simulated with NS2.

## TEACHING EXPERIENCE

### *Assistant/Associate Professor*

Computer Science, California State University-Stanislaus

Aug. 2018 - present

- **Android Mobile Application Development** (CS3810), Summer 2019-2024  
Taught fundamental concepts in the design and implementation of Android mobile application. Covered GUI components, layout (Linear and table layout), activities, MVC model, SQLite, menus and toast, touches and swipes, fragments, and AsyncTask. Guided students to learn how to access remote data using Web service (with JSON data).
- **Web Development** (CS4950), Summer 2024  
Taught an introduction to fundamental concepts in the design and implementation of WWW applications. Covered how the Internet works, static and dynamic web development with HTML (HyperText Markup Language), CSS (Cascading Style Sheet), JavaScript, and some advanced Web development topics. Provided students with hands-on lab activities to build various Web applications.
- **Ecommerce Systems Design (CS4270)**, Fall 2018-2024  
Teaching introduction of fundamental concepts in technologies and architectures of ECommerce systems, and discussing the design and implementation of major components of Ecommerce systems. Topics to be covered include: Hypertext Markup Language (HTML), Cascading Style Sheet (CSS), JavaScript, SQL, Scripting language like PHP, Security in Ecommerce systems, and WordPress. To quickly grasp the concepts and components of Ecommerce Systems, students build a Web site on Shopify first. Then, students build a Web site on Cloud using WordPress and skills including HTML, CSS, JavaScript, SQL, and PHP.
- **Communication Networks** (CS3000), Spring 2019-2025, Fall 2021-2024  
Provided an introduction to fundamental concepts in the design and implementation of computer communication networks, protocols, and architectures. Guided students to understand how popular network applications such as Web browser, FTP client, remote connection, and email work on computer networks. Covered topics including TCP/IP and OSI architecture, application layer (Web, FTP, remote connection, email, client and server interaction), transport layer (TCP/UDP), network layer (IP), data link and physical layers, concept of local area network (LAN) and wide area network (WAN).
- **Cybersecurity Fundamentals** (CS4840), Spring 2019-2025, Fall 2020  
Taught fundamental concepts of information and network security issues. Discussed cryptography (symmetric and asymmetric key encryption), Web security (HTTPS, cross site scripting attack, cross site request forgery, SQL injection), Network security (ARP spoofing, packet sniffing, IP spoofing, DOS, DDOS, TCP session hijacking, SYN flood attack, SSH tunneling, IPsec, VPN). Provided tutorials and guided students' hands-on practice.
- **NoSQL Database System** (CS4280), Fall 2019/2020/2023/2024  
Taught architecture and use-cases of non-relational (NoSQL) systems, including four system types: document, graph, key-value, and wide column store. Discussed core concepts in NoSQL and how to develop applications using NoSQL. Covered advantage and disadvantage of NoSQL compared to Relational SQL, and when to use relational SQL or NoSQL. Guided students to identify and understand and use four main NoSQL models (document, key-value, column family, and graph).
- **Computer Organization** (CS3740), Spring 2021-2025, Fall 2021-2022  
Taught fundamental concepts in instruction set architecture design, digital logic techniques, cache memory, virtual memory, I/O architectures and devices, computer performance enhancements. Selected topics on embedded systems, parallel computer architecture and processing approaches are taught in addition. For practical hands-on labs, virtual machines and Cloud are used.
- **Seminar in CS** (CS4960), Fall 2019-2024, Spring 2021-2025  
Helped students present and discuss selected topics (Big Data, Internet of Things, Cloud, Security, and more) in computer science from the current literature. Taught how to find papers, read and write papers, and improve presentation skills. Guided students to understand the current trends and new skills of the topics.

- **Data Structures and Algorithms** (CS3100), Fall 2018, Spring 2019  
Taught fundamental concepts and abstraction of data structures. Discussed the design and analysis of algorithms involving such data structures as arrays, stacks, queues, lists, trees, strings, graphs, and files. Delivered techniques for estimating the time and memory requirements of computer programs. Provide several large programming assignments. Java programming language is used on Eclipse Java Developer.
- **Individual Study** (CS4980), Fall 2018, Spring 2019, Spring/Fall 2020, Fall 2021, Summer 2022  
Advised students' development and research projects. The topics can be found at "Professional Services" - "Department Service" - "Individual Study Advising" section.

### *Assistant Professor*

Computing and New Media Technologies, University of Wisconsin-Stevens Point Aug. 2015 - May. 2018

- **Information and Network Security** (CIS367), Fall 2016  
Taught fundamental concepts of information and network security issues including **web security** (cross-site scripting attack, SQL injection), **network security** (packet sniffing, IP spoofing, ARP spoofing, firewall, DNS attack, IPSec), malware (virus, worm, trojan horse), and **cryptography** (symmetric/public key encryptions, digital signatures, digital certificate, HTTPS). Discussed security topics related to database, web, mobile, and email applications.
- **Data Communication and Networks** (CIS225), Spring/Fall 2016, Spring/Fall 2017  
Taught fundamental concepts in the design and implementation of computer communication networks, their protocols, and architectures. Talked network applications such as Web browser, FTP client, remote connection, and email on computer networks. Topics to be covered include: socket (TCP/UDP) programming, RMI, REST service, TCP/IP 5 layers (application, transport, network, data link, physical) and protocols in each layer; routing algorithms; error detection; basic concepts of deploying local and wide area networks. Wireshark for packet analysis, GNS3 for deploying network, and Linux (and Eclipse) for **developing network applications** based on socket/RMI/REST are used.
- **Network Management** (CIS355), Fall 2015, Fall 2017  
Taught core concepts in designing and managing a network infrastructure using emulation tool like GNS3 and real network equipments including Cisco switch and routers. Lectured and gave hands-on labs of various network topics including OSI networking models, Ethernet LAN, WAN, IPV4 addressing and Routing, TCP/IP, subnetting (VLAN), OSPF, and NAT. Encouraged students to obtain **Cisco Network Certificate** (CCENT) by having them study exams more in detail.
- **Cloud Computing** (CIS347), Spring 2016  
Introduced practical skills and theoretical knowledge of Cloud computing. Taught how to design, deploy, administer, and use various types of Clouds including private, public, and hybrid Cloud. Taught how to develop Cloud application based on the deployed infrastructure (e.g. RESTful **Web Service**). Students performed team projects that student presented using posters as term project. Used **OpenStack** to deploy private cloud.
- **Object Oriented Programming** (CIS110), Fall 2015, Spring 2016, Spring 2017  
Taught introduction to object-oriented programming paradigm along with basic conditional and looping structures, definition and use of classes, fundamentals of object-oriented design (top-down and bottom-up approaches), development with object-oriented programming language principles, team collaboration using interface and abstract class, inheritance, polymorphism. **Java and Eclipse** are used for programming.
- **Database Design and Implementation** (CIS210), Fall 2016  
Taught methods and skills to analyze and design databases to support computer-based information systems. Discussed relational database management systems using SQL. Taught how to transform business requirements to database model, how to design database model efficiently using DFD (Data Flow Diagram) and ERD (Entity Relational Diagram), and how to implement database with tables, views, and indexes. Instructed how to efficiently add, retrieve, and remove data through the database. **Oracle, MSSQL, and MySQL** are used.

- **iOS Mobile Development** (CIS345 - online), Winter 2017  
Taught how to program mobile application on **iOS** based on **Xcode8 and swift3**. Taught how to design in storyboard, how to connect UI components to logic codes using swift, and how to access local database and cloud database (iCloud). Discussed navigation bar, tab bar, and table UI components for **UI design**. Shared the fundamental concepts of Swift. (optional, closure, class, inheritance, optional chaining, implicit unwrapping, and dictionary and set).
- **Applied System Development Project** (CNMT480), Spring/Fall 2017  
Guide students for projects that applies computer programming, system design, and Web development concepts, principles, and practices to a comprehensive **system development project**. **Waterfall and Agile** methodology are used.

### *Adjunct Faculty*

Computer Science and Electrical Engineering, University of Missouri-Kansas City Jan. 2015 - May. 2015

- **Client and Server Programming and Applications** (CS423), Spring 2015  
Taught fundamentals of Client/Server programming using **socket** interface; features of network programming including connection oriented and connectionless communication in multiple environments (Windows, UNIX, and Java); other client/server mechanisms (**RPC and RMI**) and formal object environments designed to facilitate network programming (CORBA, COM and Beans).
- **Database Design, Implementation and Validation** (CS371), Spring 2015  
Taught all aspects of database management systems. Covered database design, implementation, and validation using various databases including **ORACLE** and **mySQL**. Also, instructed practical skills to retrieve and manipulate data from database through **Web User Interfaces using PHP, JSP, ASP.NET, and mobile applications**.
- **Discrete Structures** (CS191), Spring 2015  
Taught mathematical logic, sets, relations, functions, mathematical induction, algebraic structures with emphasis on computing applications.

Dept. of Information and Computer Science, Park University, MO Sep. 2011 - May. 2012

- **Advanced Java** (CS219), Fall 2011  
Taught advanced **Java** concepts including inheritance and polymorphism as well as basic skills such as array, class (and object), top-down and bottom-up object-oriented programming approaches, and event-driven programming. Designed homework and lecture notes, and guided students' study.
- **Web Programming with ASP.Net** (CS322), Spring 2012  
Taught server-side Web programming skills including **ASP.NET** controls, business logic in **C#, Javascript**, cascading style sheet (**CSS**), and DB design (data flow diagram and entity relational diagram). Instructed students to use ASP.NET, **C#**, and MS Access DB. Guided students to make their own server-side homepages, and designed homework and lecture notes.

### *Professional Instructor*

IBM Education Center, IBM, South Korea Jan. 2002 - May. 2002

- Taught **IBM middleware servers and programming** on **Java**, LotusScript, Lotus Architecture, Lotus Enterprise Integrator, Lotus Workflow to diverse trainees including IBM customers and business partners.
- Obtained high satisfaction over 90 percentage out of 100.

Corporate Education Center, Kolon, South Korea May. 1995 - Apr. 1996

- Taught **Web** to employees, which included various topics related to the Internet such as the concept of **Internet** and Domain, the way to access and utilize Web, and making homepage with HTML.

## *Graduate Assistant*

Sep. 2008 - Dec. 2014

Dept. of Computer Science and Electrical Engineering, University of Missouri-Kansas City

- **Data Structure and Algorithm** (CS351), Fall 2010 - Spring 2012
  - Graded exams, quizzes, homework, and projects covering diverse **data structure topics** including list, stack, queue, tree (including balanced trees), hashing, graph (BFS and DFS), and sorting. In this course, all program codes were written in **C++** (using **visual studio**).
  - Helped students through office hours and special helping sessions.
  - Helped the instructor design a new-trend class project, called **Big-Data analysis** using a distributed program paradigm (Map-Reduce) on **Amazon Cloud** and **IBM Cloud**. Guided students to measure performance of the analysis system.
- **Introduction to Operating System** (CS431), Spring 2014
  - Graded exams, quizzes, and homework, which cover fundamental operating system concepts such as process management (interrupts and multitasking), memory management, CPU scheduling, and file management (including disk scheduling), and a practical example OS (Linux). Designed a class project that helps students understand how OS can handle files efficiently on **Linux**. Substituting several classes for the Instructor.
- **Practical Network Security** (INFO-TEC426), Spring 2014
  - Graded exams, quizzes, and homework directly related to secure network systems where various topics including **network attacks and defenses**, advanced cryptography, firewall systems and design, Virtual Private Network (VPN), and Intrusion Detection System (IDS).
- **Network Architecture I** (CS5520), Fall 2012
  - Assisted the instructor by grading various topics of computer network and guiding students. The topics covered protocol layering, application layer (HTTP, FTP, SMTP, DNS, and Socket), transport layer (TCP and UDP), network layer (IP, Routing algorithms, RIP, OSPF, and BGP), Link layer, and wireless networks (Mobile IP).
  - Guided students for two projects: web proxy cache (written in Java) and performance measurement of TCP and UDP on network test-bed (Emulab).
- **Problem Solving and Programming** (CS201), Summer 2011
  - Helped students program in various topics including array, class and object, overloading, pointers and dynamic memory, recursion, template, linked list, inheritance, stack, queue, and sorting. All programs were implemented in **C++**.
- **Networked Storage System** (CS5590SS), Fall 2009 and 2010
  - For the purpose of research-oriented course, I helped an instructor design several class projects: tutorial to develop codes in large scaled global research network (Planet-Lab), tutorial to get used to **Linux** (**Linux kernel recompilation, IO-scheduling, and Software RAID**).

Dept. of Electrical Engineering and Computer Science , Wichita State University

- **Introduction to Data Storage Systems** (ECE777Q), Spring 2009
  - Designed and guided students for several projects on IO-scheduling, RAID, and Linux Kernel. Tested and deployed on **Linux**.
- **Embedded Systems Programming** (ECE738), Fall 2008
  - Helped an instructor design class projects about wireless sensor networks.

## SKILLS

### Mastery:

- Programming Languages: Java, C++, C
- Operating Systems: Linux
- Network protocols: TCP/IP
- Data de-duplication skills: Fingerprinting, Chunking, Indexing
- Software Defined Network: OpenFlow, OpenVSwitch

### Proficiency:

- Mobile programming: iOS, Android programming
- Web Programming: JSP, PHP, ASP.Net, HTML, CSS, JavaScript
- Database: Oracle, MSSQL, MySQL, Non-Relational Database (Key-value/Document/Graph)
- Big Data: Analysis (Spark/Hadoop)
- Cloud: OpenStack, Azure, Amazon EC2, Google Cloud
- Distributed Programming: Socket(TCP/UDP), RMI, RPC, RESTful Web Service
- Middleware: IBM WebSphere
- Programming Languages: Bash Shell Script, R, Python
- Linux Kernel Programming

### Experienced:

- Programming Languages: Perl, Tcl, Awk

## WORK EXPERIENCE

### *Research Assistant*

Dept. of Computer Science and Electrical Engineering, University of Missouri-Kansas City, MO

Sep. 2009 - May. 2015

- Designed and developed storage and network applications to reduce data volume by removing redundancies using deduplication techniques. Used C and C++ on Linux.
- Implemented efficient multicast routing protocols in Wireless Sensor Networks using network simulator (NS2) and embedded operating system (TinyOS).

Dept. of Electrical Engineering and Computer Science, Wichita State University, KS Sep. 2008 - Aug. 2009

- Designed and implemented lightweight applications to store and retrieve data into networked file system using deduplication techniques. Used C and C++ on Linux.
- Identified the scalability issue of previous location based stateless protocols in Wireless Sensor Networks, and developed a source-based multicast routing.

### *Software Engineer*

Software Group Service, IBM, South Korea

Mar. 2000 - Apr. 2005

- Designed and implemented Web-based email systems using Java on Lotus server.
- Designed and developed Web-based portal systems using Java on IBM WebSphere. Also, managed projects as a project manager.

Kolon Data Communications, South Korea

Jul. 1998 - Dec. 1999

- Developed a Web-based document reporting system using Java.

### *System Architect and Server Administrator*

Software Group Service, IBM, South Korea

Mar. 2000 - Apr. 2005

- Designed system architecture of Web-based email and portal systems.
- Administered AIX (with DB2) and middleware servers such as IBM WebSphere (and WebSphere Portal) and Lotus.

## DEVELOPMENT PROJECTS

Web-based Portal System for KCGF (a government-owned corporation), South Korea

Aug. 2003 - Dec. 2004

- Developed Web-based portal system using WebSphere servers. Designed system architecture. Programmed user interface and back-end data integration in HTML and Java language.

Web-based Portal System for LG, South Korea

Jun. 2002 - Jul. 2002

- Developed user interface and back-end data integration using Java on Websphere Portal framework.

Web-based Email System for Hyosung, South Korea

Nov. 2000 - May. 2001

- Programmed application for a Web-based email system including web-mail, bulletin board, and document management. Programmed in HTML, LotusScript, JavaScript, and Java on Lotus server.

Web-based Reporting System for FSS (a government department), South Korea

Jul. 1998 - Dec. 1999

- Designed and programmed Web-based reporting system through which companies in Korea submit financial reports such as annual reports. Programmed in Java, HTML, JavaScript, JDBC on AIX and Oracle database. Extensible Markup Language (XML) was used for electronic reports. Designed business logic with Data Flow Diagram (DFD) and Entity Relational Diagram (ERD).

## PROFESSIONAL DEVELOPMENT

1. Participation and presentation, "CSU Systemwide Virtual IT-Cybersecurity Roundtable", online, June 17 2022
2. Participation, "IEEE International Conference on Communications (ICC)", Seoul Korea, May 16-20 2022
3. Participation, "NSF Big Data Cloud Computing (BDCC) Faculty CSU Workshop", online, March 19 2022
4. Participation, "CHEESEHub Workshop on Cybersecurity Education", online, July 26,27 2021
5. Participation, "IEEE International Conference on Communications (ICC)", online, June 14-23, 2021
6. Participation, "ACM Technical Symposium on Computer Science Education (SIGCSE)", online, March 13-20, 2021
7. Participation, "Google Faculty Institute 2020: Cloud in the classroom", online, September 18 2020,
8. Participation, "SEED (SEcurity EDucation) Workshop", 3 hours per week, online, June 25 - August 20 2020, <https://seedsecuritylabs.org/workshops/>
9. Participation, "Virtual and Augmented Reality (VR/AR) in STEM Teaching and Learning", online, July 23 2020
10. Participation, "Quality Learning and Teaching/Faculty Learning Community (QLT/FLC) Workshop", Fall 2019 - Spring 2020
11. Participation, "ACM Technical Symposium on Computer Science Education (SIGCSE)", Minneapolis, Minnesota, March 13-20, 2019
12. Participation, "Writing & Designing NSF Proposals Workshop", February 23, 2016