Dr. Jiachen Chen

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SUMMARY

Computer scientist/engineer with 10+ years of experience in computer networking and future Internet architecture, with sound knowledge of information-centric networking, software-defined networking, (edge) cloud, and delay-tolerant networking; strong skills in system architecture design, UI/UX design, and programming; and familiarity with project management and software development lifecycle. Seeking a full-time system architect/advanced development/research position with hands-on tasks in cloud applications, AR/VR, or computer networking.

EDUCATION

PhD in Computer Science, *University of Göttingen, Germany* **09.2010 – 03.2015**

PhD Programme in Computer Science (PCS), Georg-August University School of Science (GAUSS), Institute of Computer Science, Computer Networks Group

- Dissertation Topic: A Content-Oriented Architecture for Publish/Subscribe Systems
- **Graduated with Summa Cum Laude (highest honor)**

Master in Software Engineering, *Fudan University, China* **09.2008 – 07.2010**

Master of Engineering, Software School, Public Performance and Information Research Center (PPIRC)

- Thesis Topic: Fast Active Tabu Search and Its Application to Image Classification

Bachelor in Software Engineering, *Fudan University, China* **09.2003 – 07.2007**

Bachelor in Computer Science, *University College Dublin, Ireland* **09.2003 – 07.2007**

PROFESSIONAL EXPERIENCE

Postdoctoral Researcher, *WINLAB, Rutgers University, USA* **11.2015 – Present**

Network Research Lead, NSF future Internet architecture project: Participated in the design and implementation of MobilityFirst, a clean-slate architecture aiming at supporting mobility and content-centric networking.

- Redesigned the architecture of MobilityFirst over Click modular router:
  - Designed a module-based architecture that minimizes data sharing between threads, enabling efficient multi-threaded processing on multi-port software routers.
  - Took advantage of RCU to minimize locking overhead between control plane and data plane.
  - Accelerated the processing in the data plane with DPDK and P4 (up to 40Gbps throughput).
- Developed MF-IoT, a clean-slate architecture that extends MobilityFirst into IoT systems, supporting mobility and global-reachability at large scale:
  - Designed light-weight MF-IoT protocol and gateways that translate between MF and MF-IoT.
  - Implemented MF-IoT in C (in RIOT) and address translation gateways in C++/Java (in Linux).
  - Application "Motion-Triggered Surveillance Camera using MF-IoT" received best demo award in IoTDI'17.
- Led the SES-Rutgers Satellite-CDN project, seeking for efficient delivery of (video) contents across multiple CDN sites using satellites and content-centric networking:
  - Led the design and implementation of satellite-CDN system for Video on Demand applications over MF.
  - Studied content-oriented security and adopted ECDSA for content authenticity in MF.
  - In charge of the project lifecycle and the collaboration with partners of SES and iDirect.
- Led the research of improving VR multiplayer games (VR-MMOG) with edge-clouds for lower latency, higher refresh rate, better video quality and lower core-network traffic:
  - Investigated the new requirements and identified new features for VR-MMOGs;
  - Designed an architecture which takes advantage of edge clouds to render VR games for thin clients.
  - Optimized Markov Decision Process (MDP) for edge cloud migration in the game system with user mobility.

Principal Investigator, NIST Public Safety Innovation Accelerator Program (06.2017 – 05.2021): Applied for and received funding on project ReDiCom (3 years, $1.2M, 4 partners), seeking to model and develop resilient communications for first responders in disaster management:

- Modeled communication and infrastructure support in disasters based on public reports and datasets.
- Proposed a publish/subscribe architecture over graph-based namespace for communication among first responders along multiple command chains in disaster management.

- Developed a security solution for confidentiality (using attribute-based encryption) and authenticity (using digital certificate and chain-of-trust).
- Designed a layered architecture for different components studied and implemented in the project.
- In charge of demos (Android, ReactJS) in PSCR annual conferences (2018 – 2021), LANMAN'18, and ICNP'19:
  - The graph-based pub/sub application received best demo award in LANMAN'18.
- Project management: proposal writing, progress control, budget planning and management.

Project Leader, NIST Tech-to-Protect challenge (11.2019 – 11.2020): Developed Next-Gen MCPTT to provide efficient push-to-talk (PTT) services for first responders:

- Investigated the issues with existing mission-critical push-to-talk (MCPTT) services.
- Improved Mission-Critical Open Platform (MCOP) with store and play features, enabling first responders play (or re-play) audio on demand, and speak without the need to wait for the floor.
- Enhanced the application with cloud-based text-to-speech, speech-to-text, and map functionalities.
- Enabled the use of application in infrastructure-less environments via D2D communications.
- Awarded the 1st prize in both the in-person contest (New York) and online contest (nation-wide).

Research Assistant, *Computer Networks Group, University of Göttingen, Germany* **07.2010 – 10.2015**

Participated in the research of Information-Centric Networking.

- Performed research on Content-Centric Networking and pub/sub systems.
- Developed an efficient architecture for content-centric publish/subscribe systems:
  - Designed the pub/sub protocol (COPSS), a congestion-control protocol for multicast (SAID), an incremental deployment solution (COPSS-hybrid), and an object resolution service for name discovery (ORICE).
  - Implemented a prototype over CCNx/NDNx to demonstrate the feasibility of the solution, and an event-driven network simulator to prove the efficiency at scale.
  - Developed applications using COPSS: CNS (messaging for disaster management) and G-COPSS (gaming).
  - The research received EU-Japan FP7 fuding under project GreenICN (3 years, €3M, 6 partners).
- Proposed to adopt information-centricity concepts in network management:
  - Designed and implemented function-centric service chaining mechanism (FCSC) for flexible, scalable, and reliable traffic steering in access networks and clouds.
  - The work received best paper award in ACM ICN'14
- Designed a solution for interoperability among IP and ICNs without introducing another protocol.

Research Assistant, *PPIRC, Fudan University, China* **06.2009 – 11.2010**

Designed/adopted machine-learning techniques for natural-language processing and image classification:

- Developed a DOM-based web crawler and informative section analyzer using C# browser APIs. Created an information pool (>50GB) and indexed using Lucene for keyword-based content retrieval.
- Participated in and led teams in the NIST Text Retrieval Conference (TREC) contest. Ranked #3 in 2007 Spam track, #4 in 2008 Enterprise Track, and #2 in 2010 Entity track.
- Studied Geometric Manifold Entropy (GEOMEN) for image classification. Designed a classification algorithm with high accuracy and accelerated it using CUDA.

Programmer, UX Designer, *Rofine (Shanghai) Computer Tech. Co., Ltd., China* **06.2007 – 07.2009**

Developed Rich Internet Applications for data visualization using Adobe AIR/Flex, WPF/C#, and AJAX.

SKILLS

Knowledge Areas: Information-Centric Networking, Pub/Sub Systems, Software-Defined Networking, Security, Edge Computing, IoT, System Architecture, Parallel Processing, Machine Learning, UI/UX
Languages: C++, C & CUDA, Java & Android, ReactJS, C#, Python, R, VB, SQL, GraphQL
Tools: NS2, NS3, OMNET++, Wireshark; MATLAB; Lucene, Lemur (Information Retrieval); MS SQL Server, MySQL, SQLite, Oracle, DB2, MangoDB, BerkeleyDB; JWT, Firebase

PROFESSIONAL ACTIVITIES

TPC Members: ICNP'19, ICNP'18, VTC2018-Fall, ITC'17, NOM'17, CFI'16, ICNP'13 (poster & demo)
Peer Reviews: (Conferences) CoNext'21, ICNP'20, HotNets'20, LANMAN'20, SIGCOMM'19, ICN'16, NOM'16, … (Journals) TMC, TSC, COMNET, ToN
Invited Talks: IEEE 5G Tutorial on 5G IoT Networks (2017), ACM/IEEE HotWeb'17, IEEE IoTDI'16
Web Chairs: ICNP (2018 – 2021)