Jiayi Meng

meng72@purdue.edu 765-775-8552
https://www.cs.purdue.edu/homes/meng72

EDUCATION

Purdue University — **West Lafayette, IN, USA**
Master & Ph.D. of Computer Science — *Aug. 2016 - Present*

University of Science and Technology of China (USTC) — **Hefei, Anhui, China**
B.E. of Computer Science and Technology — *Sep. 2012 - July 2016*

University of California, Los Angeles (UCLA) — **Los Angeles, CA, USA**
UCLA-Cross-disciplinary Scholars in Science and Technology Program — *July. 2015 - Sep. 2015*

EXPERIENCE

Purdue CS180: Programming I & CS240: Programming in C — *May 2021 - Aug. 2021*
Teaching Assistant

Purdue ECE595: Introduction to Operating Systems — *Aug. 2019 - Dec. 2019*
Grader

AT&T Research Labs — *June 2019 - Aug. 2019*
Research Intern

RESEARCH HIGHLIGHTS

Enabling High-Quality Deep Neural Network-based MR on Mobile Devices — *Since Sep. 2020*
Advisor: Prof. Y. Charlie Hu

- Demonstrated the potentiality of edge-assisted Mixed Reality (MR) which offloads Deep Neural Networks (DNN)-based MR tasks (e.g. motion tracking, depth estimation and object detection) to edge servers to achieve reasonably real-time high accuracy on resource-constrained mobile devices.
- Experimentally studied an important design challenge of single-task edge-assisted MR (i.e. an instance of AR) about how to pick a DNN model out of many choices proposed to run on the edge server.
- Designed optimal offloading schedule and further considered the impact of numerous factors such as on-device fast tracking, frame downsizing and available network bandwidth for single-task MR.

Proactive Energy-Aware Adaptive Video Streaming on Mobile Devices — *Sep. 2019 - Aug. 2020*
Advisor: Prof. Y. Charlie Hu

- Observed that the built-in QoE optimization frameworks of modern mobile apps naturally lend themselves to proactive energy-aware app adaptation, which should outperform classic reactive energy-aware app adaptation.
- Showcased how to integrate user-specified energy budget with the built-in app adaptation logic of MPC-based Adaptive Bitrate (ABR) streaming system, which has been open-sourced.
- Evaluated proactive energy-aware video streaming improves QoE by 44.8% (Pixel 2) and 19.2% (Moto Z3) over the reactive approach under low power budget.

Network-Side 5G User Localization using Angle-Based Fingerprints — *June 2019 - Aug. 2019*
Advisor: Dr. Abhigyan Sharma; Prof. Y. Charlie Hu

- Demonstrated that geometry-based approach has limitations on supporting accurate localization for cellular user equipments (UE) due to the lack of line-of-sight (LoS) transmissions.
- Proposed to exploit multipath propagtion as well as angle-of-arrival (AoA) of different paths to fingerprint UE

in 5G network.
- Evaluated that the proposed technique achieves comparable or even 2.2X higher accuracy than RSRP-based fingerprinting technique in simulation using ns-3.

Enabling High-Quality Multiplayer VR on Mobile Devices over WiFi *Mar. 2018 - June 2019*
Advisor: Prof. Y. Charlie Hu

- Experimentally demonstrated that the prior-art 2-layer distributed VR rendering architecture fails to support 4k-resolution multiplayer VR apps due to the linear increase in network bandwidth requirement.
- Proposed to explore the similarity of background environment (BE) frames to reduce the network load in prefetching BE frames.
- Presented a novel technique to significantly enhance the similarity of BE frames and thus reduce the network load from frame caching.
- Evaluated that the proposed technique reduces per-player network requirement by 10.6X−25.7X and easily supports 4 players for high-resolution VR apps on Pixel 2 over 802.11ac, with 60 FPS and under 16ms responsiveness.

LTE Modem Power Measurement, Analysis and Optimization *Feb. 2017 - Nov. 2017*
Advisor: Prof. Y. Charlie Hu

- Built the first fine-grained event-based power model for LTE modems, which captures the power draw of all LTE modem power-on events due to both data and control procedures in different RRC states.
- Analyzed modem energy drain with the new modem power model using the data collected in the wild.
- Correlated modem energy drain with LTE control events, which exposes potential modem optimizations.

Building NIDS using GPU on the NFV Platform *Mar. 2016 - July 2016*
Advisor: Prof. Bei Hua

- Virtualized the network function, Network Intrusion Detection System (NIDS), on Docker, a software technology providing operating-system-level virtualization.
- Accelerated and optimized the performance of NIDS using Intel DPDK and GPU.

PUBLICATIONS

- **[Sigcomm NAI'21]: Jiayi Meng***, Zhaoning Kong*, Qiang Xu and Y. Charlie Hu. *"Do Larger (More Accurate) Deep Neural Network Models Help in Edge-assisted Augmented Reality?"* (*co-primary)
- **[ATC'21]: Jiayi Meng**, Qiang Xu and Y. Charlie Hu. *"Proactive Energy-Aware Adaptive Video Streaming on Mobile Devices"*
- **[ASPLOS'20]: Jiayi Meng***, Sibendu Paul* and Y. Charlie Hu. *"Coterie: Exploiting Frame Similarity to Enable High-Quality Multiplayer VR on Commodity Mobile Devices"* (*co-primary)
- **[LANMAN'20]: Jiayi Meng**, Abhigyan Sharma, Tuyen X. Tran, Bharath Balasubramanian, Gueyoung Jung, Matti Hiltunen and Y. Charlie Hu. *"A Study of Network-Side 5G User Localization Using Angle-Based Fingerprints"*
- **[MobiCom'19]:** Shivang Aggarwal, Swetank Kumar Saha, Pranab Dash, **Jiayi Meng**, Arvind Thirumurugan, Dimitrios Koutsonikolas, and Y. Charlie Hu. *"Poster: Can Mobile Hardware Keep Up with Today's Gigabit Wireless Technologies?"*
- **[SIGMETRICS'18]:** Xiaomeng Chen, **Jiayi Meng**, Y. Charlie Hu, Maruti Gupta, Ralph Hasholzner, Venkatesan Nallampatti Ekambaram, Ashish Singh, and Srikathyayani Srikanteswara. *"A Fine-grained Event-based Modem Power Model for Enabling In-depth Modem Energy Drain Analysis"*
- **[IMC'18]:** Haotian Deng, Chunyi Peng, Ans Fida, **Jiayi Meng**, and Y. Charlie Hu. *"Mobility support in cellular networks: A measurement study on its configurations and implications"*
- **[NSDI'18]:** Kai Zhang, Bingsheng He, Jiayu Hu, Zeke Wang, Bei Hua, **Jiayi Meng**, and Lishan Yang. *"G-NET: Effective GPU Sharing in NFV Systems"*

AWARDS AND HONORS

- Student Grant of USENIX ATC *2021*
- Student Travel Grant of ASPLOS *2020*
- Student Travel Grant of Sigmetrics *2018*
- Best Undergraduate Thesis *2016*
- Outstanding Graduates on Good Character and Excellent Research *2016*
- Honorable Mention of 2015 Mathematical Contest in Modeling *2015*
- CCF Outstanding Undergraduate Award *2015*
- Huawei Scholarship *2014*
- National Scholarship *2013*

PROFESSIONAL SERVICES

- Artifact Evaluation Committee member for USENIX SOSP 2021
- Artifact Evaluation Committee member for ACM SIGCOMM 2021
- Artifact Evaluation Committee member for Eurosys 2021

LEADERSHIP AND ACTIVITIES

- Class President *2012-2016*
- President of Television Host Club *2014-2015*
- Producer of 2013-2014 USTC Singing Competition, KSTAR *2013-2014*
- Conductor of College Choir and Got the first prize of the "12.9" choir competition *2012*

TECHNICAL SKILLS

- Skillful in: C/C++, Python, Java, C#, SQL, CUDA, openGL, Linux, Unity
- Familiar with: VHDL, Assembly, Matlab, Origin, Mathematica