

# Chih-Ho Hsu

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## Education

### National Taiwan University (NTU)

Sep. 2016 – Jan. 2021(expected)

- Bachelor of Science in Electrical Engineering, GPA: 3.3/4.0 (Overall)
- Specialized in related topics in Wireless Communication and Networking, including *Adaptive Video Streaming, Vehicular Edge Computing, Caching, Task Offloading, Network Slicing, Social Network, Reinforcement Learning*

## Publications

### Journal Papers

- [1] Y. Chiang, **C. Hsu**, and H. Wei, "Collaborative Social-Aware and QoE-Driven Video Caching and Adaptation in Edge Network," in *IEEE Transactions on Multimedia*, 2020. [Demo] [Link]
- [2] Y. Chiang, Y. Chao, **C. Hsu**, C. Chou and H. Wei, "Virtual Network Embedding With Dynamic Speed Switching Orchestration in Edge Network," in *IEEE Access*, vol. 8, pp. 84753-84768, 2020. [Link]
- [3] **C. Hsu**, Y. Chiang, and H. Wei, "Deep Q-Learning based Joint Dynamic Network Slicing and Resource Allocation in Multi-Tenant Edge Computing System," in preparation, 2021.
- [4] Y. Zhang, Y. Chiang, **C. Hsu**, Y. Chao, and H. Wei, "Management and Orchestration of Edge Computing: A Survey on State-of-the-art Techniques and Infrastructures," submitted to *IEEE Communications Surveys & Tutorials*, 2021.

### Conference Papers

- [5] **C. Hsu**, Y. Chiang, and H. Wei, "Mobility-Aware Joint QoS Promotion and Load Balancing in MEC-based Vehicular Networks: A Deep Learning Approach," to appear in *IEEE Vehicular Technology Conference (VTC)*, 2021.
- [6] Y. Chao, Y. Chiang, **C. Hsu**, C. Chou and H. Wei, "Satellite-UAV-MEC Collaborative Architecture for Task Offloading in Vehicular Networks," to appear in *IEEE GLOBECOM Workshops*, 2020.
- [7] **C. Hsu**, "MEC-Assisted FoV-Aware and QoE-Driven Adaptive 360° Video Streaming for Virtual Reality," to appear in *IEEE International Conference on Mobility, Sensing and Networking*, 2020.
- [8] **C. Hsu**, Y. Chiang, and H. Wei, "QoE-Driven Interest-Based Video Caching and Adaptation in 5G Mobile Edge Network," poster in *Taiwan Telecommunication Annual Symposium*, 2020.

## Research Experiences

### Wireless Mobile Network Laboratory, NTU

Advisor: Prof. [Hung-Yu Wei](#)

Research Assistant

Feb. 2020 – Present

- **Researched on emerging techniques in 5G&B mobile network** [2], [3], [4]
  - Surveyed 350+ papers on challenges, state-of-the-art researches and implementation of edge computing
  - Collaborated on architecture design and simulation design of Virtual Network Embedding (VNE) problem
  - Designed a low-complexity and load-balanced routing algorithm to guarantee heterogeneous QoS in SDN
  - Implemented the container-based dynamic network slicing system with workload prediction in our 5G testbed
- **Researched on mobility-aware task offloading in vehicular edge network** [5], [6]
  - Constructed a Deep Learning model to jointly optimize offloading decision, allocation of spectrum and computing resources in RAN, constrained by energy consumption, delay-tolerance and vehicles' mobility
  - Developed a 2-stage method to jointly optimize UAV deployment and resource allocation for vehicular network

Undergraduate Researcher

Sep. 2018 – Jan. 2020

- **Researched on cache-enabled social-aware adaptive video streaming** [1], [8]
  - Formulated a hybrid Quality of Experience (QoE) model for adaptive video streaming, consisting of video resolution, resolution switching rate, initial buffering time and video stalling time
  - Implemented a statistical time series model to predict interactions among users in Online Social Networks (OSN)
  - Established a mathematical model to quantify the information dissemination among users in OSN
  - Designed a Social-aware QoE-driven framework to optimize video caching and video transcoding decision in a 2-tier MEC system based on viewing history, information dissemination state and users' channel condition
  - Conducted experiments with real-world traces to validate the proposed framework

## Work Experiences

### Global Communications Conference (GLOBECOM), IEEE

Aug. 2020

Reviewer

- Reviewed a paper on vehicular edge computing network that was submitted to workshop on RAFNET

## **Cinnamon AI Taiwan Inc., Taipei**

Jul – Aug. 2019

### *Summer Internship*

- Maintained online model serving pipeline with Docker and Tensorflow
- Performed text recognition by designing specialized loss function and data preprocessing mechanism for *MobileNetv3*

## **BroadMission Technology, Remote**

Jan. – Jul 2019

### *Software Engineer (part-time)*

- Developed customized DevOps tool with *RedHat*, realizing CICD tracking by Hygiea, Jenkins, Maven, SonarQube, Jmeter
- Developed a home supervision system, by realizing RTSP-based streaming platform, real-time object recognition with Yolov3 and LSTM-based anomaly detection mechanism
- Developed a serverless Chatbot, realizing user classification, customized response and hierarchical control interface

## **Foxconn Advanced Communication Academy, Taipei**

Sep. 2018 – Jun 2019

### *Internship*

- **Collaborated with Intel Corp. to develop commercial platform for 5G network infrastructure management**
  - Orchestrated edge hosts in Multi-access Edge Computing (MEC) system with OpenStack and Kubernetes
  - Implemented network microservices instantiation and policy-driven lifecycle management with ONAP
  - Constructed GUI and role-based access control for the MEC system

## **Cyber-Physical Systems Research Group, NTU**

May – Jun 2018

### *Undergraduate Assistant*

- Collaborated on analyzing images of endoscopic surgery for labeling and building the website for crowdsensing

## **Advanced Material Research Group, NTU**

Feb. – Aug. 2017

### *Undergraduate Assistant*

- Implemented plant factory, realizing automatic measurement and control of temperature, moisture, light, and gases

## **Skills**

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<b>Programming:</b>	Python, C++, PHP, JavaScript, Java, C#, MATLAB
<b>Framework:</b>	Tensorflow, OpenCV, Pytorch, Vue.js, Django, Flask, MySQL, Mininet, Git
<b>Platform:</b>	OpenStack, Kubernetes, ONAP, AWS, GCP, Azure, Docker, Jenkins
<b>Software:</b>	LaTeX, Unity, Android Studio, SolidWorks, Arduino, Quartus II, PSpice, LabVIEW

## **Course Projects**

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### **Task Offloading for AR in MEC System with Dynamic Network Slicing**

Aug. – Oct. 2020

#### *Wireless and Mobile Network Laboratory*

- Constructed a Augmented Reality application on Android, realizing object detection, object projection and rendering
- Implemented a 5G ETSI-MEC testbed, where AR apps can offload its computation tasks to proximate edge servers
- Built a container-based dynamic network slice that can adjust the isolated resources based on workload prediction

### **Analysis of Task Scheduling Algorithms for FPGA HLS**

May – Jun 2020

#### *Introduction to Electronic Design Automation*

- Implemented state-of-the-art resource-constrained scheduling algorithms for FPGA HLS, including list scheduling, force-directed scheduling, DRL, GA, SA and ACO
- Compared the performances of algorithms in terms of complexities and the completion time of dependant tasks

### **SMS-Controlled Smart and Reliable Pet Keeper**

Jan. – Feb. 2020

#### *Personal Communications Services*

- Constructed an automatic pet feeding system controlled by Arduino through Bluetooth communication
- Developed an Android APP to remotely feed and monitor the pets through Short Message Service (SMS)

### **Analysis of D2D Caching Schemes in Heterogeneous Network**

May – Jun 2019

#### *Introduction to Wireless and Mobile Networking*

- Implemented simulations for heterogeneous network by modeling user mobility, inter-cell interference from D2D and BS2D communication, and wireless fading channels
- Evaluated the performances of 4 widely-used D2D caching schemes from a selected paper

### **P2P-based Multi-user Concurrent Video Conference System**

May – Jun 2018

#### *Introduction to Computer Network*

- Realized multi-user video conferencing by constructing TCP client and server sockets
- Synchronized different video source from multiple users by implementing an orchestration node