Aoyu Gong

Contact Information

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Education

Master of Science, Communication Systems *Sep. 2021 – Present*

École Polytechnique Fédérale de Lausanne (EPFL), Lausanne, Switzerland

- GPA: **5.70/6.00**

Bachelor of Engineering, Communication Engineering *Sep. 2015 – Jun. 2019*

Nanjing University of Science and Technology (NJUST), Nanjing, China

- Advisor: Prof. Yijin Zhang
- GPA: **3.90/4.00**

Preprints & Publications

* stands for the equal contributions.

6. Jingwei Liu, Rui Zhang, **Aoyu Gong**, He Chen, "Optimizing age of information in wireless uplink networks with partial observations," *submitted*, Jun. 2022.
5. **Aoyu Gong**, Yijin Zhang, Lei Deng, Fang Liu, Jun Li, Feng Shu, "Dynamic optimization of random access in deadline-constrained broadcasting," *major revision*, Jun. 2022.
4. Yijin Zhang*, **Aoyu Gong***, Lei Deng, Yuan-Hsun Lo, Yan Lin, Jun Li, "Achieving maximum urgency-dependent throughput in ALOHA-like random access," *submitted*, Apr. 2022.
3. **Aoyu Gong***, Tong Zhang*, He Chen, Yijin Zhang. "Age-of-information-based scheduling in multiuser uplinks with stochastic arrivals: A POMDP approach," in *Proc. IEEE GLOBECOM*, Dec. 2020, pp. 1–6. [Code] [Slides]
2. Fan Zhang, **Aoyu Gong**, Lei Deng, Yijin Zhang. "Scheduling algorithms for wireless downlink with deadline and retransmission constraints," in *Proc. IEEE ICCT*, Oct. 2020, pp. 736–740.
1. Yijin Zhang, **Aoyu Gong**, Yuan-Hsun Lo, Jun Li, Feng Shu, Wing Shing Wong. "Generalized p-persistent CSMA for asynchronous multiple-packet reception," *IEEE Trans. Commun.*, vol. 67, no. 10, pp. 6966–6979, Oct. 2019.

Research Experience

Dynamic Optimization of Random Access in Deadline-Constrained Broadcasting

[Research Collaborator] with Prof. Yijin Zhang *Jun. 2020 – Feb. 2021*

- Consider dynamic optimization of random access in deadline-constrained broadcasting with frame-synchronized traffic.
- Define a dynamic control scheme that allows each active node to determine the transmission probability based on the local knowledge of current delivery urgency and contention intensity.
- Develop a Markov decision process (MDP) framework for an idealized environment and a partially observable MDP (POMDP) framework for a realistic environment.
- Investigate the behaviors of the optimal scheme for extreme cases in the MDP framework, leverage intuition gained from these behaviors to propose a heuristic scheme for the realistic environment,

and generalize the heuristic scheme to support retransmissions.

AoI-Based Scheduling in Multiuser Uplinks with Stochastic Arrivals

[Research Collaborator] with Prof. He Chen and Dr. Tong Zhang *Mar. 2020 – Aug. 2020*

- Consider a multiuser uplink status update system, where a monitor aims to timely collect randomly generated status updates from multiple end nodes through a shared wireless channel, i.e., to schedule the end nodes to minimize the network-wide age-of-information (AoI).
- Formulate this problem as a POMDP and design a low-complexity myopic policy.

Generalized p-Persistent CSMA for Asynchronous Multiple-Packet Reception

[Principal Investigator] supported by the National Undergraduate Innovation and Entrepreneurship Training Program under Grant 201710288029 *Apr. 2017 – Oct. 2018*

- Consider a multiple-access system with multiple-packet reception capability γ, i.e., a packet can be successfully received as long as it overlaps with $\gamma - 1$ or fewer other packets at any instant during its lifetime.
- Generalize p-persistent carrier-sense multiple access (CSMA) to consider that a user with carrier sensing capability c adopts the transmission probability p_n if this user has sensed n ongoing transmissions for $n = 0, 1, \ldots, c - 1$.
- Formulate such CSMA as a parameterized MDP and use the long-run average performance to evaluate the saturation throughput.
- Modify this MDP to establish an upper bound on the maximum throughput, and modify this MDP again to propose a heuristic design with near-optimal performance.

Awards & Honors

Provincial Best Bachelor Thesis Award *Sep. 2020*

- Awarded by Jiangsu Provincial Department of Education (across all disciplines)

Bachelor of Engineering with Honors *Jun. 2019*

- Awarded by Nanjing University of Science and Technology (**top 5%**)

NJUST Best Bachelor Thesis Award *Jun. 2019*

- Awarded by Nanjing University of Science and Technology (across all disciplines)

National Scholarship (Three Times) *Nov. 2018 / Nov. 2017 / Nov. 2016*

- Awarded by Ministry of Education of the People's Republic of China (**top 1%**)

NJUST Special-Class Scholarship (Six Times)
Mar. 2018 / Sep. 2018 / Mar. 2017 / Sep. 2017 / Mar. 2016 / Sep. 2016

- Awarded by Nanjing University of Science and Technology (**top 1%**)

Interests & Skills

Area of Interest:

- Random-access protocols in wireless networks
- Timely status update in real-time monitoring

Computer Skills:

- MATLAB, Python