

# Yuzhe Yang

<https://yyzharry.github.io/>

Room505, Yanyuan45#, Peking University, Beijing, 100084, P. R. China  
(+86)1880-108-7681      yuzheyangpku@gmail.com

## EDUCATION

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**School of Electronic Engineering and Computer Science, Peking University**

*Aug. 2014 - Present*

- **Overall Ranking: 4/53, Cumulative GPA: 3.71/4, Major GPA: 3.83/4**
- **Junior Year Ranking: 1/53, Cumulative GPA: 3.92/4, Major GPA: 3.93/4**
- **Core Courses:** Information and Coding Theory (96/100), Methods of Mathematical Physics (97/100), Data Structure and Algorithm (96/100), Electrodynamics (99/100), Signals and Systems (93/100), Principle of Microcomputer (99/100), Computer Networks (Honor Track) (95/100), Principle of Circuit Analysis (92/100), Academic Writing and Report (92/100), Emerging Techniques for Modern Wireless Communications (94/100)

### Honors and Awards:

- 2017 IEEE ComSoc Student Competition **First Prize** (1<sup>st</sup> out of 23 finalists), serving as *Team Leader*
- 2017 National Scholarship (highest honor), The Chinese Government, Top 0.1% nationwide
- 2017 Huawei Scholarship, Peking University, Top 0.7% among undergraduates
- 2017 Outstanding Undergraduate Research Award, Peking University, Top 1%
- 2017 Distinguished All-Round Leader-Student, Peking University, Top 1/53
- 2016 Samsung Scholarship, Samsung Electronics Co., Ltd, Top 3/53
- 2016 Distinguished All-Round Student, Peking University, Top 3/53

## RESEARCH EXPERIENCE

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**Research Assistant, Institute of Wireless Communications and Signal Processing**

*Advisor: Prof. Lingyang Song, School of EECS*

### I. Sensor Location Recommendation for 3D Fine-Grained Air Quality Monitoring via Semi-Supervised

#### Learning

*Sept. 2017 – Present*

- Designed a multi-layer 3D spatial-temporal correlation graph model; proposed an entropy-based semi-supervised learning method for air quality index (AQI) estimation, based on very sparse raw data
- Designed an Entropy Minimization Ranking algorithm to select and recommend most suitable sensor locations for 3D fine-grained AQI monitoring
- Constructed method greatly outperforms other methods w.r.t. estimation accuracy, and the proposed algorithm provides near-optimal choices for sensor deployment

### II. Optimal Drone Trajectory Planning for 3D Mobile Sensing

*Jun. 2017 - Aug. 2017*

- Defined the “dominating path” using the concept of dominating set; established a multi-layer 3D network model; formulated the problem as the minimum dominating path problem
- Mathematically derived the function of optimal dominating path for the 3D grids; determined the lower bound of the optimal path for different sizes of grids
- Proposed algorithm saved 32% time, while covering 19% more sensing scope than existing solutions

### III. Realtime Profiling of Fine-Grained 3D AQI Distribution using UAV Sensing

*Dec. 2016 - Jun. 2017*

- Designed a mobile sensing system by unmanned-aerial-vehicle (UAV) to profile realtime fine-grained 3D AQI map
- Proposed a novel distribution model that consists of a linear part using Gaussian Plume model (GPM), and a non-linear part using Artificial Neural Networks (ANNs)
- Designed the adaptive monitoring algorithms for UAV measurement, and formulated a sub-optimal trajectory planning algorithm
- Demo video can be found on YouTube: [https://www.youtube.com/watch?v=POX-kazz\\_Ec](https://www.youtube.com/watch?v=POX-kazz_Ec)

### IV. Outdoor 3D Spectrum Map Reconstruction via UAV Sensing

*Jul. 2016 – Dec. 2016*

- Assembled two UAVs with separate modules, adjusted their PID parameters by debugging motors' outputs (using SITL on Linux to do UAV simulation), and realized stable flying and loitering
- Divided outdoor complex space into cubes with regular shape, using an Android smartphone boarded on the UAV to sense the Wi-Fi intensity, i.e. received signal strength (RSS)
- Used random walking model via Markov chain for UAV to detect possible dramatic changes

## PUBLICATIONS

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- **Yuzhe Yang**, Zijie Zheng, Kaigui Bian, Lingyang Song and Zhu Han. “Realtime Profiling of Fine-Grained Air Quality Index Distribution using UAV Sensing,” accepted by *IEEE Internet of Things Journal*, Nov. 2017.
- **Yuzhe Yang**, Zijie Zheng, Kaigui Bian, Yun Jiang, Lingyang Song and Zhu Han. “Arms: A Fine-grained 3D AQI Realtime Monitoring System by UAV,” *IEEE Global Communications Conference (Globecom)*, Singapore, Dec. 2017.
- **Yuzhe Yang**, Zijie Zheng, Kaigui Bian, Lingyang Song and Zhu Han. “Sensor Deployment Recommendation for 3D Fine-Grained Air Quality Monitoring using Semi-Supervised Learning,” *IEEE International Conference on Communications (ICC)*, Kansas City, MO, May 2018.
- **Yuzhe Yang**, Zhiwen Hu, Zijie Zheng, Kaigui Bian and Lingyang Song. “3D Air Pollution Monitoring System in Urban Areas using UAV,” **First Prize** (1<sup>st</sup> out of 23 finalists), *IEEE ComSoc Student Competition: Communication Technology Changing the World*. Aug. 2017.
- **Yuzhe Yang**, Zixuan Bai, Zhiwen Hu, Zijie Zheng, Kaigui Bian and Lingyang Song. “AQNet: Fine-Grained 3D Spatio-Temporal Air Quality Monitoring by Aerial-Ground WSN,” submitted to *IEEE International Conference on Computer Communications (INFOCOM)*, Honolulu, HI, Apr. 2018.
- Pengyu Zhao, **Yuzhe Yang**, Yuanxing Zhang, Kaigui Bian and Lingyang Song. “Optimal Trajectory Planning of Drones for 3D Mobile Sensing,” submitted to *ACM SIGCOMM*, Aug. 2018.
- Kaigui Bian, **Yuzhe Yang**, Zhiwen Hu, Zijie Zheng, Lingyang Song, Wotao Yin and Zhu Han. “AQI-Patroller: 3D Air Quality Profiling in Urban Areas using Drones,” submitted to *IEEE Internet of Things Journal*, Nov. 2017.

## COURSE PROJECTS

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### Dynamic Webpages

Jan. 2017 - Present

- Implemented dynamic webpages by HTML/CSS (Bootstrap), JavaScript (jQuery), Python, Node.js and MySQL
- Presented real-time 3D fine-grained air quality index (AQI) map in Peking University
- Scraped AQI data from Moji website in real-time, and presented 2D AQI map in China with local photos

### OFDM System Design and Simulation

May 2017 - July 2017

- Designed effective IIR filter to do signal processing on transceiver for OFDM symbol
- Used BPSK/QPSK modulation, cyclic prefix (CP), up/down-sampling, and realized theoretical BER result

### Microcomputer Design

Mar. 2017 - July 2017

- Designed elevator control system for microcomputers (single chip) by C51
- Realized robust Finite-State-Machine with controlling of 6 floors, keyboard input, AD/DA, “Beep tone” by voice data stored in SPI Flash, LED and Lcd1602 for control visualization, graphic interface on TFT screen

### Image Processing with MATLAB

Mar. 2016 - July 2016

- Used four different methods to process image combined with Gaussian Noise and Obfuscation
- Realized different algorithms and compared their performance
- Used two different ways to realize Constrained Least Squares Algorithm

### Adjustable Sawtooth-Wave Generator

Mar. 2016 - July 2016

- Theoretically calculated the parameters of each element, designed three plans and compared their performance; optimized some parameters and selected the best parameter
- Constructed new functions in Cadence to measure and simulate the function of the generator

### Multi-Band Filter

Oct. 2015 – Dec. 2015

- Designed a multi-band filter for voice recognition between male and female; realized the system on a circuit board
- Innovatively used Active Filter to realize the function, with fewer components
- Realized two fixed bands (300~400Hz, 2500~3000Hz) and two changeable bands (1200~1600Hz, 1700~2100Hz)

## SKILLS

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Technical: C/C++, Python, Linux, Assembly, MATLAB, VHDL, Git, Cadence, HTML/CSS, JavaScript, Node.js, SQL, LaTeX

## ENGLISH PROFICIENCY

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<b>TOEFL</b>	Total: 104	Reading: 30	Listening: 25	Speaking: 22	Writing: 27
<b>GRE</b>	Verbal: 153	Quantitative: 170	Analytical Writing: 3.5		