

## Part I:

The IoT is an emerging field in the 21<sup>st</sup> century that revolutionize human life. Obviously, there will be a vast world for those concentrating in communication or network to show themselves with the increasingly fast development of the IoT. Seeing the numerous opportunities for people to make a change in this field, I hope to be one of them making fruitful achievements.

To achieve that goal, I learned with my best efforts in most courses, so that my cumulative GPA is 89.5/100 for the first three years; while from the mathematical modeling competitions and course projects I participated in, I grasped essential research and teamwork skills, which supported my later experiences as a research assistant.

*High Robust Indoor Positioning System Based on AOA* was my first research at the Dalian University of Technology. Thanks to my former competition and project experiences, I could find proper methods from a large number of papers easily. By learning from the methods for reference, I modified them to make them useful in the research, and helped achieve the accuracy of the ArSeRoL system, the new type of indoor positioning system via Wi-Fi signals, to 40 cm. Encouraged by the achievements I made, I became more determined to pursue my next research.

In the research *A Data Backhaul Method for Low-power Ocean Sensing Data (Multi-hop LoRa Network)*, I have already got familiar with my supervisor and other members and cooperated smoothly during that research. My main duty was to implement the functions proposed by my senior. When encountering the restraints of hardware and the specificities of LoRa signals, I would communicate with my senior proactively for whether we should modify or delete the functions; Every time one of us came up with new ideas, we would also determine together whether to implement the idea based on the requirements of the research and the characteristics of LoRa. As a result, we established a new type of LoRaWAN mesh networks with functions that we were all satisfied with.

As for the most recent research *LPWAN-based Patient Tracking & Alerting System Facing COVID-19 Pandemic*, we are inspired by the BeepTrace system at first, a system based on smartphones with high hardware requirements. A challenge for us is to create a new system with a low price, low energy cost, and small volume. In response to the challenge, we transplant some of the client-side functions to region servers and apply the LoRa. Considering the side-effects of LoRa and the limitations of the simple hardware of mobile devices, we design a communication protocol to make sure every trace is recorded. This research is still in-progress currently, and is expected to achieve what we plan to realize.

Since I have participated in enough research, projects, and competitions, I already have extensive experience in learning and practicing in groups. Being able to apply what I have learned from textbooks, I do have the confidence to say that I am well-prepared for my master's studies. In my future studies at your program, I will continue reading pieces of literature like what I did in the past, which will help me get in touch with advanced perception in my area of interest. If there will be chances, I will probably be a research assistant or intern to accumulate the necessary experience.

After graduation from your program, I wish to be a cyber-engineer at a top enterprise like Apple or Alphabet, upgrading my technical skills, and generalizing my perceptions. With 3 or 5 years' working experience, I will already be mature enough and become a skilled staff with an extensive network of contacts. Afterward, as creative management personnel, I hope to try focusing on some pilot projects on the most hotspot issues with my team, making enough profits for the company. Only then I will be truly prepared for creating a new startup that cooperates with other companies.

## Part II:

Papers: The aforementioned *High Robust Indoor Positioning System Based on AOA* was submitted to INFOCOMM in 2018, whose title was *ArSeRoL: Area Segmentation-Based High Robustness Indoor Localization*, but was denied at last because of its accuracy, and now it was being modified, and we plan to submit it again in 2021. The second project, *A Data Backhaul Method for Low-power Ocean Sensing Data (Multi-hop LoRa Network)*, and the third one, *LPWAN-based Patient Tracking & Alerting System Facing COVID-19 Pandemic*, are still in process and will be submitted at the beginning of 2021.

Patents and copyrights: I submitted three patents, *LPWAN-based Patient Tracking & Alerting System Facing COVID-19 Pandemic*, the patent of its hardware design, and *A Data Backhaul Method for Low-power Ocean Sensing Data*, to the China National Intellectual Property Administration on October 10, 2020, and it can cost about six months for the three patents to be examined. The names of those patents are written in Chinese. The authorship of them all will be Jian Fang, Lei Wang, and Wenbo Zhao, and the page numbers are 5, 5, and 4.

## Part III:

1. 2019 APMCM:
  - a. Name: Third Price
  - b. Period: From Nov 28, 2019 to Dec 2, 2019, UTC/GMT+08:00
  - c. Scope: International
  - d. Description: Analyzed the pros and cons of economic development in Zhejiang province, and made appropriate suggestions based on the conclusions of the first three questions and the current economic situation and provincial policies. I Provided part of the solutions, realized part of the algorithms, finished part of the final report, won the 3rd Prize.
2. 2019 CUMCM:
  - a. Name: Third Price
  - b. Period: From Sep 12, 2019 to Sep 15, 2019, UTC/GMT+08:00
  - c. Scope: Provincial
  - d. Description: Differentiated the working process of high-pressure fuel line by time, analyzed the changes of various factors in a short period under ideal conditions, iterated several times to get the required result via Python.
3. 2019 MCM/ICM:
  - a. Name: Honorable Mention;
  - b. Period: From Jan 25, 2019 to Jan 29, 2019, UTC/GMT+08:00
  - c. Scope: International
  - d. Description: Analyzed the characteristics of existing resources and urban distribution of Puerto Rico, in order to better solve these problems in actual (i.e. when hit by the worst hurricane on record in 2017). I Proposed a model to create the best scheme of drone fleet via the 3D-KLP algorithm, packing algorithm, and a new AHP algorithm. Optimized ISO container deployment by k-means and gravity; Simplified flight path for drones under different needs by transforming actual problems into graphics problems I Provided part of the solutions, realized part of the algorithms, finished part of the final report, won the 'Honorable Mentions' for the 2019 MCM/ICM.
4. Scholarships:
  - a. Second-class scholarship for study (awarded in 2018)
  - b. Second-class scholarship for study (awarded in 2019)