BOYI LIU (刘博艺)

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PERSONAL SUMMARY

I am a self-motivated student and I love to try new things. I was engaged in the research of robotics, machine learning, cloud computing application and security. **I am currently a third-year graduate student of shenzhen institute of advanced technology, Chinese academy of sciences.**

EDUCATION

University of Chinese Academy of Science, Pattern Recognition and Intelligent System, *Master Student* 2017.9 - 2020.6

 Postgraduate without entrance exams, Published 2 papers, IEEE Student member

Hainan University, Network Engineering, *Bachelor of Engineering* 2013.9 - 2017.6

 GPA 2/120 (Top 2%), Student of the Year Award (Top 0.02% of the University, best honor), National Encouragement scholarship, Honor of the most innovative and practical college students, published 3 papers，Outstanding graduation thesis, Outstanding Graduate Honor.

PAPERS

Robotics and Self Driving (During Master)：

- **Boyi Liu**, Lujia Wang*, Ming Liu, Chengzhong Xu. Lifelong Federated Reinforcement Learning: A Learning Architecture for Navigation in Cloud Robotic Systems, IEEE/RSJ International Conference on Intelligent Robots and Systems (IROS 2019) and IEEE Robotics and Automation Letters (IEEE RA-L).
- **Boyi Liu**, Lujia Wang*, Ming Liu, Chengzhong Xu. Federated Imitation Learning: A Privacy Considered Imitation Learning Framework for Cloud Robotic Systems with Heterogeneous Sensor Data, submitted to ICRA 2020.
- **Boyi Liu**, Zhuhua Hu*, Yaochi Zhao, Yong Bai, Yu Wang. Recognition of Pyralidae Insects Using Intelligent Monitoring Autonomous Robot Vehicle in Natural Farm Scene, submitted to Applied Engineering in Agriculture.

Machine Learning (During Undergraduate)：

- **Boyi Liu**, Jieren Cheng*, Kuanqi Cai, Pengchao Shi, Xxiangyan Tang. Singular Point Probability Improve LSTM Network Performance for Long-term Traffic Flow Prediction, National Conference of Theoretical Computer Science, 328-340. **(Outstanding Student Paper Award)**

Image Processing (During Undergraduate)：

- Zhuhua Hu, **Boyi Liu***, Yaochi Zhao, Mengxing Huang, Yong Bai, Fusheng Lin. Recognition of Pyralidae Insects with Unmanned Monitoring Robot Based on Histogram Reverse Mapping and Invariant Moment, IEEE International Conference on Advanced Manufacturing (ICAM), 407-410.
- Jieren Cheng, **Boyi Liu***, Xiangyan Tang, Zhuhua Hu, Jianping Yin. Traffic flow detection method based on vertical virtual road induction line, International Journal of Embedded Systems 10 (6), 518-525.
- Jieren Cheng, **Boyi Liu***, Xiangyan Tang. An automatic traffic-congestion detection method for bad weather based on traffic video, International Journal of High Performance Computing and Networking 3 (11), 251-259.

COMPETITION

- "Challenge cup" national college students extracurricular academic works competition，**Provincial Grand Prize** once，**Provincial First Prize** once.
- "Creating Youth" National University Student Innovation and Entrepreneurship Competition，**Provincial Grand Prize**，**National Silver Award**
- National College Students Mathematical Modeling Competition，**National Second Prize**
- American College Student Math Modeling Competition，**Meritorious Honor**
- "Internet +" national college students innovation and entrepreneurship competition，**Provincial Gold Award** Twice.
- "Silk Road" Robot Creative Competition，**Grand Prize of National Finals**

- Microsoft Image cup International University Student Technology Competition**First Prize of South China Division (Top 2)**

HONOR

- During the undergraduate period, I was awarded the national inspirational scholarship for three consecutive years, "the most innovative and practical college student", and "the three best students"
- Excellent undergraduate thesis, outstanding undergraduate
- Student of the Year Award (Top 0.02% of Hainan University)
- Outstanding Paper Award of National Theoretical Computer Science Annual Meeting

PROJECTS
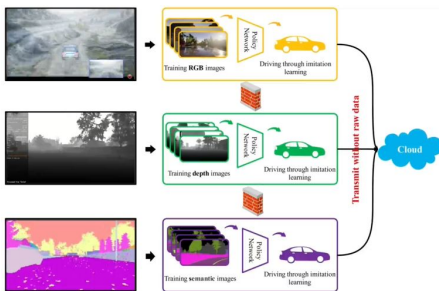
Federated Imitation Learning In this work a knowledge fusion algorithm is proposed for the cloud fusing knowledge from local robots. Then, a knowledge transfer scheme is presented to facilitate local robots acquiring knowledge from the cloud. With FIL, a robot is capable of utilizing knowledge from other robots to increase its imitation learning in accuracy and training efficiency. FIL considers information privacy and data heterogeneity when robots share knowledge. **Video Link: https://youtu.be/_lxZFD0bJcU**

Lifelong federated reinforcement learning system for robotics, 2018.6-2019.6. This work was motivated by the problem of how to make robots fuse and transfer their experience so that they can effectively use prior knowledge and quickly adapt to new environments. To address the problem, we present a learning architecture for navigation in cloud robotic systems: Lifelong Federated Reinforcement Learning (LFRL).
Video Link: https://youtu.be/SmDpOPw3m7I

Autonomous Navigation Robot for pest identification and environmental monitoring, Team Leader, 2017 Diseases and insect pests are important factors that affect crop yield. At present, the identification of crop diseases and insect pests in China mainly depends on manual work, which has a large workload. And the staff experience, knowledge reserve requirements are high. Aiming at the above problems, this paper designs and implements an autonomous navigation robot for pest identification and environmental monitoring. Its main functions include pest identification, pest trapping, environmental monitoring, real-time positioning, map building, autonomous navigation, human-computer dialogue, network storage and other functions. **Video Link: https://youtu.be/ryYF6uCD1FY**

Pest control robot based on Beidou navigation and infrared thermal imaging technology, Team Leader, 2018. Agriculture is the first industry in the national economy. For a large population country like China, agriculture has a strategic position. Diseases and insect pests are the main factors that cause crop yield reduction. In order to reduce the losses caused by pests and reduce the dependence on human resources, the team developed a pest control robot based on Beidou navigation and thermal imaging vision technology. Its main functions include pest identification, autonomous cruise, environmental monitoring, precise spraying and ground air coordination. **Video Link：https://youtu.be/OkqVeXv_zyo**