PEIJIE XU

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EDUCATION

University of Southern California — **Los Angeles, USA**
M.S. in Computer Science — *Aug. 2021 ~ Present*

Chongqing University (CQU) — **Chongqing, China**
B.Eng. in Electrical Engineering | Hong-Shen Honors Program — *Sept. 2017 ~ Jun. 2021*

- Overall GPA: 3.63 / 4.0 (top 10%) CS Courses Score: 94.0 / 100 Average Score: 87.9 / 100

RESEARCH EXPERIENCE

Humanoid Robot V-SLAM and Control System Development — **CQU**
Research Assistant | Supervisor: Prof. Yongduan Song & Niu Wang — *Aug. 2021 ~ Present*

- Control the humanoid robot Roban to finish a sequence of tasks required by BOTEC
- Developed a localization, mapping, and navigation system based on ORB, OctoMap, and move_base
- Built the robot's model in CoppeliaSim/V-REP to simulated the control algorithm; controlled the gait using a dynamic model which derived from Lagrangian dynamics when it stands on one leg

Robot Arm Control System Programming and Transplantation — **CQU**
Research Assistant | Supervisor: Prof. Yongduan Song & Niu Wang — *Jul. 2021*

- Built a C++ library to realize OOP control of an old Denso robot arm which used to can only be manually controlled by teaching pendant; the project uses socket programming to communicate with arm
- Transplanted the library to ROS, used MoveIt!-based motion planning method to achieve real-time robot arm control; the project includes URDF model building, rviz visualization, inter-node communication, etc.

Deep Reinforcement Learning (DRL) - Guided Offshore Wind Farm Voltage Control — **CQU**
Undergraduate Thesis Project | Supervisor: Prof. Hui Li | Lab: SKL-PES — *Mar. 2021 ~ Jun. 2021*

- Applied DRL to minimize the Average Voltage Deviation (AVD) of the offshore wind farm; the work was awarded the outstanding undergraduate thesis of CQU (**top 1.5%** in the university)
- Built reactive power-voltage optimization model and formulated it as a Markov Decision Process; established the agents' actor & critic's Deep Neural Network and the interactive environment of RL; trained the agents with adapted Deep Deterministic Policy Gradient (DDPG) and Multi-Agent DDPG
- Decreased AVD by 11.48% after adding the forward difference of active power into observation; decreased AVD to 5.4×10^{-4} p.u. and 3.6×10^{-4} p.u. using policy trained by DDPG and Multi-Agent DDPG respectively, which means the proposed multi-agent-based method improves the control performance by 33.33%

PUBLICATION

- Hongtao Tan, Hui Li, **Peijie Xu**, Renkuan Liu, Xiao Wang, Zhiting Zhou, Jie Zheng. **Multi Objective Optimization of Q-V Control for Offshore Wind Farm Based on Sensitivity Analysis Method**. International Conference on Power Engineering 2021.

HONORS & AWARDS

First Prize of Chinese Mathematics Competitions for College Students — *Sept. 2018*
Successful Participant Prize of Mathematical Contest in Modeling — *Apr. 2019*
Excellent Prize of Mathematical Contest in Modeling of Chongqing University — *Dec. 2018*
Third Prize of Mathematics Competitions of Chongqing University — *Jul. 2018*
Third Class Chongqing University Scholarship — *May 2018*

SKILLS & INTERESTS

Programming Skills:

- Languages: C/C++, Java, Python, Matlab, Verilog HDL
- Software: PyTorch, ROS, CoppeliaSim/V-REP, OpenCV, g2o, Git, Simulink, PSIM, Multisim
- Micro-Controller: DSP, FPGA

Interests: Soccer (Captain of Hong-Shen School), Swimming, Middle-distance running, Indoor arrangement

WORK EXPERIENCE

ABB **Chongqing, China**

Intern | Software Platform: RobotStudio 2019 *Jul. 2020*

- Designed a versatile robot application based on a collaborative robot (IRB 14050 Yumi) which expedited the speed of queuing by 23.6%, reduced direct human contact, and prevented the transmission of the virus

SIDE PROJECTS

Wind Farm Multi-Agent Consensus Control **SKL-PES, CQU**

Research Assistant | Supervisor: Prof. Minyou Chen *Jan. 2020 ~ Dec. 2020*

- Investigated control methods for a distributed wind farm system
- Formulated the target wind farm as a graph; designed and simulated a distributed consensus algorithm to regulate output power of 10 doubly-fed induction generators-based wind turbines with on-site battery energy storage systems

Electrical Compensation Technology for Visible Light Communication (VLC) **CQU**

Leader | Supervisor: Prof. Quanming, Luo *Mar. 2019 ~ Dec. 2020*

- Investigated into the compensation technology for the electrical index deterioration of VLC
- Structured the VLC system; designed and made the data sending and receiving platform; proposed and analyzed a waveform compensation method of a VLC driver; simulated the proposed method in PSIM
- Extended communication distance of VLC system whose LED worked as a scattering light source by 189%

Android Application Development **CQU**

Supervisor: Prof. Ruilong Yang *Sept. 2020 ~ Dec. 2020*

Software Platform: Android Studio | Language: Java

- Independently developed 4 APPs: Oral Calculation Tester (860 lines), Student Information Manager (990 lines), 24 Game with Poker(1160 lines), and Vocabulary Helper (1310 lines)
- Designed the user interface for APPs; developed management systems using database (SQLite)

Digital Oscilloscope Implementation and Real-Time Signal Processing **CQU**

Team Leader | Supervisor: Prof. Yuxing Mao *Nov. 2020 ~ Dec. 2020*

Software Platform: Code Composer Studio 9 (CCS) | Lines of Code: 1801 | Language: C

- Achieved an oscilloscope based on a TMS320F28335 DSP development kit and an LCD screen
- Sampled voltage of signal using the ADC in the DSP; analyzed frequency components of the signal using 128 points FFT; stabilized the waveform in rising edge, high-level or low-level mode; implemented a Finite Impulse Response (FIR) filter on the digital signal using circular convolution
- Speeded up refresh rate of the LCD by 274%; decreased delay time to 10% when transmitting data in the bottom layer software

Motor Vector Control System Design and Analysis **CQU**

Software Platform: SIMULINK | Supervisor: Prof. Mingyu Wang *May 2020 ~ Jun. 2020*

- Built an Indirect Rotor Flux Oriented control system for an induction motor (IM)
- Formulated a model of IM in a stationary reference frame ($\alpha\beta$ frame) by taking rotate speed, stator current and rotor flux as state variables; designed and simulated a motor control system in Simulink based on above model with no static difference between given and output; analyzed and concluded the suitable domain of parameters of PID according to the given IM

Brushless DC Motor Control System Design **CQU**

Team Leader *Mar. 2020 ~ Jun. 2020*

- Achieved a brushless DC motor control system on a PCB and a DSP development kit
- Designed the motor drive module and regulated motor speed with PID control

Digital Clock Design **CQU**

Team leader | Supervisor: Prof. Lan Xiong *May. 2018*

- Achieved a digital clock base on Xilinx Artix-7 FPGA (XC7A35T-1CSG324C)
- Structured, coded and debugged the source and constrain files for the FPGA development kit