Yuchen Song

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EDUCATION BACKGROUND

South China University of Technology, Guangzhou, China (985 Project, "Double First-Class Universities")

Bachelor of Engineering (Expected graduation date: Jun. 2023)

➢ Concentration: Robotics Engineering｜GPA: 89.49/100 & 3.82/4.0｜Minor: Finance

➢ Coursework includes: *Classical Control Theory, Mechanical Behavior of Materials, Thermodynamics and Fluid mechanics, Heat Transfer, Design and Manufacturing, Theory and Technology of Robotics etc.*

➢ Award:　Third Prize merit scholarship & "Outstanding Student Leader"(1/45) in Sept. 2021

　　　　　"Zhizao Shunde" Scholarship (1/370) & "Outstanding Student Leader"(2/46) in Sept. 2020

　　　　　Second Prize merit scholarship (Top 2 out of 78 students) in Sept. 2019

University of California, Berkeley, Online

Summer Session Visitor (Jun. 2020-Aug. 2020)

➢ Department: EECS｜Course: *CS61BL Data Structures and Programming Methodology*

RESEARCH INTEREST

Deep Learning, Reinforcement Learning, Robotics

PUBLICATION

➢ Yuchen Song and Xuejian Zhang "Lymph node sections detection based on deep convolutional neural networks", Proc. SPIE 12079, Second IYSF Academic Symposium on Artificial Intelligence and Computer Engineering, 120792F (1 December 2021); https://doi.org/10.1117/12.2622998

RESEARCH EXPERIENCE

Reinforcement Learning in Merging Scenerio

Supervised by Professor Yuan Lin (Work in progress)

Research purpose: Apply novel reinforcement learning algorithms to the traffic scenario of merging.

➢ Used SUMO to build parallel-type merging scenario, and registered it as a customized environment to gym;

➢ Used TraCI to interact self-defined agent (ego vehicle) with SUMO predefined driving models and deployed reinforcement learning approaches to explore a good control policy for parallel-type merging scenario;

➢ Defined a customized policy for novel reinforcement learning.

Lymph Node Sections for Cancer Detection Based on Deep Convolutional Neural Networks (CNN)

Online research seminar supervised by Professor Mark Vogelsberger, MIT (Jul. 2021-Aug. 2021)

Research purpose: Compare and explore effective approaches to cancer detection based on lymph node section photos.

➢ Applied various kinds of CNNs on the dataset from Kaggle and achieved high accuracy on making predictions;

➢ Made comparisons among the most famous architectures like VGG16, ResNet-18, and EfficientNet;

➢ Conducted experiments to emphasize the importance of pre-trained weights of these networks;

➢ Designed a user-interface based on **PyQt5**;

➢ Source code available at https://github.com/Yuchen-Song/Lymph-Node-Sacns-for-Cancer-Detection.

Tools Applied: Deep learning framework: **TensorFlow** and **Keras**.

Continuous Motion Trajectory Tracking and Position Compensation for Vertical Six-Axis Manipulator

Supervised by Professor Kai Wu (Apr. 2020-Mar. 2021)

Research purpose: Improve the manipulator performance when working in macro-displacement and with high-precision requirement.

➢ Completed the research report together with other team members, focusing on the analysis of accuracy influencing factors and methods to improve precision;

➢ Delved into the knowledge of robot kinematics, and programmed a MATLAB script to explicitly show the application of the robot coordinate and position transformation formula;

- Conducted researches on communication between KUKA robot controller and Raspberry Pi controller based on OPC-UA communication protocol.

COURSE PROJECTS

Design & Manufacturing of Robot Cars (Four semesters' projects) [link]

Group Leader (Jun. 2021 & Dec. 2021 & Jun. 2022) | Group Member (Jan. 2020)

*Project purpose: Design robot cars using **Arduino** or **STM32** as the main control board to effectuate the assigned tasks.*

- Took charge of the processes of pre-planning, budget controlling, robot car designing, mid-term manufacturing, improving, and debugging, also assigned appropriate tasks to each teammates as the group leader.

Achievement: Designed four versions of cars to successfully conduct task implementation: the first one could achieve line tracking and cargo delivering; the second one could be controlled via bluetooth and shoot the balls to a designated area; the third car was able to conduct wireless charging and capacitor storage during cruise; and the fourth car was designed as to be able to conduct obstacles avoidance, line tracking, objects detection, grasping and unloading.

Modelling and Controlling of Segway (two-wheeled self-balancing vehicle) [link]

Group Leader (May 2022)

- Analysed the physical model of segway using inverted pendulum method;
- Designed an LQR (Linear Quadratic Regulator) to control the segway and make it self-balanced;
- Simulated the system under different disturbances with Simulink;
- Plotted the system response to illustrate the effect of compensator.

COMPETITION

Contemporary Undergraduate Mathematical Contest in Modeling [link]

Third Prize (Provincial) (Sept. 2020)

Objective: Develop a mathematical model to study the credit strategies for MSMEs (Micro, Small and Medium Enterprises).

- Conducted data screening of 425 data records in Excel and used deletion method and interpolation method to deal with missing data;
- Pored over dozens of documents to upgrade my ability in dealing with bugs in coding;
- Engaged in model construction and enhanced the model with matlab to find the best model parameters;
- Proposed credit strategies for the banks, such as the amount of loans, the interest rates and the term of loans, according to credit risk analysis of the enterprise.

SKILL-SET

- Technical Skills: Be reasonably skillful in C++/C, MATLAB(Simulink), Python, Java, and R.
- Language Skills: Chinese (Native), TOEFL 100 [Cer.], GRE 321+3.5 [Cer.].