Tianyou Hu

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Education

Washington University in St.Louis	*Sep. 2021 - Present*

M.S. in Mechanical Engineering (expected in May 2023)

GPA: 4.00 / 4.00

Chongqing University	*Sep. 2017 - Jun. 2021*

B.Eng. in Vehicle Engineering

GPA: 3.08 / 4.00

Research Interest

Robotics, Simultaneously Localization And Mapping (SLAM), Motion planning, Computer Vision, Machine Learning, Signal Processing

Publication

[1] **T. Hu**, Y. Deng, Y. Deng and A. Ge, "Fully Convolutional Network Variations and Method on Small Dataset," 2021 IEEE International Conference on Consumer Electronics and Computer Engineering (ICCECE), 2021, pp. 40-46, doi: 10.1109/ICCECE51280.2021.9342059.

Research Projects

Acoustic Source Identification Algorithm based on Microphones Array under Strong Background Noise

Supervisor: Prof. Zhigang Chu from Chongqing University   *Mar. 2021 - Jun. 2021*

➢ Built plane acoustic detection model in by implementing cross-spectrum beam-forming algorithm simulated under theoretically pure environment and noisy environment;

➢ Added diagonal reconstruction algorithm to enhance disturbance resisting capability under different acoustic frequency;

➢ Analyze influence of microphones distribution, signal noise ratio and snapshots numbers;

Vison-based Exploration of Robot in Fully Unknown Environment   *Aug. 2022 - Present*

Supervisor: Prof. Yiannis Kantaros from Washington University in St. Louis;

➢ Setup environment and implemented SLAM and navigation algorithm in Robot Operation System (ROS) simulator;

➢ Applied SLAM algorithm for building map in unknown environment on TurtleBot3 robot;

➢ Applied Rapid Exploring Random Tree (RRT) navigation algorithm on TurtleBot3 to navigate in map built by SLAM.

➢ Combined SLAM and navigation to realize autonomous exploration in unknown map on TurtleBot3;

➢ Applied YOLOv7 neural network for object detection on TurtleBot3; Applying depth estimation algorithm to obtain coordinate of object.

Computer Vision and Machine Learning with Self-driving Car project   *Aug. 2019 - Nov. 2020*

Supervisor: Dr. Ian Deng from University of California, San Diego;

➢ Built Fully Convolutional Networks (FCN) based on VGG16, ResNet and vanilla Convolutional Neural Network (CNN);

➢ Fed a small dataset containing 367 train images and 101 test images, then tuned kernel size and up-sample algorithm to improve the segmentation accuracy and "mean Intersection over Union" metric for each model. Less training parameters produces higher accuracy, hence bi-linear interpolation is used as up-sample method. Accuracy was increased from 34% to 87%;

➢ Compared performance of FCNs based on different CNNs, and summarized FCN variations and method on small dataset;

Computer Aid Design on Piston of Internal Combustion Engine   *Feb. 2021 - Apr. 2021*

➢ Drew 3D model in Altair Inspire, then added stress and constraints; Ran analyze for the stress distribution;

➢ Ran optimization to minimum mass; Utilized PolyNurbs to create the optimized model then analyzed stress for it;

➢ Used Altair Inspire Cast for casting simulation to verify whether model is manufacturable.

Work Experience

Graduate Teaching Assistant   *Jan. 2023 - Present*

Supervisor: Prof. Vladimir Kurenok from Washington University in St. Louis;

ESE 502 Mathematics of Modern Engineering II:

Hold in-person Office Hour per week; Grade homework and exams for students;

Core content: Fourier Series, Fourier Integral, Fourier Transform, Complex valued series and functions;

Skills

Computer Language: Python (Tensorflow, NumPy, Matplotlib), Java, C, MATLAB, Shell

Software: Robot Operation System(ROS), SolidWorks, Altair Inspire, ANSYS, COMSOL, CAXA, Microsoft Office