

Ziheng Zhang

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Education Background

Beihang University(BUAA)

09/2019-06/2023

School of Advanced Engineering (Shen Yuan Honors College)

- Major: Electronic Information Engineering
- GPA: 85/100

Publication & Patent

Publications:

07-08/2022

- Zimo Ma, Yifeng Li, Di Liu, **Ziheng Zhang** and Kuangyu Zheng “Joint Energy and Makespan Optimization for Dynamic CNN Tasks scheduling on the Heterogeneous System”, Under Review

Research Experience

Key Laboratory of Advanced Technology for Information System

02/2021-Now

Advisor: Assoc. Prof. Kuangyu Zheng

Project : High-efficiency Resource Coordination and Intelligent Information Processing in Cloud, Edge and End

04/2021-Now

- Completed the initial phase of the development of high energy efficient cloud-edge-end application; recognized the texture within road pavement image by using Convolutional Neural Network (CNN).
- Pre-processed images by conducting image binarization, noise reduction and feature extraction to identify texture features.
- Developed a deep convolutional neural network (DCNN) to achieve crack detection and recognition on concrete pavement to help guarantee road safety.
- Built a R-CNN (Regions with CNN features) model using the Caffe framework that extracted discriminative features and mapped raw pixel intensities of the crack patch into a feature vector by several fully connected layers.
- Trained the model on 40000 3-channel RGB images labeled as with/without cracks, fine-tuned the parameters to find the best fitting parameters.
- Conducted experiments to verify an over 99% accuracy on test set.

Project : Mobile Crack Recognition System based on Retinex and R-CNN

04/2021-06/2022

1st Prize, Beihang Electronics Innovation Competition | 32nd "Feng Ru" Cup Sci&Tech Work Competition

- Proposed a small-scale, low-cost, easy-to-mount mobile road crack recognition system based on Retinex and R-CNN.
- Applied R-CNN (Region-based CNN) for crack detection, introduced Frankle-McCann Retinex for image enhancement and used Otsu's method for thresholding, to finally achieve crack recognition.
- Built a smart car based on Raspberry PI with NoIR Camera, deployed the system for validation.

NUS SoC Summer Workshop 2022

05-07/2022

Project: Stress Test-based Smart Heart Condition Monitoring System

Honorable Mention, Artificial Intelligence of Things (AIoT) Group

Advisor: Prof. Tan Wee Kek

- Designed and created a smart system for heart condition assessment based on Raspberry Pi, which assessed heart condition based on heart rate, blood oxygen level and ECG signals.
- Used two contact sensors to collect parameters of heart rate, blood oxygen saturation and ECG signals, used images about human cheek obtained from a non-contact camera to analyze the rPPG signal and calculate HRV so as to measure heart rate and beating regularity.
- Designed a CNN algorithm for heart condition prediction, built it on TensorFlow, and trained it on the

Cleveland dataset.

Core Member, Arduino based Bluetooth Controlled Car

09/2020-11/2020

- Built a Bluetooth controlled car and performed experiment to simulate the real driving tests.
- Designed the car based on Arduino, using Infrared sensors for road edge detection and an ultrasonic sensor for range and obstacle detection.
- Assisted in circuit design and assembly, programmed and debugged the code for wheel speed control, motor drive, Bluetooth serial module, ultrasonic and Infrared sensing.
- Achieved functions: ultrasonic ranging alarm, infrared edge line collision alarm and subject test counting.
- Built the road to simulate the scene for real driving tests, conducted experiments to control the car's movement from mobile App to complete 4 subject tests: Side Parking, Right-angle Turn, S-curve and Reverse Parking.

New Woundplast Design

01/2020-02/2020

30th "Fengru" Cup Student Creativity Competition

- Designed a novel woundplast with air permeability, water-resistance and flexibility. Used Ethyl carbamate, plus gauze and natural Malaysia gum, overlaid with breathable elastic bandage.

Course Project

Digital image Processing System with GUI

05-06/2022

- Performed image transforms, i.e. Fourier transform, Discrete cosine transform and Hadamard transform, degraded image restoration using inverse and Wiener filter.
- Performed image segmentation using inter-class variance method after smoothing and median filtering, used Hough transform for edge detection.
- Built a CNN model for handwritten digit recognition, optimized parameters, trained it on MNIST dataset.

Telecommunication Principles Practice

03-05/2022

- Performed modulation/demodulation: AM, DSB, SSB, FM, OOK, 2FSK, BPSK, QPSK, MSK, and DBPSK, and implemented cyclic code for error-correcting.

Shark Dentist Biting Game Circuit

09/2021-12/2021

- Designed a shark dentist biting game circuit based on FSM, with digital tube and LED display.
- Implemented cycle selection of tooth using cycle counter, completed Verilog code, conducted simulation in ModelSim, synthesized using Xilinx ISE, burned on FPGA board and conducted tests.

Traffic Light Circuit

09/2021-12/2021

- Implemented a traffic light circuit based on FPGA, using finite state machine (FSM), capable of 3-state transition and countdown display with LED.
- Achieved yellow and green lights flashing when countdown started, red light button to set lane warning period, green light button for pedestrian crossing time extension.

Blood Type Likelihood Calculator

09/2021-12/2021

- Designed a blood group calculator based on FPGA, to find the child's probable blood type based on blood types of the parents using combinatorial logic, using two digital tubes to show the result.

DTMF Signaling system Design in Matlab

09/2021-12/2021

- Implemented a Dual Tone Multi Frequency (DTMF) Signaling system with 16 characters, adopted DFT to achieve DTMF detection, and Goertzel algorithm to achieve DTMF decoding.
- Superimposed an interference signal and Gaussian white noises with different SNR for evaluation.

Rectangular Waveguide Horn Antenna

09/2021-11/2021

- Designed an X-band (8GHz~12GHz) rectangular horn antenna with the optimal gain of 15 dB.
- Calculated the size of the horn, generated the model, performed simulation in Ansys HFSS.

Communication Application

10/2020-12/2020

- Built a TCP Client/Server in Python with GUI supporting messaging, video talk and file transferring.

- Used Socket programming to realize bi-directional communication, used Tkinter to build GUI.

Skills

- **English Test: IELTS - 7.0** (L 7.5, R 7.5, W 6.5, S 6.0) (03/2022)
- **Proficient in** C++, C, Python, MATLAB, NetLogo, Verilog; **Skillful in** Arduino Programming