Zhengjie Zhao

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RESEARCH INTEREST

Algorithms, Image Processing, Computer Vision

EDUCATION

Nanjing University of Information Science & Technology (Honours Degrees) **09/2016-06/2020**

Major: Electronic Science and Technology **Degree:** Bachelor of Engineering **GPA: 3.513/5.0** **Ranking: 9/139**

University of Cambridge, Fitzwilliam College **07/2017-08/2017**

Summer School for Electrical Engineering Courses

RESEARCH EXPERIENCE

Underwater Image Enhancement with a Total Generalized Variation Illumination Prior **01/2019-08/2019**

- **Supervisor: Peixian Zhuang, Lecture, Nanjing University of Information Science& Technology**

- Aimed to promote the visual quality of degraded underwater images and settle the disadvantages of Retinex-based methods-halo artifacts around edges and universal grey in low contrast areas
- Established a Retinex-based variational model for single underwater image enhancement by imposing a total generalized variation (TGV) prior to the illumination to approximate piece-wise linear smoothness of the illumination for the first time
- Derived an efficient iterative optimization scheme to address our proposed model by alternately calculating R and I iteratively
- Carried out numerous experiments of visualization and objective metrics to demonstrate the superiority of the proposed method compared with several state-of-the-art underwater enhancement methods
- Applied the proposed method to dehaze, sandstorm removal and low illumination image enhancement
- Utilized Matlab and Python to implement the above model, algorithms and conducted experiments

The Design and Realization of Methane and Carbon Dioxide Infrared Gas Sensors (SRTP) **05/2017-05/2019**

- **Supervisor: Jianhua Chang, Professor, Nanjing University of Information Science& Technology**

- Aimed to develop an accurate two-component gas sensor with appropriate temperature and humidity compensation algorithms
- Designed a multi-reflection sphere gas chamber and box reflective gas chamber to increase the optical path and improve the measurement accuracy
- Configured CH_4 and CO_2 standard gases with different concentrations to conduct calibration experiments on the sensor system
- Established the mapping relation between the output electrical signal and the gas concentration of CH_4 and CO_2 according to the calibration result and used Matlab to do the curve fitting to build the output model of the sensor
- Chose the optimized BP neural network as the compensation algorithm to reduce the influence of ambient temperature and humidity on the sensor when detecting gas concentration and implemented it by Matlab
- Contrasted the performance of various optimization algorithms and selected GWO algorithm as the optimization algorithm to update the weights and threshold values of BP neural network constantly to improve the speed of convergent, skip the local optimum, and achieve the global minimum

Design of Thermal Protective Clothing Based on Heat Conduction Partial Differential Equation Model **09/2018**
(China Undergraduate Mathematical Contest in Modeling)

- **Supervisor: Zhoumu Yang, Lecturer, Nanjing University of Information Science& Technology**

- Aimed to obtain the distribution of temperature of different layers of the thermal protective clothing
- Established a partial differential equation model of heat conduction for the thermal protective clothing and skin system
- Added the fifth skin layer on the existed four layers of heat insulation and set the core temperature of human as the right boundary condition to make the model close to reality
- Solved the physical model of heat conduction differential equation by improving the C-N difference method
- Advanced the C-N difference method from dividing the layers with four demarcation points and calculating the distribution of temperature of the five layers as a whole with only two boundary conditions

The Design and Manufacture of Students Counting System and Superheterodyne Radio 03/2018-06/2018

- **Supervisor: Jixin Yuan, Lecturer, Nanjing University of Information Science& Technology**
- Committed to designing the hardware system of students counting system and superheterodyne radio
- Selected STC89C51 as the core hardware, programmed the software part by Keil C51, and weld the STC89C51, photoelectric sensor, LED monitor, and other semiconductor devices to guarantee the counting system operate smoothly
- Designed the circuit schematic diagram of superheterodyne radio by Protel and weld triodes, transformers, resistors, electrolytic capacitors, and other parts to ensure the radio functions normally

Innovative Research on Nanotechnology in Water Purification (University of Cambridge Summer School) 07/2017-08/2017

- **Supervisor: Yang Su, Tutor, University of Cambridge**
- Learned about nano water purification process, material selection, and water purification experiment configuration through literature review and group discussion
- Applied SEM to analyze the morphological characteristics of TiO_2 to have an insight into its dielectric and mechanical properties
- Selected CdS as the membrane and solved its negative effects by putting forward two innovative methods, including adding sacrificial agent Na_2SO_3 and mixing PEO into the liquid polysulfide electrolyte

PUBLICATIONS

Zhengjie Zhao, Yongyi Zhao, Chunxia Kong, Mingxi She, Jianhua Chang, Wan Shen, **SF6 Infrared Gas Sensor Based on GWO-BP Neural Network**, *Laser & Infrared*, Vol.50, No.1, January 2020

Zhengjie Zhao, Yuxiang Dai, Peixian Zhuang, **Underwater Image Enhancement with a Total Generalized Variation Illumination Prior,** 2019 IEEE Intl Conf on Parallel & Distributed Processing with Applications, Big Data & Cloud Computing, Sustainable Computing & Communications, Social Computing & Networking, DOI 10.1109/ISPA-BDCloud-SustainCom-Social Com 48970.2019.00147 (Published)

PATENTS

Jianhua Chang, Yongyi Zhao, Wan Shen, **Zhengjie Zhao**, Rong Ding, **A Three-component Infrared Gas Sensor for Mining**, Patent No. ZL 2018 2 1737467.4

Jianhua Chang, Yongyi Zhao, Wan Shen, **Zhengjie Zhao**, Wanwan Lu, **An Infrared Gas Sensor with a Temperature Control System**, Patent No. ZL 2018 2 1734979.5

Jianhua Chang, Mingxi Yu, **Zhenhjie Zhao**, Yongyi Zhao, Wan Shen, **A Multicomponent Infrared Gas Detection Device Based on a Box Reflector Gas Chamber**, Application No. ZL 201920416640.9

Jianhua Chang, **Zhengjie Zhao**, Mingxi Yu, Wan Shen, Yongyi Zhao, **An Infrared Gas Detection Device Based on Multi-reflection Sphere Gas Chamber**, Application No. ZL 201920450519.8

AWARDS & HONORS

Honours Degrees of Nanjing University of Information Science and Technology (for top 1.4% students)	**06/2020**
Third Prize in Lanqiao Cup Jiangsu Province C/C++ Contest	**04/2019**
Merit Student at Nanjing University of Information Science & Technology	**11/2017-12/2018**
First-class Scholarship at Nanjing University of Information Science & Technology (for top 10% students)	**11/2017-12/2018**
Second Prize of Jiangsu Province in China Undergraduate Mathematical Contest in Modeling	**10/2018**
Outstanding Student Leader at Nanjing University of Information Science & Technology	**11/2017**
2017 Government Scholarship for Overseas Study of College Students in Jiangsu Province	**09/2017**

ACTIVITIES

Minster of Learning Department, **Student Union of Electronic and Information Engineering School**	**05/2017-05/2018**
Exchange Study, **University of Tokyo**	**12/2016**

SKILLS

Matlab, SPSS, C, Python, NCRE Rank 2 (C Language)