Wanqing Zhang

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EDUCATION

Tsinghua University (Ranked 23rd in U.S. News 2022), China   Sept. 2021 – Jun. 2024

M.S. in Electronic and Information Engineering | Advisor: Associate Prof. *Jianshe Ma* | GPA: 3.96/4

Key courses: Modern Information Optics, Imaging Optics, Optical Systems and Experiments

Thesis: Host-nondestructive disinfection technique based on antibacterial blue light

Central South University (Ranked 209th in U.S. News 2022), China   Sept. 2017 – Jun. 2021

B.S. in Mechanical Engineering and Automation | Average Score: 90.79/100 | Ranking: 6/357 (Top 2%)

Thesis: Design of target tracking and aiming system based on image

PUBLICATIONS

[1] **Wanqing Zhang**, Ping Su, Jianshe Ma, et al. A Singlet State Oxygen Generation Model Based on the Monte Carlo Method of Visible Antibacterial Blue Light Inactivation, [J], *Journal of Photochemistry & Photobiology, B: Biology* **(Q1, IF: 6.814)**, 2023, (*Paper*).

[2] **Wanqing Zhang**, Ping Su, Jianshe Ma, et al. A Review on Nondestructive Light-based Inactivated Techniques, [J], *Journal of Tsinghua University* (*Sci & Technol*) (EI), Under Review, 2023

[3] Zhi Chen, **Wanqing Zhang**, Zhaojun Yan. Plastic Laser Transmission Welding Technology and Research Trends, [J], *Applied Laser* (CSCD), 2020, (*Paper*)

[4] **Wanqing Zhang**. "A Positioning Jig for Professional Use in Mechanics", CN210209443U [P] , 2020

[5] Taotao Chen, **Wanqing Zhang**, Yuting Tang, et al. "Smart Windows Based on Humidity, Temperature and Light Sensors", CN210134757U [P] , 2020

MANUSCRIPT IN PREPARATION

[1] **Wanqing Zhang**, Ping Su, Jianshe Ma, et al. Effects of Various Repetition Rates and Output Irradiance on Energy Efficiency of Antibacterial Blue Light Inactivation, 2023

[2] **Wanqing Zhang**, Ping Su, Jianshe Ma, et al. Neural Network Inversion Algorithm for Optical Properties of Turbid Media Based on OD Values, 2023

PRESENTATION

[1] Jianshe Ma, **Wanqing Zhang**. "Host-nondestructive Disinfection Technology Based on Visible Spectrum", The 2nd China BIO-lighting technology forum, Guangzhou, China, Aug., 2022 (Oral presentation)

RESEARCH EXPERIENCE

A Singlet State Oxygen Generation Model Based on Monte Carlo Method   Dec. 2021 – Present

- Considered the propagation of light and mathematical description of intracellular singlet oxygen generation for the first time in the antibacterial blue light inactivation field.

- Proposed an improved Monte Carlo model to adapt the property of the bacterial fluid. Used the TTHG scattering phase function to optimize backward scattering. Used particle swarm optimization to obtain the optimal parameters of the TTHG function based on the theoretical Mie scattering.

- Determined a mathematical model of the photochemical kinetics of singlet oxygen generation, and obtained the time distribution and light intensity on the cumulative singlet oxygen concentration.

- The model explains the differences in inactivation doses across studies under different study conditions and develops a mechanistic model to help guide the future practical application of antibacterial blue light.

Effects of Various Duty cycle and Frequency on Energy Efficiency   Oct. 2022 – Present
- Built a 405 nm light source system with uniform light intensity and designed the circuitry with an adjustable duty cycle and frequency. Constructed a heat sink to ensure temperature stability during the experiments.
- Carried out a series of E. coli inactivation experiments under different light conditions with different duty cycles and frequencies.
- Developed a mixed-effects model to obtain the time-power dependence of inactivation rate and to investigate the effect of time and optical power on energy efficiency.

Target Tracking System Based on Single Binocular Vision and Fusion   Oct. 2020 – Jun. 2021
- Proposed a single-binocular vision fusion target tracking system, which can take into account both large field of view detection and target detail acquisition. Experimental results showed that the target amplification factor of the system was 3.49. The field amplification factor of the system was 7.43.
- Applied a mix-Gaussian based background subtraction method to detect moving objects.
- Converted The 3D spatial position of the target into the servo calculation angle of the steering gear based on the coordinate transformation model. Controlled the small-field telephoto camera to obtain target details.

OTHER ACTIVTIES

Teaching Assistant | LED Technology and Application   Sept. 2022 – Dec. 2022
- Assist the teacher to complete the course teaching; answer questions to students.

Shenlan College | Visual SLAM Basic Course   Jun. 2022 – Dec. 2022
- Mathematics: Lie group and Lie algebra, camera model and coordinate transformation.
- Algorithm: front-end (feature point method and direct method) and BA optimization methods.
- System: basic understanding of ORB-SLAM 2.

National College Students' Innovation and Entrepreneurship Project   Mar. 2019 – Jun. 2021
- The project focusing on the research of the technology of pyrolysis of waste by magnetized air.
- Responsible for the 3D structure modeling of a domestic waste magnetization and pyrolysis device, effectively reducing the cost of waste treatment by nearly 30%.
- Won the 1st Prize in Student Internet+ Innovation and Entrepreneurship Competition.

HONORS AND SCHOLARSHIP

SIGS First-class Scholarship, Tsinghua University	CNY 4,000	2022
Provincial Excellent Graduates, Hunan province		2021
Excellent Graduates, Central South University		2021
National Scholarship (top 1%), China	CNY 8,000	2020
National Scholarship (top 1%), China	CNY 8,000	2019
Outstanding College Students, Central South University		2018 – 2020
First-class Scholarship, Central South University	CNY 6,000	2018 – 2020

SKILLS

Programming: MATLAB | Cpp | Python | Linux   **Libraries:** OpenCV | PyTorch | CMake

Algorithm: Monte Carlo model | Mie theory calculation | Particle swarm optimization | BP neural network | Image processing (edge Detection, corner detection, SIFT, SURF, Mean-Shift)

Biological experiment: E. coli cultivation | Colony Enumeration | Photoelectric turbidimetry

Mechanical software: SolidWorks | AutoCAD   **Microcontroller:** STM32 | C51 | Arduino

Languages: Mandarin Chinese (native speaker) | English (CET-6: 551) | Korean (TOPIK II)