Wanqing Zhang

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EDUCATION

Tsinghua University (Ranked 25th in QS World 2023), China   Sept. 2021 – Jun. 2024

M.S. in Electronic and Information Engineering | GPA: 3.96/4 | Ranking: 2/35

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 93rd in ARWU 2023), China   Sept. 2017 – Jun. 2021

B.S. in Mechanical Engineering and Automation | Average Score: 90.79/100 (3.8/4) | Ranking: 6/357 (Top 2%)

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

RESEARCH WORKS

PUBLICATIONS & PATENTS

[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*, 2023. **(Q1, IF: 6.814)**

[2] **Wanqing Zhang**, Ping Su, Jianshe Ma, et al. An Approach to Improve Energy Efficiency during Antimicrobial Blue Light Inactivation: Application of PWM Dimming to Balance Irradiance and Irradiation Time, [J], *Antibiotics*, 2023. **(Q1, IF: 4.8)**

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

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

PATENTS

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

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

PRESENTATION

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

RESEARCH PROJECTS

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

- Proposed the first mechanistic model in the antibacterial blue light inactivation field to quantify the relationship between light energy and singlet oxygen generation.
- Proposed a TTHG scattering phase function improved Monte Carlo model to adapt the property of the bacterial fluid. Applied particle swarm optimization to obtain the optimal parameters of the TTHG function based on the theoretical Mie scattering.
- Established the first mathematical model of the photochemical kinetics of singlet state oxygen generation under blue light and obtained the time distribution of the cumulative singlet state oxygen concentration.
- Explained the differences in inactivation doses across studies under different study conditions for the first time and help guide the future practical application of antibacterial blue light.

Effects of Various Duty Cycle and Frequency during Disinfection   Oct. 2022 – Present
- Built the 405 nm light source system independently: selected LED light source with uniform light intensity; designed a 3D modelling in SolidWorks; manufactured by laser cutting and 3D printing.
- Designed the circuit: applied the constant current source and PWM signal to control the duty cycle and frequency of the light source; designed a heat sink to maintain a stable temperature during the experiment.
- Carried out a series of *E. coli* inactivation experiments under different light conditions.
- Proposed a mixed-effects model to obtain inactivation rate with respect to time-intensity, and the gradient was solved for both variables to explore the effect 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.
- 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.

ADDITIONAL 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
- Learnt the mathematics: Lie group and Lie algebra, camera model and coordinate transformation.
- Understood the algorithm: optical flow method and direct method; BA optimization methods.
- Build a system: a visual odometry based on ORB-SLAM 2.

National College Students' Innovation and Entrepreneurship Project   Mar. 2019 – Jun. 2021
- Researched the technology of pyrolysis of waste by magnetized air.
- Optimized the 3D structure modeling of a domestic waste magnetization and pyrolysis device, effectively reducing the cost of waste disposal by nearly 30%.
- Won the First Prize in China College Students' 'Internet+' Innovation and Entrepreneurship Competition.

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 (IELTS: 7.0) | Korean (TOPIK II)

HONORS

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