Youchao Wang

Department of Engineering, University of Cambridge

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Education

Ph.D. in Engineering *University of Cambridge, UK, 2019 – present*
- Electrical Engineering Division, Department of Engineering.

M.Phil. in Engineering (By Research) *University of Cambridge, UK, 2018 – 2019*
- Electrical Engineering Division, Department of Engineering.

B.Eng. Electronic Engineering (1st Class Honours) *University of Manchester, UK, 2016 – 2018*
- Second year direct entry. Final grade: 87%. Third year rank: 3/250. Second year rank: 1/240.

B.Eng. Electrical Engineering and its Automation *North China Electric Power University, China, 2014 – 2018*
- First and Second year final result: 83%. First year rank: 2/119.

High School Graduate *Tsinghua High School, China, 2011 – 2014*

Project Portfolio

Hybrid opto-electronic neural network processor for deep learning applications *2019 – present*
- Ph.D. Degree Research Project, Supervisor: Prof. Timothy Wilkinson
- Focus: Optical information processing, Fourier optics, Spatial light modulator, Machine learning algorithms, FPGA, Hardware and software co-design.

Interfacing a High Speed Ferroelectric Spatial Light Modulator *2019 – present*
- Research Side-Project, Supervisor: Prof. Timothy Wilkinson
- Focus: Spatial light modulator display driver, Computer generated holograms, PCB hardware design, FPGA firmware implementation.

Computer Generated Holography on a Digital Signal Processor System *2019*
- M.Phil. Degree Research Project, Supervisor: Prof. Timothy Wilkinson
- Focus: Computer generated holograms, Digital signal processing, Algorithm implementation.
- Published a first-author paper focusing on the algorithm implementation on a digital signal processor.

Sensor Data Fusion using Automated Dimensional Function Synthesis *2018 – 2019*
- M.Phil. Degree Research Project, Supervisor: Dr. Phillip Stanley-Marbell
- Focus: Miniature hardware system design, Firmware implementation, Physics specification language compiler design.
- Published a first-author paper focusing on the implementation of a dimensional function synthesis compiler.

"IoT" Water Quality Monitoring System for Protecting Rivers and Watercourses *2017 – 2018*
- B.Eng. Degree Individual Project, Supervisor: Prof. Bruce Grieve
- Focus: Low-cost turbidity sensor design, Low power embedded system design.
- Published a first-author paper focusing on the design of a low-cost turbidity sensor.

Embedded System Project Team Competition (3rd Rank Among 48 Groups) *2016 – 2017*
- Second-year Team Project: Line-following robotic buggy using light-sensitive sensor array and ultrasound sensor.
- A major contributor to hardware design and software implementation, including buggy structural design, line-detection application, motor control and programming. Leading role in team organisation (team of 4).

Work Experience

Undergraduate Supervision Tutor
St. John's College, University of Cambridge, UK *Jan. 2020 – present*
- Give individual supervision courses to a group of 16 second-year Engineering students at St John's College.
- Course Part IB Paper 6, including Linear Systems and Control, Communications, Fourier Transforms & Signal and Data Analysis.

Part Time Research Assistant
Department of Engineering, University of Cambridge, UK *Jan. 2019 – Mar. 2019*

- Supervisor: Dr. Phillip Stanley-Marbell
- Embedded system circuit design and embedded system software development.

Research Assistant
Department of Engineering, University of Cambridge, UK *Aug. 2018 – Sep. 2018*
- Supervisor: Dr. Phillip Stanley-Marbell
- Research topic: Deriving physically-inspired sensor signal invariants using a physics specification language
- Compiler Construction, Programming language design, Signal and Noise, Dimensional analysis, Physically-inspired high-level description language (*Newton*).

Research Assistant
School of Electrical and Electronic Engineering, University of Manchester, UK *Jul. 2017 – Sep. 2017*
- Supervisors: Prof. Bruce Grieve in collaboration with Prof. Christopher Collins at University of Reading
- Research topic: "Internet of Things" LoRaWAN Sensor System for Protecting Rivers and Watercourses
- Internet of Things (IoT) in e-Agri, Hardware design, PCB design, Firmware design and implementation, Wireless communication.

Position of Responsibility

Electronic Engineering Third Year Student Representative *2017 – 2018*
Electrical and Electronic Engineering Second Year Student Representative *2016 – 2017*
Chairman of NCEPU International Education School Students' Union *2014 – 2015*
Chairman of Tsinghua High School Students' Union *2012 – 2013*
Chairman and General Secretary of Tsinghua High School Model United Nations *2012 – 2013*

Selected Honours and Awards

CSC Cambridge Scholarship (Fully-funded Ph.D.) *Jun. 2019*
CSC Masters Programme Scholarship (Partially-funded M.Phil.) *Jun. 2018*
Third Year 3rd Prize in School of EEE, UoM (Top 3 of the year) *Jun. 2018*
2018 Beijing Outstanding Higher Education Graduate Title *Jun. 2018*
Second Year 1st Prize in School of EEE, UoM (Top 1) *Oct. 2017*
Beijing Capital University & College "Pioneer Cup" Outstanding Member Title *Oct. 2016*
3rd Prize Student Scholarship at NCEPU *Sep. 2016*
Entrepreneur Student Scholarship (Top 3) at NCEPU *Dec. 2015*
1st Prize (Top 2) Student Scholarship at NCEPU *Sep. 2015*
Special Award (Top 1‰) in National English Competition for College Students *May. 2015*
2nd prize (Top 10) in 20th National English Speaking Competition, Beijing region *Dec. 2014*

Key Skills and Interests

Subject Related
- **Software Programming:** Proficient in C programming (Embedded C and compiler design). Know well in C++, Python (Tensorflow Framework), Java (Eclipse IDE and Android software development), Matlab and Simulink.
- **Hardware programming:** Know well in Verilog and VHDL coding. Experience in HLS arithmetic C and Xilinx Vitis.
- **Hardware development:** Proficient in Altium Designer. Know well in Eagle, Designspark and NI Multisim (Circuit and PCB design). Know well in Solidworks and Fusion360 (Product design).
- **Environment:** Proficient in MplabX IDE and Code Composer Studio. Know well in Cadence Software (VLSI), Xilinx IDE and Quartus Prime (FPGA).
- **Embedded systems:** Proficient in the use of microcontrollers (ARM family, PIC family). Know well TI KeyStone DSPs and Lattice iCE40 FPGAs. Experience in Raspberry Pi, Beagle Bone Boards.

IT
- Proficient in MacOS and Linux (Ubuntu, Debian, etc.).
- Proficient in the use of LaTeX (Invited talk *How to use LaTeX* at University of Cambridge, 2019)
- Proficient in the use of Adobe Family (After Effect, Audition, Premiere, Photoshop and Illustrator), Microsoft Office Products, Corel VideoStudio, Edius, FinalCut Pro.
- Proficient in Photography, Filmmaking and Video Editing. Experience in Web development and maintenance.

Language
- English (**IELTS 8.0/9.0**), Chinese (Native Speaker)

Interests

- Photography, Tennis, Piano, Model United Nations

Academic Responsibility

- Reviewer of *Applied Optics*

Publication List

[1] HoloBlade: An Open-Hardware Spatial Light Modulator Driver Platform for Holographic Displays
Andrew Kadis, **Youchao Wang**, Daoming Dong, Peter Christopher, Ralf Mouthaan and Timothy Wilkinson. *In submission*.

[2] Aberration Correction of a Ball-lens Holographic Projector using a Retroreflector Array
Andrew Kadis, Ralf Mouthaan, Peter Christopher, Daoming Dong, **Youchao Wang** and Timothy Wilkinson. *In submission*.

[3] Real-time parallel holographic foveated rendering for head-up displays
Daoming Dong, **Youchao Wang** (**corr. author**) and Timothy Wilkinson. *In submission*.

[4] Deriving Equations from Sensor Data Using Dimensional Function Synthesis
Vasileios Tsoutsouras, Sam Willis, **Youchao Wang** and Phillip Stanley-Marbell. To appear in *Communications of the ACM* (**Invited as a CACM Research Highlight**), 2020.

[5] Cost-Optimized Heterogeneous FPGA Architecture for Non-iterative Hologram Generation
Daoming Dong, **Youchao Wang** (**corr. author**), Andrew Kadis and Timothy Wilkinson. In *Applied Optics*, vol.59, no.25, 2020.

[6] OASys: Envisioning an Opto-electronic Accelerator for Deep Learning Applications
Youchao Wang and Timothy Wilkinson. In *Proceedings of FiO/LS*, 2020.

[7] Computer-Generated Fresnel Holograms Using Field Programmable Gate Arrays
Daoming Dong, Andrew Kadis, **Youchao Wang** and Timothy Wilkinson. In *Proceedings of DH3D*, 2020.

[8] HoloBlade: An Open Platform for Holography
Andrew Kadis, Daoming Dong, **Youchao Wang**, Peter Christopher, Ralf Mouthaan and Tim Wilkinson. In *Proceedings of DH3D*, 2020.

[9] Holographic Rendering of a Real-World Scene Captured with a Low-cost RGB-D Camera
Fan Yang, **Youchao Wang**, Ralf Mouthaan and Tim Wilkinson. In *Proceedings of DH3D*, 2020.

[10] Hardware Implementations of Computer Generated Holography: A Review
Youchao Wang, Daoming Dong, Peter Christopher, Andrew Kadis, Ralf Mouthaan, Fan Yang and Timothy Wilkinson. *Optical Engineering*, 59 (10), 102413, 2020.

[11] Predictive Search Algorithm for Phase Holography
Peter Christopher, **Youchao Wang**, and Timothy Wilkinson. *Journal of the Optical Society of America: A*, vol. 36, no. 12, 2019.

[12] Computer Hologram Generation With One-Step Phase-Retrieval Using a Digital Signal Processor Board
Youchao Wang, Daoming Dong, Peter Christopher, Andrew Kadis and Timothy Wilkinson. In *Proceedings of GlobalSIP 2019*, 2019.

[13] Fixed-Point Accuracy Analysis of 2D FFT for the Creation of Computer Generated Hologram
Daoming Dong, **Youchao Wang**, Peter Christopher, Andrew Kadis and Timothy Wilkinson. In *Proceedings of GlobalSIP 2019*, 2019.

[14] Deriving Equations from Sensor Data Using Dimensional Function Synthesis
Youchao Wang, Sam Willis, Vasileios Tsoutsouras and Phillip Stanley-Marbell. *ACM Transactions on Embedded Computing Systems*, vol. 18, no. 5, 2019. (*Best Paper Award* at the *2019 ACM/IEEE Embedded Systems Week*)

[15] Distributed Water Quality Monitoring System using Internet of Things Wireless Protocol – Long Range Wide Area Network
Shariar Morshed Rajib, **Youchao Wang**, Chris Collins and Bruce Grieve. *In Submission*, 2019.

[16] Safeguarding Sensor Device Drivers Using Physical Constraints
Gregory Brooks, **Youchao Wang** and Phillip Stanley-Marbell. In *Proceedings of ACM EuroSys 2019* (poster), Dresden, 2019.

[17] Low-Cost Turbidity Sensor for Low-Power Wireless Monitoring of Fresh-Water Courses
Youchao Wang, Shariar Morshed Rajib, Chris Collins and Bruce Grieve. *IEEE Sensors Journal*, vol. 18, no. 11, 2018. (Officially announced as **one of the 25 most downloaded** *Sensors Journal* papers in the months of October, November and December 2018, and **the 7th most popular document** as of January 2019)
[18] Interest Set Mechanism to Improve the Transport of Named Data Networking
Xiaoke Jiang, Jun Bi, **Youchao Wang** and You Wang. In *Proceedings of ACM SIGCOMM13* (poster, Section 12), Hongkong, 2013.
[19] Tech report: Interest Set Mechanism to Improve the Transport of Named Data Networking
Xiaoke Jiang, Jun Bi, **Youchao Wang** and You Wang. *Tsinghua University*, 2013.

Referees

Available on request