

# Youchao Wang

Department of Engineering, University of Cambridge

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## Education

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### Ph.D. in Engineering

- Electrical Engineering Division, Department of Engineering.

*University of Cambridge, UK, 2019 – present*

### M.Phil. in Engineering (By Research)

- Electrical Engineering Division, Department of Engineering.

*University of Cambridge, UK, 2018 – 2019*

### B.Eng. Electronic Engineering (1<sup>st</sup> Class Honours)

- Second year direct entry. Final grade: 87%. Third year rank: 3/250. Second year rank: 1/240.

*University of Manchester, UK, 2016 – 2018*

### B.Eng. Electrical Engineering and its Automation

- First and Second year final result: 83%. First year rank: 2/119.

*North China Electric Power University, China, 2014 – 2018*

### High School Graduate

*Tsinghua High School, China, 2011 – 2014*

## Project Portfolio

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### 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 (3<sup>rd</sup> 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

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### 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 3 <sup>rd</sup> Prize in School of EEE, UoM (Top 3 of the year)	Jun. 2018
2018 Beijing Outstanding Higher Education Graduate Title	Jun. 2018
Second Year 1 <sup>st</sup> Prize in School of EEE, UoM (Top 1)	Oct. 2017
Beijing Capital University & College "Pioneer Cup" Outstanding Member Title	Oct. 2016
3 <sup>rd</sup> Prize Student Scholarship at NCEPU	Sep. 2016
Entrepreneur Student Scholarship (Top 3) at NCEPU	Dec. 2015
1 <sup>st</sup> Prize (Top 2) Student Scholarship at NCEPU	Sep. 2015
Special Award (Top 1%) in National English Competition for College Students	May. 2015
2 <sup>nd</sup> prize (Top 10) in 20 <sup>th</sup> 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

## Publication List

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- [1] REAL-TIME PARALLEL HOLOGRAPHIC FOVEATED RENDERING FOR HEAD-UP DISPLAYS  
Daoming Dong, **Youchao Wang (corr. author)** and Timothy Wilkinson. *In submission*.
- [2] A COST-OPTIMIZED HETEROGENEOUS FPGA ARCHITECTURE FOR NON-ITERATIVE HOLOGRAM GENERATION  
Daoming Dong, **Youchao Wang (corr. author)**, Andrew Kadis and Timothy Wilkinson. *In submission*.
- [3] OASys: ENVISIONING AN OPTO-ELECTRONIC ACCELERATOR FOR DEEP LEARNING APPLICATIONS  
**Youchao Wang** and Timothy Wilkinson. *In submission*.
- [4] COMPUTER-GENERATED FRESNEL HOLOGRAMS USING FIELD PROGRAMMABLE GATE ARRAYS  
Daoming Dong, Andrew Kadis, **Youchao Wang** and Timothy Wilkinson. In *Proceedings of DH3D*, 2020.
- [5] HOLOBLADE: AN OPEN PLATFORM FOR HOLOGRAPHY  
Andrew Kadis, Daoming Dong, **Youchao Wang**, Peter Christopher, Ralf Mouthaan and Tim Wilkinson. In *Proceedings of DH3D*, 2020.
- [6] 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.
- [7] [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, 2019.
- [8] [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.
- [9] 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.
- [10] 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.
- [11] [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, being invited as a research highlight to be present in *Communications of the ACM* magazine.)
- [12] 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.
- [13] [SAFEGUARDING SENSOR DEVICE DRIVERS USING PHYSICAL CONSTRAINTS](#)  
Gregory Brooks, **Youchao Wang** and Phillip Stanley-Marbell. In *Proceedings of ACM EuroSys 2019* (poster), Dresden, 2019.
- [14] [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 **7<sup>th</sup> most popular document** as of January 2019)
- [15] [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.
- [16] [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

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Available on request