

PERSONAL INFORMATION

Huang, Chih-Hsien

Date of birth, place: 10/02/1981, Taichung (Taiwan)

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Researcher unique identifier(s): orcid.org/0000-0003-3012-543X

EDUCATION

2010 – 2015	PhD in Electrical and Computer Engineering Texas A&M University, College Station, Texas, USA Advisor: Prof. Dr. Jun Zou GPA:4.0/4.0
2003 – 2005	Master in Electrical Engineering National Cheng Kung University, Tainan, Taiwan Advisor: Ming-Shing Young GPA:3.56/4.0
1999 – 2003	Bachelor in Electrical Engineering National Cheng Kung University, Tainan, Taiwan GPA:2.89/4.0

RESEARCH HIGHLIGHTS

- Development of water-immersible micromachined 2D scanning devices and build 3D acoustic imaging systems based on their advantages.
- Achieved world first *in-vivo* photoacoustic microscopy system with 500% frame rate improvement.
- Investigating mechanism of ultrasound neuron stimulation through discovering relation between modulation and pupil diameter.
- Design, simulation, and characterization of both acoustic and mechanical properties for several circular membrane type actuators and sensors.

CURRENT AND PREVIOUS POSITION(S)

2017 – Present **Postdoctoral Research Fellow**

Department of Life Science and Imaging (LSI), IMEC, Belgium (associate with KU Leuven)

- Research, design, and execute of animal experiment for analysing mechanism behind ultrasound neuron modulation.
- Build photoacoustic imaging platform for multi-purpose PA imaging requirement.
- Multiphysics simulation and modeling for membrane type actuators and sensors including pMUT, cMUT, and micromechanical optical pressure sensor.
- Design, characterization, and testing of acoustic transducers for ultrasound gesture recognition, haptic feedback, ultrasound neuron modulation, and acoustic holography.

2015 – 2016 **Research, Design, and Development Engineer III**

Houston Technology Centre, Baker Hughes Incorporated, Houston, Texas

- Developed next generation resistivity logging while drilling tools. Expected to improve at least 50% accuracy when the formation resistivity larger than 100 ohm-m from analysis and simulation of electrical and electromagnetic properties for down hole resistivity measurement.
- Analyzed root cause of electrical resistivity imager of current tool. Provided solutions for high quality resistivity imaging in harsh conditions like high resistivity formation with low resistivity drilling fluid
- Sustaining, maintenance, and technical support for current LWD tools. Modification, diagnosis, and modeling of antenna, amplifier, and analog-to-digital conversion circuits.

2010 – 2015 **Doctoral Research Assistant**

Department of ECE, TAMU, College Station, Texas

- Created world first MEMS scanning mirror which can work reliably in the liquid environment.
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- Achieved first *in-vivo* photoacoustic microscopy system with 500% frame rate improvement.
- Designed and fabricated 2-D virtual ultrasound array microsystem and reconstruct 3D images with Matlab and Volview. Reduced the cost of generating 3D ultrasound imaging for at least 100% and improved the resolution more than 50% through applying SAFT with overlapped single transducer instead of 1-D or 2-D physical ultrasound transducer array.
- Fabricated 2-D MEMS scanning mirror for portable and handheld photoacoustic microscopy system.

2013 **Research and Design Engineer** (Intern)

Taiwan Semiconductor Manufacturing Company (TSMC), Hsinchu, Taiwan

- Examined customized E-Beam patterning design analyzer software to evaluate its feasibility and quality.
- Analyzed incoming issues while mass product ordinary layouts with multiple E-Beam direct write system through paper searching, existing layouts analysis, and simulation with Matlab.

2012 –2013 **LabView Programmer** (Part time)

Department of Psychology, TAMU, College Station, Texas

- Developed 12 different bio signal monitoring systems including EMG, GSR, ECG, PPG, and respiration integrated with surveys. Managed testing flows of each psychological experiment and increased subjects testing speed for 90%.
- Organized electrical devices and programs to communicate Biopac and Medoc Pathway System by LabView. Reduced 50% of system setup time during each trail.

2010 **Research Assistant**

Department of Computer Science, NCKU, Tainan, Taiwan

- Developed baseline shift heartbeat calculating algorithm to monitor the physical condition of patients in nursing hospital. Increased 90% heart beat accuracy when the patient is under emergency.
- Modified wearable Zigbee based sensor network monitor system. Saved 30% dimension and 50% weight of entire system.

2005 –2010 **Electrical Engineer**

Laser Technology Centre, Industrial Technology Research Institute, Tainan, Taiwan

- Created pixel by pixel colour feedback algorithm for LED back light module by using current mixing method. Issued two patents (*US patent* Pub. No.: 2008/0012820 A1 and Patent No.: 7973759) and increased 19.85 % color accuracy of LED monitor.
- Investigated flick free sequential LED light intensity detection method to address the blink issue of large size LED monitor. Increased 300% of LED dimension without blink phenomena and got one patent (*US patent*, Pub. No.: US 2008/0252664 A1).
- Deduced stablbing wavelength algorithm for LED backlight module. Increased 50% temperature tolerance of LED monitor and issued one patent (*US patent*, Patent No.: 7638744).

2003 –2005 **Master Research Assistant**

Department of Electrical Engineer, NCKU, Tainan, Taiwan

- Investigated emotion monitoring biofeedback system for archers to evaluate the mental state during practicing and competition. In preliminary result, 60% of subjects got improvement after practicing with biofeedback system during simulation trial.

FELLOWSHIPS AND AWARDS

2013 Best Oral Paper Award SPIE BiOS 2013

2010 –2013 Department Scholarship, Department of Electrical and Computer Engineering, TAMU

2013 –2015 NSF award NSF CMMI-1131758

2016 –2018 Postdoctoral Research Fellowship, IMEC, Belgium (associate with KU Leuven)

SUPERVISION OF GRADUATE STUDENTS AND POSTDOCTORAL FELLOWS

2012 –2013	Song Xu, Master Student, day to day supervision, PhD candidate now Department of ECE, Texas A&M University, College Station, Texas, USA
2014 –2015	Fang Cheng , Master Student, day to day supervision, PhD candidate now Department of ECE, Texas A&M University, College Station, Texas, USA
2017	Two Master Students, weekly supervision IMEC, Belgium
2017	One Bachelor Student, day to day supervision IMEC, Belgium (Joint with Johns Hopkins University, USA)

TEACHING ACTIVITIES

2007	Lecture: 8 hours Ministry of Economic Affairs of Taiwan Course: "Development of driving circuits for LED backlight module"
2015	Lecture and Advisor: 2+10 hours NSF REU Brown-Bag Event, USA Course: "Micromachined Scanning Devices for 3D Acoustic Imaging" Topic: "Piezoelectric flags for wind energy harvesting and wind speed sensing"

ORGANISATION OF SCIENTIFIC MEETINGS

2014	<i>Judge</i> for Student Research Week, Texas A&M University, Texas, USA
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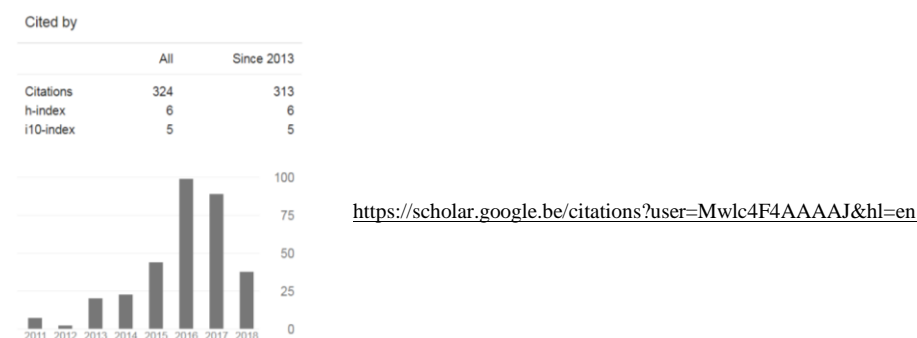
MEMBERSHIPS OF SCIENTIFIC SOCIETIES

2013	Member of SPIE
2015	Member of IEEE

MAJOR COLLABORATIONS

- Industrial Technology and Research Institute, Hsinchu, Taiwan
- Taiwan Telemedicine Device Co., Tainan, Taiwan
- Washington University at St. Louis, Missouri, USA
- Celle Technology Centre, Celle, Germany

PUBLICATIONS



INTERNATIONAL PEER-REVIEWED JOURNALS

1. **Chih-Hsien Huang**, Junjie Yao, Lihong V Wang, and Jun Zou "A water-immersible 2-axis scanning mirror microsystem for ultrasound and photoacoustic microscopic imaging applications," *Microsystem Technologies*, Vol. 19, 577-582, 2012.
Citations: Google scholar: 10 ISI web of science: 7
2. **Chih-Hsien Huang** and Jun Zou "A novel two-axis micromechanical scanning transducer using water-immersible electromagnetic actuators for handheld 3D ultrasound

imaging,” *Sensors and Actuators A*, Vol. 236, 281-288, 2015.

Citations: Google scholar: 0 ISI web of science: 0

3. **Chih-Hsien Huang***, Junjie Yao*, Lidai Wang, Joon-Mo Yang, Liang Gao, Konstantin I Maslov, Jun Zou, and Lihong V Wang “Wide-field fast-scanning photoacoustic microscopy enhanced by a water-immersible MEMS scanning mirror,” *Journal of Biomedical Optics*, Vol. 17(8), 2012.
Citations: Google scholar: 73 ISI web of science: 32
4. Junjie Yao, Lidai Wang, Joon-Mo Yang, Konstantin I Maslov, Terence TW Wong, Lei Li, **Chih-Hsien Huang**, Jun Zou, and Lihong V Wang “High-speed label-free functional photoacoustic microscopy of mouse brain in action,” *Nature Methods*, Vol. 12, 407–410, 2015.
Citations: Google scholar: 174 ISI web of science: 89
5. Catherine Martel, Junjie Yao, **Chih-Hsien Huang**, Jun Zou, Gwendalyn J Randolph, and Lihong V Wang “Photoacoustic lymphatic imaging with high spatial-temporal resolution,” *Journal of Biomedical Optics*, Vol. 19, 116009–116009, 2014.
Citations: Google scholar: 13 ISI web of science: 6
6. Song Xu, **Chih-Hsien Huang**, and Jun Zou “Microfabricated water-immersible scanning mirror with a small form factor for handheld ultrasound and photoacoustic microscopy,” *Journal of Micro/Nanolithography, MEMS, and MOEMS*, Vol. 14, Issue (3), 2016.
Citations: Google scholar: 4 ISI web of science: 1
7. Yun He, Lidai Wang, Junhui Shi, Junjie Yao, Lei Li, Ruiying Zhang, **Chih-Hsien Huang**, Jun Zou, Lihong V Wang “In vivo label-free photoacoustic flow cytography and on-the-spot laser killing of single circulating melanoma cells,” *Scientific Reports*, Vol. 6, 39616, 2016. Citations: Google scholar: 4 ISI web of science: 1
8. Li Lin, Junjie Yao, Ruiying Zhang, Chun-Cheng Chen, **Chih-Hsien Huang**, Yang Li, Lidai Wang, William Chapman, Jun Zou, and Lihong V Wang “High-speed photoacoustic microscopy of mouse cortical microhemodynamics,” *Journal of Biophotonics*, Vol.10, 792-798, 2017.
Citations: Google scholar: 2 ISI web of science: 0

INTERNATIONAL PEER-REVIEWED CONFERENCES

1. Junjie Yao, **Chih-Hsien Huang**, Konstantin Maslov, Lidai Wang, Liang Gao, Jun Zou, and Lihong V Wang “Water-Immersion MEMS Scanning Mirror Enhanced Optical-Resolution Photoacoustic Microscopy,” *Biomedical Optics*, BSu3A. 54, 2012.
Citations: Google scholar: 1 ISI web of science: 0
 2. **Chih-Hsien Huang**, Junjie Yao, Lihong V Wang, and Jun Zou “A water-immersible two-axis scanning mirror microsystem for ultrasound and photoacoustic microscopic imaging applications,” *MOEMS and Miniaturized Systems XII*, Vol. 8616, 2013.
Citations: Google scholar: 0 ISI web of science: 0
 3. Junjie Yao, **Chih-Hsien Huang**, Catherine Martel, Konstantin I Maslov, Lidai Wang, Joon-Mo Yang, Liang Gao, Gwendalyn Randolph, Jun Zou, and Lihong V Wang “Water-Immersion MEMS scanning mirror designed for wide-field fast-scanning photoacoustic microscopy,” *SPIE BiOS*, 858127-6, 2013.
Citations: Google scholar: 0 ISI web of science: 0
 4. **Chih-Hsien Huang**, and Jun Zou “A novel two-axis micromechanical scanning transducer for handheld 3D ultrasound and photoacoustic imaging,” *Photons Plus Ultrasound: Imaging and Sensing* 2016, Vol. 9708, 2016.
Citations: Google scholar: 0 ISI web of science: 0
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5. Song Xu, **Chih-Hsien Huang**, and Jun Zou “A two-axis water-immersible MEMS scanning mirror for scanning optical and acoustic microscopy,” *SPIE*, Vol. 9760, 2016.
Citations: Google scholar: 0 ISI web of science: 0
6. Song Xu, **Chih-Hsien Huang**, and Jun Zou “A new water-immersible two-axis MEMS scanning mirror for photoacoustic microscopy,” *Clinical and Translational Biophotonics*, JW3A. 14, 2016.
Citations: Google scholar: 0 ISI web of science: 0
7. Yun He, Lidai Wang, Junhui Shi, Junjie Yao, Lei Li, Ruiying Zhang, **Chih-Hsien Huang**, Jun Zou, and Lihong V Wang “Real-time photoacoustic flow cytography and photothermolysis of single circulating melanoma cells in vivo,” *SPIE*, 100641E, 2017.
Citations: Google scholar: 0 ISI web of science: 0
8. **Chih-Hsien Huang**, Hang Gao, Rachid Haouari, Benedetto Troia, Shengping Mao, Roelof Jansen, Veronique Rochus, and Xavier Rottenberg “A high-sensitivity and wide dynamic range acoustic sensor using multiple MZIS MICRO-OPTO-MECHANICAL technology,” *IEEE International Ultrasonics Symposium*, 2017.
Citations: Google scholar: 1 ISI web of science: 0
9. Benedetto Troia, **Chih-Hsien Huang**, Shengping Mao, Hang Gao, Roelof Jansen, Veronique Rochus, and Xavier Rottenberg “Coupled multiphysics circuitual modelling of micro-opto-mechanical sensor systems,” *SPIE Photonics* 2018.
Citations: Google scholar: 0 ISI web of science: 0
10. **Chih-Hsien Huang**, Hang Gao, G.B. Torri, Shengping Mao, Yongbin Jeong, Veronique Rochus, and Xavier Rottenberg, “Design, Modelling, and Characterization of Display Compatible pMUT Device,” *EuroSimE* 2018, *accept.*
11. Guilherme Brondani Torri, M. Signorelli, **Chih-Hsien Huang**, Rachid Haouari, , Shengping Mao, and Xavier Rottenberg, “Design and Test of a 3D Printed Acoustic Fresnel Lens,” EuroSimE 2018, *accept.*
12. **Chih-Hsien Huang**, Libertario Demi, Guilherme Brondani Torri, Shengping Mao, Yongbin Jeong, David Cheyns, Xavier Rottenberg, and Veronique Rochus, “Display Compatible pMUT Device for Mid Air Ultrasound Gesture Recognition,” *Techconnect World* 2018, *accept.*

PATENTS

1. **Zhi-Xian Huang**, Hong-Xi Cao, Kun-Chieh Chang, Chun-Chieh Yang, and Fu-Shun He “System and method for driving light emitters of backlight module using current mixing.” (US patent, Patent No.: 7973759), *Grant*
Citations: Google scholar: 6
 2. **Zhi-Xian Huang**, Hong-Xi Cao, Kun-Chieh Chang, Fu-Shun Ho, and Chun-Chieh Yang “A system and method for stabling wavelength of LED radiation in backlight module.” (US patent, Patent No.: 7638744) , *Grant*
Citations: Google scholar: 1
 3. Chun-Chieh Yang, Hong-Xi Cao, Kun-Chieh Chang, **Zhi-Xian Huang**, Cheng-Fa Chen, and Ji-Bin Horng “System and method for achieving desired operation illumination condition for light emitters.” (US patent, Pub. No.: US 2008/0012820 A1), *Publication of Application*
Citations: Google scholar: 3
 4. **Zhi-Xian Huang**, Kun-Chieh Chang, Chieh Yang Chun, and Hong-Xi Cao “Device and Method For Driving Light Emitting Diodes.” (US patent, Pub. No.: US 2008/0252664 A1), *Publication of Application*
Citations: Google scholar: 24
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5. **Zhi-Xian Huang**, Hong-Xi Cao, Kun-Chieh Chang, Chun-Chieh Yang, and Fu-Shun He “System and method for driving light emitters of backlight module using current mixing.” (CN patent, Patent No.: ZL200710111818), *Grant*
6. **Zhi-Xian Huang**, Kun-Chieh Chang, Chieh Yang Chun, and Hong-Xi Cao “Device and Method for driving light emitting semiconductor components.” (CN patent, Patent No.: ZL200810091678), *Grant*
7. **Zhi-Xian Huang**, Hong-Xi Cao, Kun-Chieh Chang, Fu-Shun Ho, and Chun-Chieh Yang “System and method for stabilizing wavelength of LED radiation in backlight module.” (CN patent, Patent No.: ZL200810130508), *Grant*
8. **Zhi-Xian Huang**, Kun-Chieh Chang, Chun-Chieh Yang, and Hong-Xi Cao “Device and method for driving light emitting diodes.” (TW patent, Patent No.: I376659) , *Grant*
9. **Zhi-Xian Huang**, Hong-Xi Cao, Kun-Chieh Chang, Chun-Chieh Yang, and Fu-Shun He “Circuit, illumination system and method for driving light emitters using current mixing.” (TW patent, Patent No.: I371733), *Grant*

REVIEWER

1. Journal of Biomedical Optics (SPIE)
2. Chinese Optics Letters (OSA)

GRANT PROPOSAL

- 2014 NSF proposal “Dynamically Reconfigurable 2D Virtual Transducer Arrays for 3D Ultrasound Imaging”
- 2015 NSF proposal “2D Virtual Transducer Arrays for Ultrasound Tomography”
- 2017 MARIE SKŁODOWSKA-CURIE ACTIONS” Micromechanical Ultrasound Transducer for Acoustic Neuron Tomography and Stimulation”
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