FACULTY OF ENGINEERING & INFORMATION TECHNOLOGIES

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Research interests

Professor Xiaoke Yi's research into nanophotonics and integrated microwave photonics promises to lead to breakthroughs that will meet our ever-increasing demand for information and communication systems that can process high-frequency and wideband signals at lightning speed.

"Microwave photonics is a multidisciplinary field that brings together the worlds of microwave engineering and optoelectronics, for applications in areas such as communications, radars, sensors and instrumentation.

"These applications require ever-increasing speed, bandwidth, sensitivity, functionality and dynamic range. They also need devices that are small and lightweight and have low power consumption, strong immunity to electromagnetic interference and high mobility.

"Currently digital electronic circuits are the most widely used approaches for these applications; however, the sampling speed of digital electronic is normally less than several gigahertz. The unique capabilities of photonics for processing ultrawide bandwidth, where high-frequency microwave signals are only a tiny fraction of the carrier's optical frequency, make it a promising solution to meet our ever-increasing demand for expanding the capacity of information and communication systems and networks.

"My vision is to deliver major breakthroughs in signal processing and sensing that will bring about disruptive changes in fields such as communications, defence and healthcare delivery.

"For example, I am currently working on a non-invasive sensing technique for glucose monitoring in people with diabetes that is highly accurate, fast (real-time), low-cost, pain-free and risk-free. This represents a major breakthrough in the development of non-invasive blood glucose measurement devices that can provide stable and reliable results, conveniently and economically.

"I first encountered fibre optics during my PhD, when I started to explore using light for signal processing. Since joining the University of Sydney more than 10 years ago I've continued to pursue my passion in photonic signal processing, and have driven this field from concepts to discrete components to integration circuits and functional subsystems.

"Here I am surrounded by amazing colleagues who are passionate about their research and about new technologies, and my research benefits from this supportive and collaborative environment.

"The University's recent $150 million investment in establishing the world-leading Australian Institute for Nanoscale Science and Technology also shows its commitment to a major research focus on nanoscale science and its applications."

Teaching and supervision

ELEC2302(http://cusp.sydney.edu.au/students/view-unit-page/alpha/ELEC2302) - Signals and Systems

ELEC4710(http://cusp.sydney.edu.au/students/view-unit-page/alpha/ELEC4710) - Engineering Project A

ELEC4711(http://cusp.sydney.edu.au/students/view-unit-page/alpha/ELEC4711) - Engineering Project B

ELEC4712(http://cusp.sydney.edu.au/students/view-unit-page/alpha/ELEC4712) - Honours Thesis A

ELEC4713(http://cusp.sydney.edu.au/students/view-unit-page/alpha/ELEC4713) - Honours Thesis B

ELEC5516(http://cusp.sydney.edu.au/students/view-unit-page/alpha/ELEC5516) - Electrical and Optical Sensor Design

ELEC5721(http://cusp.sydney.edu.au/students/view-unit-page/alpha/ELEC5721) - Foundations of Signals and Systems

Current research students

Project title	Research student
Microwave Photonic Phase Shifters on Nanochips	Suen Xin CHEW
Integrated Microring Resonator: From Light Coupling to Photonic Signal Processing	Alvin Tak Lok Hui HUI
Stability and Dynamics of Bragg Grating Solitons in a semilinear Dual-Core System with Cubic-Quintic Nonlinearity	Md JAHIRUL ISLAM
Integrated Microwave Photonics Signal Processing	Bo LIU
Optimization of the Integrated Photonics Platform	Keith POWELL
Microwave Photonic Signal Processing with Dynamic Reconfigurability	Jianqiao REN
Optical filter based on micro-ring resonator	Shijie SONG
Photonic biomedical sensor	Chujun WU
Microwave Photonic Signal Processing and Sensing	Wenjian YANG

Awards and honours

- 2017: Sydney Accelerator Fellowship Awards (SOAR)
- 2016: Vice-Chancellor's Award, "Outstanding Research Engagement and Innovation."

In the media

Champions of change(http://sydney.edu.au/engineering/news/2017/champions-of-change.shtml) [6-Mar-17]

Faculty of Engineering and Information Technologies

International Women's Day on 8 March is a chance to celebrate the achievements of women and discuss what further steps can be taken to progress gender equity. More..(http://sydney.edu.au/engineering/news/2017/champions-of-change.shtml)

科普：吹气可监测糖尿病(http://news.xinhuanet.com/science/2016-08/22/c_135624421.htm) [22-Aug-16]

Science Xinhua

新华社悉尼8月22日电 澳大利亚悉尼大学日前宣布，该校研究人员开发出一种简单的手持呼吸测试仪器，能够通过检测呼出气体中的酮类物质含量来监测糖尿病，未来有望替代传统的指尖采血检测方法. More..(http://news.xinhuanet.com/science/2016-08/22/c_135624421.htm)

Detecting diabetes' deadly ketones(http://sydney.edu.au/news-opinion

/news/2016/08/18/detecting-diabetes-deadly-ketones.html) [18-Aug-16]

University of Sydney

A recently created device could mean an end to finger-prick blood tests for diabetes patients. More..(http://sydney.edu.au/news-opinion/news/2016/08/18/detecting-diabetes-deadly-ketones.html)

Eureka Prizes announces five Sydney finalists(http://sydney.edu.au/news-opinion/news/2016/07/29/eureka-prizes-announce-four-sydney-finalists.html) [29-July-16]

University of Sydney

The Oscars of Australian science selects an engineer and 3 scientists from Sydney. More..(http://sydney.edu.au/news-opinion/news/2016/07/29/eureka-prizes-announce-four-sydney-finalists.html)

PhD and master's project opportunities

- Design of new signal processor for fiber-wireless communication systems(http://www.usyd.edu.au/research/opportunities/opportunities/405)
- Microwave photonic solutions for modern radar/antenna systems(http://www.usyd.edu.au/research/opportunities/opportunities/406)

Selected grants

2017

- *SOAR Fellowship - Yi, Xiaoke*; Yi X; DVC Research/SOAR Fellowships.

2016

- *Ultrafast optoelectronic characterisation for optical and wireless systems*; Shieh W, Moss D, Yi X, Skafidas E, Nirmalathas A, Lim C, wong E, Minasian R, Li Y, Pelusi M, Marpaung D, Austin M, Schroder J, Nguyen T; Australian Research Council (ARC)/Linkage Infrastructure, Equipment and Facilities (LIEF).
- *Photonic Discrete Signal Processing*; Yi X; DVC Research/Bridging Support Grant.

2013

- *Photonic Enhanced Radio Frequency Front End (DSTO)*; Yi X; Defence Science and Technology Group/Research Support.
- *A mobile imaging platform to further transform breast cancer imaging research in NSW initiated by BREAST*; Brennan P, Mello-Thoms C, Yi X, Grieve S, McEntee M; Cancer Institute New South Wales/Equipment Grant.

2012

- *Microwave photonics for biomedical instrument and devices*; Yi X, Yu C, Lu C; Office of Global Engagement/IPDF Grant.
- *Photonic Enhanced RF Front-end for Signal Intelligence and Electronic Warfare*; Yi X; Department of Defence (Federal)/Research Support.

2011

- *New multi-function wideband microwave and radio frequency signal conditioning based on photonic approaches*; Yi X, Minasian R; Australian Research Council (ARC)/Discovery Projects (DP).

2010

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Selected publications

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- By type(#publications-by-type)
- By year(#publications-by-year)

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2017

- Hu, S., Li, L., Yi, X., Teng, F. (2017). Tunable Dual-Passband Microwave Photonic Filter Based on Stimulated Brillouin Scattering. *IEEE Photonics Technology Letters*, 29(3), 330-333. [More Information](http://dx.doi.org/10.1109/LPT.2017.2647968)

2016

- Minasian, R., Yi, X. (2016). Advances in High-speed and Adaptive Microwave Photonic Signal Processing. *Procedia Engineering*, 140, 217-224. [More Information](http://dx.doi.org/10.1016/j.proeng.2016.07.348)
- Hui, A., Yi, X., Song, S., Nguyen, L. (2016). Continuously tunable delay line based on eye-like ring resonator. *2016 18th International Conference on Electromagnetics in Advanced Applications (ICEAA 2016)*, Piscataway: (IEEE) Institute of Electrical and Electronics Engineers. [More Information](http://dx.doi.org/10.1109/ICEAA.2016.7731482)

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2015

- Minasian, R., Yi, X. (2015). Advances in high-speed and adaptive microwave photonic signal processing. *Photonics Global Conference (PGC2015)*, Singapore: Elsevier. [More Information](http://dx.doi.org/10.1016/j.proeng.2016.07.348)
- Mustafa, F., Yi, X., McEwan, A. (2015). Comparison of Geant4/Gamos with Monte Carlo Multilayer: Photon Transport in Tissue-Simulating Phantom for Glucose Sensing. *6th European Conference of the International Federation for Medical and Biological Engineering*, Cham: Springer International Publishing Switzerland. [More Information](http://dx.doi.org/10.1007/978-3-319-11128-5_69)

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2014

- Li, L., Yi, X., Huang, T., Minasian, R. (2014). High-Resolution Single Bandpass Microwave Photonic Filter With Shape-Invariant Tunability. *IEEE Photonics Technology Letters*, 26(1), 82-85. [More Information](http://dx.doi.org/10.1109/LPT.2013.2288972)
- Leitner, P., Yi, X., Huang, T., Li, L. (2014). Noise performance of spectrum sliced microwave photonic filters in non-constant dispersive media. *19th OptoElectronics and Communications Conference, OECC 2014 and the 39th Australian Conference on Optical Fibre Technology, ACOFT 2014*, Barton, ACT: Engineers Australia.

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2013

- Minasian, R., Chan, E., Yi, X. (2013). Advances in optoelectronic approaches for wideband and programmable processing of ultrafast signals. *6th International Conference on Advanced Optoelectronics and Lasers (CAOL 2013)*, Ukraine: IEEE. [More Information](http://dx.doi.org/10.1109/CAOL.2013.6657508)
- Minasian, R., Chan, E., Yi, X. (2013). Advances in Ultra-Wideband and Adaptive Microwave Photonic Signal Processors. *2013 IEEE International Conference on Communications Workshops*, Piscataway, United States: (IEEE) Institute of Electrical and Electronics Engineers. [More Information](http://dx.doi.org/10.1109/ICCW.2013.6649353)

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2012

- Li, L., Yi, X., Huang, T., Minasian, R. (2012). Distortion-free spectrum sliced microwave photonic signal processor: Analysis, design and implementation. *Optics Express*, 20(10), 11517-11528. [More Information](http://dx.doi.org/10.1364/OE.20.011517)
- Chu, R., Minasian, R., Yi, X. (2012). Inspiring student learning in ICT communications electronics through a new integrated project-based learning approach. *International Journal of Electrical Engineering Education*, 49(2), 127-135. [More Information](http://dx.doi.org/10.7227/IJEEE.49.2.3)

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2011

- Li, L., Yi, X., Huang, T., Minasian, R. (2011). Microwave photonic filter based on dispersion controlled spectrum slicing technique. *Electronics Letters*, 47(8), 511-512. [More Information](http://dx.doi.org/10.1049/el.2011.0449)
- Huang, T., Yi, X., Minasian, R. (2011). Microwave photonic filter based on

fractional delay lines. *10th International Conference on Optical Communications and Networks ICOCN 2011*, Guangzhou, China: (IEEE) Institute of Electrical and Electronics Engineers. [More Information](http://dx.doi.org/10.1049/cp.2011.1363)

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2010

- Yi, X., Li, L., Huang, T., Minasian, R. (2010). Elimination of Dispersion-Induced RF Distortion in Spectrum Sliced Microwave Photonic Filters. *2010 IEEE International Topical Meeting on Microwave Photonics (MWP 2010)*, Piscataway, New Jersey, United States of America: (IEEE) Institute of Electrical and Electronics Engineers. [More Information](http://dx.doi.org/10.1109/MWP.2010.5664129)
- Minasian, R., Yi, X., Chan, E. (2010). Microwave Photonic Filters. *2010 Photonics Global Conference (PGC 2010)*, Singapore: (IEEE) Institute of Electrical and Electronics Engineers.

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2009

- Huang, T., Yi, X., Minasian, R. (2009). A High-order FIR Microwave Photonic Filter. *International Topical Meeting on Microwave Photonics MWP 2009*, USA: (IEEE) Institute of Electrical and Electronics Engineers. [More Information](http://dx.doi.org/10.1109/OECCACOFT.2008.4610326)
- Yi, X., Minasian, R. (2009). Microwave photonic filter with single bandpass response. *Electronics Letters*, 45(7), 362-363. [More Information](http://dx.doi.org/10.1049/el.2009.0140)

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2008

- Huang, T., Yi, X., Minasian, R. (2008). A New Tunable Microwave Photonic Filter with Wavelength Re-use. *The 2008 IEEE International Topical Meeting on Microwave Photonics jointly held with the 2008 Asia-Pacific Microwave Photonic Conference*, Gold Coast, Australia: (IEEE) Institute of Electrical and Electronics Engineers. [More Information](http://dx.doi.org/10.1109/MWP.2008.4666685)
- Huang, T., Yi, X., Minasian, R. (2008). New Photonic Signal Processor With Wavelength Re-Use and Bipolar Taps. *OECC/ACOFT 2008 Conference*, Sydney: (IEEE) Institute of Electrical and Electronics Engineers. [More Information](http://dx.doi.org/10.1109/OECCACOFT.2008.4610442)

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2006

- Yi, X., Minasian, R. (2006). Dispersion Induced RF Distortion of Spectrum-Sliced Microwave-Photonic Filters. *IEEE Transactions on Microwave Theory and Techniques*, 54(2), 880-886. [More Information](http://dx.doi.org/10.1109/TMTT.2005.863050)
- Yi, X., Minasian, R. (2006). Noise characteristics of spectrum sliced microwave photonic filters. *Electronics Letters*, 42(14), 814-815. [More Information](http://dx.doi.org/10.1049/el:20061453)
- Yi, X., Minasian, R. (2006). Noise mitigation in spectrum sliced microwave photonic signal processors. *Journal of Lightwave Technology*, 24(12), 4959-4965. [More Information](http://dx.doi.org/10.1109/JLT.2006.884563)

2005

- Yi, X., Minasian, R. (2005). Effect of dispersion on spectrum sliced microwave photonic filters. *18th Annual Meeting of the IEEE Lasers and Electro-Optics Society (LEOS 2005)*, Piscataway, NJ, USA: (IEEE) Institute of Electrical and Electronics Engineers.
- Minasian, R., Chan, E., You, N., Chen, J., Yi, X., Atai, J. (2005). Fibre Bragg Grating Microwave Photonic Signal Processors. *BGPP/ ACOFT 2005 : OSA Topical Meeting on Bragg Gratings, Poling & Photosensitivity (BGPP) / 30th Australian Conference on Optical Fibre Technology (ACOFT) 2005*, Sydney: Tour Hosts Pty Ltd.

2004

- Yi, X., Wei, F., Wang, Y., Lu, C., Zhong, W. (2004). PMD and CD Characterization of Chirped Fiber Bragg Gratings Employing Photonic Microwave Technique. *Microwave and Optical Technology Letters*, 41(1), 1-2.

2003

- Yi, X., Lu, C., Wei, F., Wang, Y., Zhong, W. (2003). A New Method for Chromatic Dispersion Measurement of WDM Components Using Photonic Microwave Technique. *IEICE Transactions on Electronics*, P4-3 (7), 293-296.
- Yi, X., Lu, C., Yang, X., Zhong, W., Wei, F., Ding, L., Wang, Y. (2003). Continuously tunable microwave-photonic filter design using high-birefringence linear chirped grating. *IEEE Photonics Technology Letters*, 15(5), 754-756. [More Information](http://dx.doi.org/10.1109/LPT.2003.809979)

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2001

- Yi, X., Wei, F., Hong, N., Chao, L. (2001). Tunable Microwave Filter Design Using Wavelength Conversion Technique and High Dispersion Time Delays. *IEEE Photonics Technology Letters*, 13(18), 857-859.