

## SHOUHUA HUANG

Jet Propulsion Lab, 4800 Oak Grove Dr., MS298-100

Pasadena, CA91109

Ph : 818-354-0457

Shouhua.Huang@jpl.nasa.gov

### PROFESSIONAL EXPERIENCE

- 2/1999-present Senior Member Engineering Staff  
Jet Propulsion Laboratory, Pasadena, California
  - High stable optical / photonic transmission / distribution link
  - Ultra low phase noise photonic / microwave oscillator
- 4/1997-2/1999 Senior Engineer  
Osicom Technologies, Inc., Santa Monica, California
  - WDM optical communication system planning and development
  - TDM data communication system research and development
- 11/1995-3/1997 Research Engineer  
E-TEK dynamics, Inc., San Jose, California
  - Optical communication equipment and component research and development
- 3/1994-10/1995 Research Associate  
Optical Communication Laboratory, Electrical Engineering-Systems,  
University of Southern California, Los Angeles, California
  - 2.488 Gb/s DWDM transmitter and receiver research and design
  - DWDM circulating loop controller research and design
  - Amplifier based DWDM system AOTF dynamic equalizer research and design
  - 6x2.4 Gb/s 9,000 km DWDM optical communication system research and transmission experiment
  - 6-channel 1,000 km DWDM circulating loop research and transmission experiment with 6 EDFAs and AOTF dynamic equalizer
- 3/1992-2/1994 Lecturer  
Optical Communication Laboratory, Dept. of Electronic Engineering,  
Tsinghua University, Beijing, China
  - 4x622 Mb/s 40 km DWDM optical communication system research and transmission experiment
- 8/1986-2/1988 Engineer  
High Speed Optical Communication Laboratory,  
Wuhan Research Institute of Posts and Telecommunications (WRIPT), Wuhan, China
  - 1.12 Gb/s IM-DD optical communication system research and transmission experiment
  - Microwave hybrid integrated optical transmitter and receiver research and design
  - High efficient LD-fiber coupling technology research and development
  - 560 Mb/s 50 km non-repeater optical system design and transmission experiment
  - 140 Mb/s 60 km non-repeater optical system design and transmission experiment
- 3/1980-8/1983 Engineer  
Ministry of Aeronautics and Space of China (MASC)
  - Microwave technology research and development

### RESEARCH / DEVELOPMENT ACHIEVEMENTS

- Ultra stable photonic / microwave transmission / distribution links for NASA Deep Space Network (DSN) (2004- present)
- Ultra low phase noise photonic / microwave oscillator (1999- 2004)
- Channel expendable and bit rate flexible DWDM optical communication system (1997-1999)  
Designed and developed the whole system architecture (called GigMux<sup>®</sup>, see of Osicom / Sorrento Networks product catalogue), transmitter, receiver, Mux/Demux module, protection module, etc.
- Sophisticated optical switch (1996-1997)
- High precision laser wavelength locker (1996)
- High linearity optical transmitter and receiver (1995-1996)

- 6×2.4 Gbit/s 9,000 km wavelength division multiplexing (WDM) optical communication system transmission experiments (1994-1995)  
6×2.4 Gbit/s circulating loop with 1,000 km DSF, 6 EDFAs and AOTF dynamic equalizer, loop controller, AOTF controller, EDFA gain peak shift experiment, passive and active spectrum compensation for long-haul WDM communication systems.
- 4×622 Mb/s 40 km high density (HD) WDM IM-DD optical transmission system (1992-1993)
- 1.12 Gb/s 8 km CFT-FSK optical coherent transmission system (1991)  
High speed LD modules, broad bandwidth low noise PIN/FET, 2.4 Gb/s PRBS generator, high speed optical transmitters, clock frequency tracking/locking-automatic frequency control (CFT-AFC) system.
- LD property comprehensive measurement system (1990)  
High speed LD test fixture, Fiber polarizer, fiber polarization controller, Fabry-Perot optical filter
- Delayed self-heterodyne optical spectrum analyzer (1989)
- 1.12 Gb/s 8 km IM-DD optical transmission system (1987)  
Microwave hybrid IC technology, high efficient LD-fiber coupling technology, high efficient fiber splicing technology
- 560 Mb/s 50 km non-repeater optical transmission system (1986)
- 140 Mb/s 60 km non-repeater optical transmission system (1986)

### **PATENTS**

**5 U.S. patents** in optical / photonics communication systems and components field.

### **PUBLICATIONS**

Authored and co-authored **over 90 papers**.

### **AWARDS**

Two NASA “Space Act Awards”.

One NASA “Group Achievement Award”.

### **MEMBERSHIPS**

**Senior member, OSA**

**Senior member, IEEE**

Member, SPIE

### **EDUCATION**

- 1992 Ph.D., Beijing University of Posts and Telecommunications
- 1986 M.E., Wuhan Research Institute of Posts and Telecommunications
- 1980 B.S., Nanjing University

## SELECTED PUBLICATION LIST

### Proceedings:

1. S.Huang, M. Calhoun, and R. Tjoelker, "Optical link and RF distribution for antenna arrays," **IEEE International Frequency Control Symposium**, pp. 637-641, Miami, FL, June 2006.
2. S.Huang, L.Maleki, and T.Le, "A 10 GHz optoelectronic oscillator with continuous frequency tunability and low phase noise," **IEEE Frequency Control Symposium and PDA Exhibition**, Proc.2001, pp. 720-727, Seattle, WA, June 2001.
3. S.Huang, M.Tu, S.Yao, and L.Maleki, "A 'turnkey' optoelectronic oscillator with low acceleration sensitivity," **IEEE Frequency Control Symposium and PDA Exhibition**, Proc.2000, pp. 269-279, Kansas, MS, June 2000.
4. S.Huang, X.Zou, S.-M.Hwang, A.E.Willner, Z.Bao, and D.A.Smith, "Experimental demonstration of dynamic equalization of three 2.5-Gbit/s WDM channels over 1,000-km using acousto-optic tunable filters," **Conference on Optical Fiber Communications'96**, Proc. Vol.2, pp.186-188, San Jose, CA, Feb. 1996.
5. S.Huang, X.Y.Zou, A.E.Willner, "Experimental demonstration of active equalization and ASE suppression of three 2.5-Gbit/s WDM - network channels over 2500 km using AOTF as transmission filters", **Conference on Laser and Electro-Optics**, paper CThC21, Anaheim, California, June 1996.
6. S.Huang, X.Y.Zou, E.Park, and A.E.Willner, "9,000-km WDM transmission of three 2.5-Gbit/s channels covering a 5-nm wavelength range and using no pre-emphasis", **Topical Meeting on Optical Amplifiers and Their Applications'95**, paper ThD14, Davos, Switzerland, June 1995.
7. S.Huang, "Influences of EDFA on WDM/FDM systems", **SPIE's Annual Meeting**, San Diego'94 , July 1994, No.2289-17.
8. S.Huang, D.Huang, X.Jiang, F.Liu, J.Li, B.Zhou, "4 x 622 Mb/s km transmission experiment of WDM system with EDFA", **SPIE's Annual Meeting**, San Diego, CA , July 1994, No.2289-19.
9. S.Huang, S.Xie, B.Zhou and Y.Gao, "Crosstalk performance of optical WDM systems," **SPIE Conf. Multigigabit Fiber Communication Systems**, San Diego, CA, July 1993, No.2024-32.
10. S.Huang and Z.Zhao, "1.1 Gbit/s FSK system experiment with CFT scheme," **SPIE's OE/FIBERS'92**, Boston, MA, Sept. 1992, No.1787-34.
11. S.Huang, "4.16 GHz balanced detector optical receiver using resonance optical front-end," **EOS/SPIE/EUROPTO'93**, Berlin, FRG, April 1993, No.1974-08.
12. S.Huang, "DFB-LD modules with 4.7 GHz FM bandwidth," **EOS/SPIE/EUROPTO'93**, Berlin, FRG, April 1993, No.1974-21.
13. S.Huang, "Compensation of fiber dispersion in coherent optical communication," **International Conference on Communication Technology'92**, Beijing, China, 1992, pp.04.03.1-2.
14. S.Huang and Z.Zhao, "1.1 Gb/s optical FSK system transmission experiment," **International Conference on Communication Technology'92**, Beijing, China, 1992, pp.04.01.1-2.
15. S.Huang, S.Xie, B.Zhou and Y.Gao, "Performance of Fabry-Perot demodulator used for WDM systems," **OFSET'93**, Xi'an, China, Oct. 1993, pp.78-82.
16. S.Huang, D.Huang, S.Xie, B.Zhou and C.Jin, "A 622 Mb/s LED optical transmitter," **OFSET'93**, Xi'an, China, Oct. 1993, pp.193-195.
17. S.Huang, "Performance of phase diversity FSK systems with nonideal signal waveform modulation," **International Conference on Communication Systems'90**, Singapore, 1990.
18. S.Huang, C.Su and Z.Yang, "1.12 Gb/s optical communication system experiment," **ICCT'89/SBOFC'89/SSL'89**, Beijing, China, 1990, pp.812-815.
19. S.Huang and J.Wang, "The PRBS generator used for Gb/s optical communication systems," **ICCT'89/SBOFC'89/SSL'89**, Beijing, China, 1990, p.1082.
20. S.Huang, J.Wang and R.Hui, "Transient chirp reduction of external cavity semiconductor lasers," **2nd SHOC**, Wuhan, China, 1989, pp. 67-69.
21. S.Huang, "Timing jitter in optical fiber communication systems," **International Conference on Communication Technology'87**, Nanjing, China, 1987, pp.69-71.
22. S.Huang, "Timing jitter in coherent optical communication systems," **Chinese Conference on Digital Communications'93**, Xi'an, China, June 1993.
23. S.Huang, "ISI and jitter in optical communication systems with EDFA," **Chinese Conference on Optical Communications'93**, Beijing, China, Oct. 1993.

24. S.Huang, D.Huang, S.Xie and B.Zhou, "LED applications to high speed optical communication systems," **Chinese Conference on Optical Communications'93**, Beijing, China, Oct. 1993.
25. S.Huang, D.Huang, S.Xie and B.Zhou, "A 2.4 Gb/s optical transmitter with high frequency stability," **Chinese Conference on Optical Communications'93**, Beijing, China, Oct. 1993.
26. S.Huang, J.Wang and R.Hui, "Transient performance of external cavity semiconductor lasers," Proc. **Chinese Conference on Optical Communications'91**, Tianjin, China, 1991, pp.182-184.
27. S.Huang and J.Yan, "Effect of modulation signal waveform in coherent optical communication systems," **Chinese Conference on Optical Communications'91**, Tianjin, China, 1991, pp.383-385.
28. S.Huang and J.Yan, "Timing jitter in FSK optical communication systems," **Chinese Conference on Optical Communications'91**, Tianjin, China, 1991,
29. S.Huang and J.Yan, "Dispersion compensation in high speed coherent optical communication systems," **Chinese Conference on Optical Communications'91**, Tianjin, China, 1991, pp.372-374.
30. S.Huang, "SAWF timing recovery in Gb/s optical communication systems," **Chinese Conference on Optical Communications'89**, Shanghai, China, 1989, pp.204-205.
31. S.Huang, "Microwave transmission line in high speed optical communication systems," **Chinese Conference on Optical Communications'89**, Shanghai, China, 1989, pp.214.
32. S.Huang, X.Shun, E.Yang and N.He, "BER performance due to timing jitter in optical communication systems," **Chinese Conference on Optical Communications'89**, Shanghai, China, 1989, pp.244.
33. L.Maleki, V.Iltchenko, S.Huang, and A.Savehenkov, "Micro-optical resonators and applications in optoelectronic oscillator," **IEEE International Topical Meeting on Microwave Photonics**, MWP2001, Proc.2001, pp. 37-40.
34. L.Maleki, S.Yao, S.Huang, Y.Ji, V.Iltchenko, and M.Tu, "Recent advances in opto-electronic signal generation," **IEEE International Conference on Phased Array Systems and Technology**, Proc.2000, pp. 361-365.
35. X.S.Yao, S.Huang, and L.Maleki, "Optical pulse synthesis using Brillouin selective sideband amplification," **Conference on Optical Fiber Communications'2000**, Proc. Vol.4, pp. 130-132, Baltimore, MD, Mar. 2000.
36. S.-M.Hwang, X.Y.Zou, S.Huang, W.Shieh, A.E.Willner, "Passive equalization of four 2.5-Gbit/s WDM channels over 1000 km using notch filter", **Conference on Laser and Electro-Optics**, Anaheim, California, June 1996.
37. M.L.Heston, D.A.Smith, Z.Bao, A.Khaydarov, A.E.Willner, S.-M.Hwang, S.Huang, X.Y.Zou, "Use of the acousto-optic tunable filter for optical spectrum analysis and EDFA power equalization in WDM systems", **Conference on Optical Fiber Communications'96**, Proc. Vol.2, pp.249-250, San Jose, CA, Feb. 1996.
38. D.Huang, S.Huang, S.Xie and B.Zhou, "Frequency-stabilized optical transmitter for 4x622 Mb/s WDM optical fiber communication system," **OFSET'93**, Xi'an, China, Oct. 1993, pp.196-201.

#### Journals:

1. S.Huang, X.Y.Zou, A.E.Willner, Z.Bao and D.Smith, "Experimental demonstration of active equalization and ASE suppression of three 2.5-Gb/s WDM-network channels over 2500 km using AOTF as transmission filters," **Photonics Technology Letters**, Vol.9, No.3, March 1997, pp.389-391.
2. S.Huang, X.Y.Zou, S.-M. Hwang, A.E.Willner, Z.Bao and D.Smith, "Experimental demonstration of dynamic network equalization of three 2.5-Gb/s WDM channels over 1000 km using acoustooptic tunable filters," **Photonics Technology Letters**, Vol.8, No.9, Sept. 1996, pp.1243-1245.
3. S.Huang, S.Xie, B.Zhou and Y.Gao, "Crosstalk of WDM optical communication systems using Fabry-Perot demodulators," **J. Optical Communication**, Vol.15, No.3, 1994, pp.101-103.
4. S.Huang and Z.Zhao, "Frequency tracking of coherent optical communication systems," **J. Optical Communication**, Vol.13, No.1, 1992, pp.17-18.
5. S.Huang and J.Yan, "Power penalty due to intersymbol interference in optical phase diversity FSK systems," **J. Optical Communication**, Vol.12, No.2, 1991, pp.59-60.
6. S.Huang and Z.Zhao, "Jitter performance of timing recovery unit of optical communication systems," **J. Chinese Institute of Communications**, Vol.11, No.5, 1990, pp.51-54.
7. S.Huang, "Performance of phase diversity FSK with intersymbol interference," **J. Chinese Institute of Communications**, Vol.13, No.2, 1992, pp.49-51.
8. S.Huang, D.Huang, F.Liu, S.Xie, and B.Zhou, "40 km transmission experiment of 4x622 Mb/s WDM Optical Communication", **Optical Communication Technology**, Vol.18, No.1, 1994, pp.24-25.

9. S.Huang, D.Huang, and B.Zhou, "2.4 Gb/s optical transmission with high frequency stability", **Optical Communication Technology**, Vol.18, No.1, 1994, pp. 22-23.
10. S.Huang, "Performance of DFB-LD modules with broad modulation bandwidth," **J. Optical Communication Technology**, Vol.17, No.4, 1993.
11. S.Huang, "Chirp noise in Gb/s optical communication systems," **Information**, 1987, No.4, pp.24-26.
12. S.Huang, X.Mao, Z.Yang, M.Cheng and X.Li, "A 50 km 560 Mb/s optical transmission experiment," **Information**, 1987, No.4, pp.55-56.
13. M.Calhoun, S.Huang, and R.L.Tjoelker, "Frequency and Time Transfer in the Deep-Space Network and Antenna Arrays," **Proc. IEEE**, Vol. 95, No. 10, October 2007, pp.1931-1946.
14. E.Rubiola, E.Salik, S.Huang, N.Yu, and L.Maleki, "Photonic-delay technique for phase-noise measurement of microwave oscillators," **J. Opt. Soc. Am. B**, Vol. 22, No. 5, 2005, pp.987-997.
15. W.Shieh, S.Huang, A.E.Willner, "A polarization-independent and contrast-ratio-enhancing module for all-optical wavelength shifting using SOAs", **Photonics Technology Letters**, Vol.8, No.4, Apr. 1996, pp.533-535.
16. W.Jiang, S.Huang and P.Ye, "Mode partition noise of semiconductor laser," **J. Chinese Institute of Communications**, Vol.12, No.3, 1991, pp.36-41.

**Invited papers:**

1. L.Maleki, S.Huang, V.Iltchenko, and T.Le, "Photonic synthesis of RF frequency," **Invited paper, IEEE Lasers and Electro-Optics Society Annual Meeting'2001**, Proc. Vol.1, pp. 119-120.
2. A.E.Willner, S.Huang, X.Y.Zou, S.-M.Hwang, D.A.Smith, and Z.Bao, "Dynamics Channel Power Equalization in Reconfigurable WDM Networks", **Invited paper, IEEE Lasers and Electro-Optics Society Annual Meeting, Proceeding**, Boston, MA, Nov. 1996.