Song-Wen Huang

CONTACT
INFORMATION

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TECHNICAL
SKILLS

5G, LTE, DSP, Wifi, 802.11ax, MIMO, OFDMA, RF IC Design, FPGA

C, C++, Python, MATLAB, Verilog, VHDL, SPICE, Linux

DSP Algorithm, Wireless Communication, Spread Spectrum, Testing, Verification

Optimization, Software-Defined Radio Networking (USRP, GNU Radio), Cognitive Radio

EDUCATION

State University of New York at Buffalo   Aug. 2014 - Dec. 2017.
Ph.D. in Electrical Engineering
Advisor: Dr. Dimitris A. Pados.   GPA: 3.92/4.00

National Chiao Tung University   Sep. 2009 - Jul. 2011.
M.S. in Electronics Engineering
Thesis Advisor: Dr. Feng-Tsun Chien.

National Chiao Tung University   Sep. 2005 - Jun. 2009.
B.S. in Electronics Engineering
Project Advisor: Dr. Hsie-Chia Chang.

WORK
EXPERIENCES

Research Assistant at State University of New York at Buffalo   Aug. 2014 - present.

- Developed DSP algorithm in simulations for transceiver design of various modulations. Implemented circuit design with in-house built prototypes with PCB boards, including customized mixers, oscillators, filters as well as dipole antennas. Receiver design consists commercial software-defined radio antenna compatible with the PC, so received signals can be observed, stored, or further processed.

- Utilized orthogonal chirp waveforms as frequency subcarriers in multicarrier communication systems, e.g., OFDM, that have both advantages of chirps and multicarrier transmission. Multicarrier chirping is also compatible with higher order modulations, e.g., 8-PSK, 16-QAM, for providing higher data rates in RF fading channels.

- Simulated and experimented a 2×2 MIMO system. With channel state information obtained by training symbols, precoding matrix is applied at the transmitter for BER and SNR performance enhancement in underwater acoustic multipath channels in Lake Erie experiments.

- Designed an adaptive beamforming antenna array, capable of adjusting phases of incident signals to the desired reflective angles and eliminated potential interferences. Moreover, amplitude of reflective signals is enhanced by the weighted coefficients of the antenna array.

- Developed iterative joint channel estimation and data detection algorithm for blind symbol detection in spread spectrum underwater acoustic communication systems. The algorithm is guaranteed to converge after sufficient iterations.

- Designed ultra-wideband nano-transceivers on graphene, which can support waveform propagation on the surface. Communications conduct in Terahertz frequencies and can be applied in biomedical applications, such as intra-body sensor networks.

Teaching Assistant at State University of New York at Buffalo   Aug. 2014 - present.

- EE 202 Circuit Analysis
- EE 205 Signals and Systems
- EE 383 Communications Systems I
- EE 478 VHDL Based Digital Design with Programmable Logic

Senior Engineer at Macronix International Co., Ltd., Taiwan   Feb. 2013 - May 2014.

- Designed DRAM circuits and collaborated with other R&D teams. Since memory elements are integrated in large numbers; speed, latency, and power consumption are the key design factors. Based on customers' requirements, customized NVM-based memory circuit design.
- Maintained Design Rule Checking (DRC) files for IC manufacturing process in 65 nm. Debugged the obscure descriptions that may result in design errors for clearly defining DRC rules for layout engineers.
- Modified and customized layout patterns by pre-sizing command files for specific design modifications, e.g. $65\text{nm} \times 2\mu\text{m}$ of Metal 1, to reduce time consuming for 80% and to keep the product cycle on track.
- Automated generation of Question & Answer (QA) patterns for verifying DRC rules. During the process, some description errors in DRC rules can be discovered and reported to the correspondent teams.

Research Assistant at National Chiao Tung University, Taiwan   Sept. 2009 - Jul. 2011.

- Designed digital IC for various kinds of 64 bits multiplier-adders with CAD tools. Implemented with verilog, VHDL, RTL schematic, and layouts' verification. Conducted comparison of process time and power consumption between various designs of multiplier-adders.
- Conducted projects of simulation studies of QPSK and 16-QAM modulations with C/C++. Analyzed the iterative soft decoding of 3GPP Turbo Code by EXIT chart and Monte Carlo simulation for performance evaluation.
- Modeled cooperative cognitive radio networks with resource allocation, e.g., time allocation and power control. Formulated the problem objective as an optimization problem and solved by a coalitional game, in which all the PUs and SUs join a grand coalition to form a cooperative communication network.
- Utilized digital image processing techniques with C/C++ implementations to identify specific objects, e.g., human figures, for security or object identification. It can be also applied in color modification or softness for image enhancement.

HONORS AND AWARDS

2nd Place, Erie Hack Finals, *Cleveland Water Alliance*   2017.

Teaching Assistantship, *State University of New York at Buffalo*   2014 - 2017.

Rank 11th, Undergraduate Score in the Class of EE, *National Chiao Tung University*   2009.

PATENT

1 patent is under review.

PUBLICATIONS

Published **2** peer-reviewed papers, **1** paper is under review, and **2** papers are prepared.

S.-W. Huang, and D. A. Pados,"Adaptive Multiuser Chirp-Division Multiplexing for Underwater Acoustic Communications," in *IEEE Transactions on Communications, 2017.* (*prepared*).

S.-W. Huang, and D. A. Pados,"*M*-ary Orthogonal Chirp Modulation for Coherent and Noncoherent Underwater Acoustic Communications," in *IEEE Communications Letters, 2017.* (*prepared*).

S.-W. Huang, and D. A. Pados,"Multicarrier Chirp-Division Multiplexing for Wireless Communications," in *IEEE International Conference on Communications, May 2018.* (*submitted*)

S.-W. Huang, G. Sklivanitis, D. A. Pados, and S. N. Batalama,"Underwater Acoustic Communications Using Quasi-Orthogonal Chirps," to appear in *Asilomar Conference on Signals, Systems, and Computers, Oct. 2017.*

S.-W. Huang, Y.-W. Chan, F.-T. Chien and Y.-C. Chung, "Efficient Resource Allocation in Cooperative Cognitive Radio Networks: A Coalitional Game Approach," in *IET International Communication Conference on Wireless Mobile and Computing (CCWMC)*, Nov. 2011.

- Technical paper reviewer for IEEE WCNC, International Conference on Network of the Future
- Member of IEEE Communications, Signal Processing, and Power & Energy Societies
- Senator of Taiwanese Graduate Student Association at State University of New York at Buffalo
- Lecturer of Heart Chan Meditation Class at State University of New York at Buffalo