Shi-Yuan Wang

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http://sywang1007.github.io/

EDUCATION

Georgia Institute of Technology   *Aug. 2018 - PRESENT*
Ph.D. student in School of Electrical and Computer Engineering
  - Ph.D. advisor: Dr. Matthieu R. Bloch

National Taiwan University (NTU), Taipei, Taiwan   *Sept. 2013 - Jan. 2018*
B.S.E in Electrical Engineering
  - Overall GPA: 4.22/4.3 (top 3%)
  - Major GPA: 4.27/4.3

RESEARCH EXPERIENCE

Georgia Tech - Communication Architectures Research Group   *Jan. 2019 - PRESENT*
Advisor: Professor Matthieu R. Bloch

Research Project: **Explicit Design of Provably Covert Channel Codes**
  - Design and implement covert channel codes with MLCPPM, polar codes, and invertible extractors
  - Analyze the covert channel code in terms of *variational distance*.
  - Our scheme is efficient in terms of secret key usage and requires **2 orders of magnitude fewer secret key bits** than previous work.
  - A conference version is submitted to *Proc. of IEEE International Symposium on Information Theory*.

Research Project: **Covert MIMO Communications under Variational Distance Constraint**
  - Study fundamental limit of communication without detecting by malicious adversary.
  - Develop information theoretic analysis and **characterize covert capacity of MIMO-AWGN channels**.
  - This work has been accepted to *Proc. of IEEE International Symposium on Information Theory* and *IEEE Transactions on Information Forensics and Security*.

Research Project: **Online Learning for Dynamic Spectrum Access**
  - Minimized coordination overhead between users and learning access policy in a distributed manner.
  - Proposed an online bandit learning framework to estimate the channel availability and user behaviors.

NTU - MicroSystem Research Laboratory   *June 2016 - July 2017*
Advisor: Professor Tzi-Dar Chiueh

Research Project: **Low-density Parity-check (LDPC) Decoder Implemented on OpenCL**
  - Utilized the parallelism of **Sum-product algorithm (SPA)** for GPU programming with OpenCL.
  - Speed up 1000x in comparison with the baseline sequential decoder.
  - The work has been documented as *a technical reference* by MediaTek Inc.

NTU - Advanced Digital Communication System Lab   *Jan. 2016 - July 2016*
Advisor: Professor Bor-Ching Su

Research Project: **Signal Processing for 5G Wireless Communication**
  - Designed filters in **Universal Filtered Multi-Carrier (UFMC)** system.
  - Formulated the physical constraints into a **non-convex optimization** problem.
  - Proposed a solution via **spectral factorization and convex optimization**.

PUBLICATION

Accepted

1. S.-Y. Wang and M. R. Bloch, "Explicit Design of Provably Covert Channel Codes," in *Proc. of IEEE International Symposium on Information Theory*, Melbourne, Australia, Jul. 2021, pp. 190–195

2. ——, "Covert MIMO Communications Under Variational Distance Constraint," *IEEE Transactions on Information Forensics and Security*, vol. 16, pp. 4605–4620, 2021

3. ——, "Covert MIMO Communications under Variational Distance Constraint," in *Proc. of IEEE International Symposium on Information Theory*, Los Angeles, CA, Jun. 2020, pp. 828–833

AWARDS & HONORS

Department of Electrical Engineering, National Taiwan University
- Dean's List Award (**5 times**)
- **3rd place**, Undergraduate Innovation Award
- Cadence EE3011 (Data Structure & Programming) Competition Award

WORKING EXPERIENCE

MediaTek, Taiwan   *July 2017 - Aug. 2017*
Summer Intern in Department of Wireless Communication Technology
- Designed an **Inter-Processor Communication** mechanism in hardware.
- Verified the datapath and interface protocol of a **Vector Operation Engine**.
- Developed a **simulation tool** for vector operation engine in C++.

SELECTED COURSEWORKS AND PROJECTS

Sparse MIMO Channel Estimation with Compressed Sensing and Learning Schemes   *Fall 2018*
Final Project of ECE6604 (Personal & Mobile Communications)
- Implemented several *compressed sensing* algorithms for MIMO channel estimation, including orthogonal matching pursuit, compressed sampling matching pursuit, and expectation maximization.

User Coexistence via Online Learning   *Spring 2019*
Final Project of ECE6254 (Statistical Machine Learning)
- Investigated the problem of *user coexistence* in multi-user communication networks.
- Formulated the problem into online learning scheme and solved with *online mirror descent* and *bandit convex optimization*.