Puyang Huang

Personal Website: https://huang-piang.github.io/puyanghuang/

Email: huangpy@ucla.edu | **Mobile:** +1-6025877609

PERSONAL PROFILE

PhD student in the Samueli Electrical and Computer Engineering Departement at University of California, Los Angeles, under the supervision of Prof. Kang L. Wang. My current research interest is spin-orbit torque (SOT) related physics as well as novel computing network applications based on MRAM.

EDUCATION

University of California, Los Angeles, California, United States 2024 - 2029 (expected)

- **Doctor of Philosophy in Engineering** (Electrical and Computer Enigneering) **Overall GPA: NULL**
- **Advisor:** Professor Kang L. Wang

ShanghaiTech University, Shanghai, China 2021 - 2024

- **Master of Science in Engineering** (Electronics Science and Technology) **Overall GPA: 3.83/4.0**
- **Advisor:** Professor Xufeng Kou **Major GPA: 3.89/4.0**
- **Major Courses:** Spintronics (A+), Physics of Semiconductor Devices (A+), Nanoelectronics (A+)
- **Honors:** 1) Outstanding Graduate of ShanghaiTech University, Jul. 2024; 2) Outstanding Student 2022-2023, Dec. 2023; 3) Merit Student 2021-2022, Dec. 2022

Shanghai Jiao Tong University, Shanghai, China 2017 - 2021

The University of Michigan and Shanghai Jiao Tong University Joint Institute (UM-SJTU JI)

- **Bachelor of Engineering** in Electrical and Computer Engineering **GPA: 3.46/4.0**
- **Advisor:** Professor Xuyang Lu
- **Major Courses:** Introduction to Circuits (A+), Data Structures and Algorithms (A+), Nanomaterials and Devices (A+), Electronic Circuits (A+), Properties of Transistors (A+), Modern Physics (A)
- **Honors:** 1) Academic Progress Award, Dec. 2020; 2) Second-Level Academic Scholarship, Dec. 2020; 3) Yu Liming Scholarship, Nov. 2020; 4) Placed 4th at the Odyssey of the Mind 2019 World Finals, April 2019; 5) Third-Level Academic Scholarship, Dec. 2019; 6) Placed 4th at the Odyssey of the Mind 2018 World Finals, April 2018; 7) Outstanding Student in Volunteer Activities, UM-SJTU JI, Mar. 2018;

RESEARCH

School of Information Science and Technology, ShanghaiTech University Shanghai, China

Main Project 1: MRAM-based Neural Network

- **Topics:**
  1) Probabilistic binary neural network implemented with heavy metal (HM)-based SOT-MRAM
  2) Demonstration of trainable activation function by topological insulator (TI)-based SOT devices
- **Collaborators:** Professor Weisheng Zhao and Professor Shouzhong Peng

Main Project 2: VCMA-assisted SOT in Strong SOC Materials

- **Topics:**
  1) Tunable efficiency and polarity of SOT driven by Berry curvature in magnetic TI
  2) Thickness-dependent SOT and crystal torque in semiconductor heterostructure
  3) Magnetization switching via SOT in thickness-controllable Van Der Waals ferromagnet
  4) Strain-modulated VCMA in conventional HM-based magnetic tunnel junctions
- **Collaborators:** Professor Xixiang Zhang and Professor Zhenhua Qiao

SKILLS

- **Micro-nano device fabrication:** Laser Direct-Write Lithography, EBL, IBE, ALD, Sputter, SEM
- **Material and device characterizations:** Probe station, PPMS, MOKE
- **Software:** SolidWorks, LaTeX, MATLAB, C, C++, Cadence PSpice, Origin, Vivado
- **Language:** Mandarin (Native); English (Fluent), TOFEL: 101, GRE: 317

PAPERS &PUBLICATIONS

First author and Co-first author

- **Huang, P.***, Yao, S.*, *et al.*, Field-Free Rashba-Type Crystal Torque MRAM with High Efficiency and Thermal Stability (accepted by ***IEDM 2024***)
- **Huang, P.***, Liu, X.*, *et al.*, Integrated Artificial Neural Network with Trainable Activation Function Enabled by Topological Insulator-based Spin-Orbit Torque Devices (accepted by ***Acs Nano***)
- Liu, X.*, **Huang, P.***, *et al.*, Wafer-scale Epitaxial Growth of the Thickness-controllable Van Der Waals Ferromagnet $CrTe_2$ for Reliable Magnetic Memory Applications. ***Adv. Funct. Mater.*** 33 (50), 2304454 (2023).
- **Huang, P.**, Chen, A., *et al.*, Interfacial Resonance States-Induced Negative Tunneling Magneto-resistance in Orthogonally-Magnetized CoFeB/MgO/CoFeB. ***IEEE T. MAGN.***, 60 (3), 1-6 (2024).
- **Huang, P.***, Chen, A., *et al.*, Enhancement of Voltage-Controlled Magnetic Anisotropy in Orthogonally-Magnetized CoFeB/MgO/CoFeB. ***INTERMAG - Short papers***, Brazil, 2024, 1-2.
- **Huang, P.***, Gu, Y.*, *et al.*, SOT-MRAM-Enabled Noise-tolerant and Resource-saving Probabilistic Binary Neural Network (arXiv:2309.07789, under review by ***Nat. Electron.***)
- Chen, P.*, **Huang, P.***, *et al.*, Tunable Chiral Magneto-Transport through Band Structure Engineering in Magnetic Topological Insulators $Mn(Bi_{1-x}Sb_x)_2Te_4$ (under review by ***Sci. Adv.***)

Co-author

- Li, L., Wu, Y., Liu, X., Liu, J., Ruan, H., Zhi, Z., Zhang, Y., **Huang, P.**, *et al.*, Room-Temperature Gate-Tunable Nonreciprocal Charge Transport in Lattice-Matched InSb/CdTe Heterostructures. ***Adv. Mater.***, 35 (3), 2207322 (2023).
- Chen, P., Yao, Q., Xu, J., Sun, Q., Grutter, A., Quarterman, P., Balakrishnan, P., Kinane, C., Caruana, A., Langridge, S., Li, A., Achinuq, B., Heppell, E., Ji, Y., Liu, S., Cui, B., Liu, J., **Huang, P.**, *et al.*, Tailoring the Magnetic Exchange Interaction in $MnBi_2Te_4$ Superlattices via the Intercalation of Ferromagnetic Layers. ***Nat. Electron.***, 6 (1), 18–27 (2023).
- Liu, J., Liao, L., Rong, B., Wu, Y., Zhang, Y., Ruan, H., Zhi, Z., Xin, L., **Huang, P.**, *et al.*, Observation of Moment-Dependent and Field-Driven Unidirectional Magnetoresistance in CoFeB/InSb/CdTe Heterostructures. ***ACS Appl. Mater. Interfaces***, 16 (34), 45687-45694 (2024).

ACTIVITIES

Art & Entertainment Department, UM-SJTU JI Student Union — Shanghai, China
Deputy Director — Jul. 2018-Aug. 2021

Orphanage of Hope Children's Home, Untal-Untal Village — Bali, Indonesia
Volunteer Teacher — Jan. 2019

The Winter & Summer Volunteer Team, SJTU — Shanghai, China
Leader — Jan. 2018 & Jul. 2018

Chengdu Research Base of Giant Panda Breeding — Sichuan, China
Panda Care Volunteer — Jul. 2018