CURRICULUM VITAE Liang Liu

Liang Liu (19830811-1353), Male, Ph.D.,

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Education:

B.Sc., Electronic Engineering, Fudan University, Shanghai, 2005

Ph.D., Microelectronics, Fudan University, Shanghai, 2010, Thesis "DSP and energy-efficient VLSI implementation for OFDM-UWB systems"

Docent:

Circuit Design, Lund University, Dec. 2015

Previous positions:

- **Associate Professor**, EIT, Lund University, Sweden, 2016-2024
- **Assistant Professor**, EIT, Lund University, Sweden, 2014-2015
- **Post-Doc**, EIT, Lund University, Sweden, 2010-2014
- **Visiting Researcher**, Electrical, Computer and Systems Engineering Department, Rensselaer Polytechnic Institute (RPI), USA, 2010

Supervision of PhD students:

As main supervisor (graduated):

- Jesús Rodríguez Sánchez, Thesis title "Systems with Massive Number of Antennas: Distributed Approaches" (Doctoral Degree, 2022)
- Mojtaba Mahdavi, Thesis title "Baseband Processing for 5G and Beyond: Algorithms, VLSI Architectures, and Co-design" (Doctoral Degree, 2021)
- Rakesh Gangarajaiah, Thesis title "Adaptive Baseband Processing and Configurable Hardware for Wireless Communication" (Doctoral Degree, 2017, main supervisor since 2016)

As main supervisor (ongoing):

- Dumitra Iancu, on distributed massive MIMO systems (2023-)
- Lina Tinnerberg, on distributed massive MIMO systems (2023-)
- Sijia Cheng, on baseband processing for beyond 5G (2022-)
- Ilayda Yaman, on 6G wireless and computer vision (2021-)
- Ali Nada (Halmstad University), on efficient baseband processing for 6G (2021-, I am formally Ali's main supervisor before the co-supervisor at HU become Docent)
- Lucas Ferreira, on ASIP design for AI and machine learning (2019-)
- Sidra Muneer, on per-antenna processing for 5G systems (2018-)
- Mohammad Attari, on processor design for 5G (2018 -)

As co-supervisor (graduated):

- Steffen Malkowsky, 2013-2019, Thesis title "Massive MIMO: Prototyping, proof-of-concept, and implementation"

- Muris Sarajlic, 2013-2019, Thesis title “Hardware-Conscious Wireless Communication System Design”
- Yangxurui Liu, 2013-2018, Thesis title “Efficient Processing and Storage for Massive MIMO Digital Baseband”
- Oskar Andersson, 2012-2016, Thesis title “Ultra-low Voltage Embedded Memories – Design Aspects and a Biomedical Use-case”
- Chenxin Zhang, 2012-2014, Thesis title “Dynamically Reconfigurable Architectures for Real-time Baseband Processing”

As co-supervisor (ongoing):

- Gareth Callanan, on toolchain for reconfigurable computing (2021 -)
- Masoud Nouripayam, on in-memory computing (2018 -)

Commissions of trust:

- **Director of International Master Program**, Embedded Electronics Engineering (EEE), Lund University, 2019 –
- **Director of post-graduate study**, Department of Electrical and Information Technology, Lund University, 2019
- **Management Group,** LTH profile area “Pillars of AI and Digitalization”
- **PhD Committee**, Yang Xiang Huang, KU Leuven 2017; Fahim UI Haque, Linköping University, 2016; Markus Hellenbrand, Lund University, 2020
- **Technical Committee**, IEEE Circuits Systems for Communication, 2015-
- **Technical Committee**, IEEE VLSI Systems and Applications, 2013 –
- **Board Member**, Swedish Chapter of IEEE SSC/CAS Society, 2012 –
- **Review Committee**, IEEE ISCAS 2014 – 2023
- **Guess Editor,** IEEE Open J. Circuits and Systems, Special Section on Circuits, Systems, and Algorithms for Beyond 5G and towards 6G, 2020
- **Special Session Organizer,** IEEE ISCAS 2020, Asilomar Conference 2020, IEEE SiPS 2021
- **Organize Committee**, Swedish System-on-Chip Conference, 2013-2015
- **Best Paper Awards Selection Committee**, IEEE Swedish System-on-Chip Conference, 2014/2015
- **Technical Committee**, Asia-Pacific Signal, and Information Processing Association, 2012 –
- **Technical Committee for International Conferences**, IEEE ICCVE 2013, IEEE WCNC 2013, IEEE NorCAS 2015-2023, ReConFig 2014, IEEE ASICON 2015-2023, IEEE SiPS 2019, 2021
- **Session Chairs**, IEEE ASICON 2015, IEEE ISCAS 2014/2015/2019, IEEE PIMRC 2011, IEEE VTC 2013, SiPS 2021
- **Scientific Reviewer** for 13 journals and 6 international conferences

Publication statistics:

1 book, 1 book chapter, over 100 papers in peer-reviewed journals and conference proceedings, Citations: 2479, h-index: 23, i10-index: 53

Honors, awards, and invited talks:

- **Invited Talk,** What is expecting from 6G circuits and transceivers? ESSCIRC 2023
- **Invited Talk**, Low-power digital beamforming access point, THE SEMICONDUCTOR RENDEZ-VOUS, 2022
- **Invited Talk**, Digital baseband implementation challenges in 6G distributed networks, 6GSymposium, 2022
- **ELLIIT Tech Talk,** “Mobile processing architectures and devices”
- **Panelist,** IEEE SiPS 2021 PhD forum

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- **Outstanding 28nm FD-SOI Chips** taped out through CMP, 2018 for the first 5G massive MIMO digital baseband processing chip
- **Invited Tutorial Paper**, Efficient DSP and Circuit Architectures for Massive MIMO: State of the Art and Future Directions, IEEE Transactions on Signal Processing, 2018
- **Göran Linds Prize in Electronics**, Royal Physiographic Society of Lund, 2017 for building the world's first 5G massive MIMO testbed and with it setting the world record in wireless spectrum efficiency
- **Invited Tutorial** on 5G Circuits and Systems, IEEE Nordic Circuits and Systems Conference, 2017
- My PhD student Steffen Malkowsky (co-supervisor) won **first prize in five of ten prize categories at the 2016 National Instruments Engineering Impact Awards** for breaking the world record on spectrum efficiency
- **IEEE Live Webinar**, Massive Signal Processing for Massive MIMO: Challenges and Lessons Learned, 2016
- **Invited Talk**, Massive MIMO Baseband Processing, MAMMOET Workshop, European Solid-State Circuits Conference, 2016
- **Best Paper Award**, IEEE International Symposium on Circuits and Systems (ISCAS), 2010 and 2014
- **Invited Talk**, Massive MIMO with FPGA, Xilinx, Dublin, 2014
- **Invited Talk**, Advanced Topics in MIMO and Signaling, UCLA, 2012
- **Shanghai Distinguished PhD Dissertation Award**, 2011
- **Outstanding Reviewer Service**, IEEE Trans. on Signal Proc., 2011
- **Outstanding Ph.D. Students Award**, Fudan University, 2010

Research projects granted as PI/Co-PI:

- **Vinnova competence center**, "Next-generation communication and computing infrastructures and applications, NextG2Com", (WP co-lead, 202-)
- **SSF multidisciplinary research center**, "Chalmers-Lund Center for Advanced Semiconductor System Design, ClassIC", (co-PI, 2023-).
- **EU MSCA Doctoral Networks project**, "ultra-massive MIMO for future cell-free heterogeneous networks, MiFuture", (co-PI, 2023-).
- **ELLIIT:** Baseband Processing for Beyond 5G Wireless (PI, 2021-)
- **SSF-CHI Project,** Large Intelligent Surfaces – Architecture and Hardware (co-PI, 2021-)
- **EU H2020-ICT-2020-2 RIA Project**, REINDEER, REsilient INteractive applications through hyper Diversity in Energy Efficient RadioWeaves technology (co-PI, 2021-)
- **VR Research Grant**, Scalable and Distributed Computing for Large Intelligent Surfaces, (PI, 2020-2023)
- **EU H2020-ECSEL Project**, Beyond5, Building the fully European supplY chain on RFSOI, enabling New RF Domains for Sensing, Communication, 5G and beyond, (co-PI, responsible for Lund University, 2020-2024)
- **Pufendorf Advanced Study Group**, Real-time data processing and decision making, (co-PI, 2019)
- **Ericsson commissioned research**, Massive MIMO Technology and Applications, (co-PI, steering group, 2018-2022)
- **European Spallation Source (ESS) commissioned research,** Grid Electronics Development Services (co-PI, 2018-2020)
- **ELLIIT 5G Wireless Communication,** work package 3 baseband processing, (PI, project leader)
- **VINNOVA Smart Electronics System Project**, Millimeter-Wave Massive MIMO systems with Smart Beamforming (co-PI, 2018-2020)
- **Intel-SRC Project**, Coordination in Distributed Multi-User High-Performance Dense Networks, (PI, project leader, 2016-2019)
- **VINNOVA Smart Electronics System Project**, Prototype System for Massive MIMO in New 5G Band, (PI, project leader, 08/2016-08/2018)
- **VINNOVA Smart Electronics System Project**, Electronics System for IoT, (co-PI, 11/2015-06/2016)

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Teaching:

- Computer Architecture, 2015 - (course responsible and development)
- Introduction to Structured VLSI Design, 2013 - 2024
- IC Project-1, Digital, 2023 - (course responsible and development)
- IC Project-2, Digital, 2024- (course responsible and development)
- DSP Design, 2013 - (invited lecture)
- Consumer Electronics, 2015 (invited lecture)
- Electrical Engineering: Possibilities and Limitations, 2015 (invited lecture)
- Supervision of 40+ master thesis projects

International and national collaboration:

I have a wide range of both national and international collaboration partners, academic as well as industrial. Many of my publications are from these collaborations.

- **International collaborations within EU projects:** I collaborate with TEC (Austria), NXP (Austria), Infineon (Austria), TU Graz (Austria), IMEC (Belgium), KU Leuven (Belgium), UNIVERSIDAD CARLOS III DE MADRID (Spain), and TID (Spain) via EU projects MAMMOET, REINDEER, and MiFuture. In the EU H2020 project BEYOND5, close collaborations are with TUD, Fraunhofer (Germany), and Leti (France).
- **Other international collaborations with academia partners:** In the field of 5G/6G systems, we have good cooperation with Dr. Thomas L. Marzetta at Bell Labs (now also with NYU) and Prof. Mark Beach at University of Bristol (UK). Collaborative research on signal processing and reconfigurable hardware design are also with Prof. Zhengya Zhang University of Michigan (USA), Prof. Dejan Markovic UCLA (USA), and Prof. Norbert Wehn at Technical University of Kaiserslautern
- **Other international collaborations with world-leading industry partners:** The collaboration with National Instruments (USA, top company in automated test equipment and virtual instrumentation) and AMD/Xilinx (USA, world-leading FPGA provider) on 5G/6G testbed development is worthwhile mentioning, which allows us to have access to the unique expertise and equipment for the project. In the area of digital IC design using advanced CMOS technologies, I have strong collaboration with Intel (USA), STMicroelectronics (France, European top semiconductor technology company), and GlobalFoundries (USA). In terms of semiconductor system design tools, close collaborations are with Candence (USA) and Synopsys (USA), the top 2 companies in electronic design automation (EDA) tools.
- **With local industry partners:** In areas of efficient algorithm-hardware codesign, strong industrial connections, especially with Ericsson, Axis Communication, and Sony Mobile, are via the competence center SoS, Connected Systems, ClassIC, and other national projects.
- **With national academia partners:** Within the ELLIIT framework, close collaboration with Linköping University and Halmstad University on digital baseband processing for wireless systems. With Chalmers University of Technology in the SSF ClassIC semiconductor systems design center, and with KTH in the EU project BEYOND5.
- **Collaborations that are outside my main research filed:** with Professor Anne L´Huillier at Atomic Physics Department we developed electronics devices for high-precision laser detection, with Professor Tõnu Pullerits and post-doc Khadga Jung Karki at Kemicentrum, we designed electronics equipment for accurately measuring ultra-high frequency signals, with Professor Kalle Åström at the Department of Mathematics we develop efficient AI hardware. With ESS we develop fast signal processing circuits for Grid Electronics.