Khac-Hoang NGO

Postdoctoral Researcher

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Department of Electrical Engineering
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Research Interests

Wireless Communications, Information Theory

Topics: massive random access, edge computing, MIMO, noncoherent communications, coded caching, network coding

Education

CentraleSupélec, Paris-Saclay Univ., France

Ph.D. in Wireless Communications — July 2017– June 2020
Thesis: Noncoherent Wireless Communications: Fundamental Limits and System Design
Advisors: Prof. Sheng Yang, Dr. Maxime Guillaud

M.Sc. in Wireless Communications — Sep. 2015–Sep. 2016
GPA: 17.35/20 *Class rank*: **1/23**
Thesis: Performance Analysis of Coded Caching
Advisors: Prof. Mari Kobayashi, Prof. Sheng Yang

Univ. of Engineering and Technology (UET), Vietnam National Univ. - Hanoi (VNU), Vietnam

B.Eng. in Electronics and Telecommunications — Aug. 2010–June 2014
GPA: 3.75/4.0 *Class rank*: **1/68**
Thesis: Software-Defined-Radio Implementation of OFDM-based Physical Layer Network Coding
Advisors: Assoc. Prof. Nguyen Linh Trung, Assoc. Prof. Nguyen Quoc Tuan

Chalmers Univ. of Technology, Sweden

Diploma in Teaching and Learning in Higher Education — Ongoing
Completed courses: Diversity and inclusion for learning in higher education (2 credits); University teaching and learning (2.5 credits); Theoretical perspectives on learning (2.5 credits); Supervising research students (3 credits); Supervising writing processes (2.5 credits)

Professional Experience

- **Communication System Group, Dept. Electrical Engineering, Chalmers Univ. of Technology, Sweden**
  Postdoctoral Researcher — Sep. 2020–present
  Topic: Low-latency and private edge computing in random-access networks
  Advisors: Prof. Giuseppe Durisi, Prof. Alexandre Graell i Amat

- **Advanced Institute of Engineering and Technology (AVITECH), UET, VNU, Vietnam**
  Adjunct Lecturer — Mar. 2021–present
  Role: Participate in research discussion and proposal writing

- **Mathematical and Algorithmic Sciences Lab., Paris Research Center, Huawei Technologies France**
  Ph.D. Engineer — Nov. 2016–June 2020
  Topic: Noncoherent wireless communications

- **Laboratory of Signals and Systems (L2S) - CentraleSupélec**, France
  Research Engineer — Sep. 2016–Nov. 2016
  Research Student — Feb. 2016–Sep. 2016
  Topic: Coded caching in practical scenarios, particularly in MIMO fading broadcast channels
  Project: Online Coded Caching: Fundamental Limits and Efficient Learning Algorithms

- **Univ. of Engineering and Technology (UET), VNU**, Vietnam
  Research Assistant July 2014–Aug. 2015
  Research Student Nov. 2012–June 2014
  Topic: Software-defined radio implementation of network coding and cognitive radio
  Project: Cross-layer cooperative communications for future wireless networks based on network coding
- **VNPT Technology, Vietnam Posts and Telecommunications Group**, Vietnam
  Intern Dec. 2013–Mar. 2014
  Topic: Website interface programming
- **Dept. of Electrical and Computer Engineering, National Univ. of Singapore (NUS)**, Singapore
  Intern July 2012–Aug. 2012
  Topic: Solar panel charge controller
  Advisor: Prof. Aaron Danner

Professional Activities

Research Funding

- **Marie Skłodowska-Curie Individual Fellowship** 2021–2023
  Title: LANTERN: Low-latency and private edge computing in random-access networks
  Responsibility: Fellow *Amount:* 192 000 Euros
- **AlumNode Funding** 2021–2022
  Title: Connecting the Unconnected: A Tool for Digital Inclusion
  Responsibility: co-investigator *Amount:* 5000 Euros

Organizing Committee

- *Communication track chair,* 2022 Int. Conf. Adv. Technol. Commun. (ATC), Hanoi, Vietnam Oct. 2022
- *Special session chair,* 25th Int. ITG Workshop Smart Antennas (WSA 2021), France Nov. 2021
- *Special session chair,* 2021 Int. Conf. Adv. Technol. Commun. (ATC), HCM City, Vietnam Oct. 2021
- 1st Junior Conf. Wireless Optical Commun., Paris-Saclay Univ., France Feb. 2019
- 1st Young Engineers and Scientists (Y-E-S) Forum, Honda Foundation, Japan Nov. 2015

Membership

- **Member** of the IEEE (S'17, M'20), IEEE Info. Theory Society, IEEE Commun. Society, IEEE Signal Process. Society, and IEEE Young Professionals

Editorship

- **Copyeditor** for ICT Research J., Vietnam Ministry Info. Commun.

Reviewer

International Journals (#reviews returned)

- IEEE Trans. Inf. Theory (1)
- IEEE Trans. Wireless Commun. (42)
- IEEE Trans. Veh. Technol. (11)
- IEEE Trans. Commun. (8)
- IEEE Trans. Signal Process. (2)
- IEEE Trans. Signal Inf. Process. Netw. (1)
- IEEE Internet Things J. (1)
- IEEE J. Sel. Areas Infor. Theory (2)
- IEEE J. Sel. Areas Commun. (1)
- IEEE Commun. Lett. (4)
- IEEE Wireless Commun. Lett. (8)
- IEEE Veh. Technol. Mag. (1)
- IET Electron. Lett. (1)
- Elsevier Pervasive Mob. Comput. (1)

Domestic Journals

- ICT Research J., Vietnam Ministry Info. Commun.
- VNU J. Science: Comput. Science Commun. Eng., Vietnam

International Conferences

- IEEE Int. Symp. Inf. Theory (ISIT): 2020, 2022
- IEEE Inf. Theory Workshop (ITW): 2018, 2021
- IEEE Global Commun. Conf. (GLOBECOM): 2017
- IEEE Int. Conf. Commun. (ICC): 2017, 2018
- IEEE Wirel. Commun. Netw. Conf. (WCNC): 2022
- IEEE Workshop Signal Process. Adv. Wireless Commun. (SPAWC): 2019
- Int. Symp. Wireless Commun. Systems (ISWCS): 2018, 2021
- Int. Symp. Commun. Info. Technol. (ISCIT): 2019
- Int. ITG Workshop Smart Antennas (WSA): 2021
- Int. Symp. Topics Coding (ISTC): 2018
- Int. Conf. Adv. Technol. Commun. (ATC): 2021
- NAFOSTED Conf. Info. Comput. Science (NICS): 2018

Teaching

- **Chalmers Univ. of Technology:**
  - **Statistics and machine learning in high dimensions** Fall 2021
    Position: Teaching Assistant *Course level:* master/PhD *Language:* English *Duration:* 8h
  - **Information theory** Spring 2021
    Position: Teaching Assistant *Course level:* master/PhD *Language:* English *Duration:* 16h

Supervision

- **Master student research projects:**
  - **MIMO detection under generalized Gaussian model** Mar. 2021
    Students: Khodor SAFA and Shanglin YANG
    University: CentraleSupélec, Paris-Saclay Univ.
  - **Embracing non-linearities in future wireless systems via nonconvex optimization** Feb.-Mar. 2020
    Students: Wassim KHELIL, Mohamed Idriss KHALEDI, and Anas OUALLOU
    University: CentraleSupélec, Paris-Saclay Univ.

Invited Talks

- **Massive Uncoordinated Random Access for the Internet of Things** 11 May 2021
  Location: Advanced Institute of Engineering and Technology (AVITECH), UET, VNU, Vietnam
- **Constellation Design for Noncoherent Communications in SIMO Block-Fading Channel** 27 Aug. 2019
  Location: Advanced Institute of Engineering and Technology (AVITECH), UET, VNU, Vietnam
- **Noncoherent Wireless Communications: Theoretical Limits and Signal Design** 11 Nov. 2017
  Location: Faculty of Electronics and Telecommunications, UET, VNU, Vietnam
- **An Achievable DoF Region for the Two-User Noncoherent MIMO Broadcast Channel with Statistical CSI** 22 Sep. 2017
  Location: Technical Univ. of Munich, Germany
- **On the Complementary Roles of Massive MIMO and Coded Caching** 25 Aug. 2016
  Location: Laboratory of Signals and Systems, UET, VNU, Vietnam

Summer Schools Attended

- IEEE ComSoc Summer School on 5G, IoT, and AI technologies Aug. 2020
- IEEE SPS - EURASIP Summer School on Signal Processing for 5G Sweden, May. 2017
- IEEE ITS European School of Information Theory Spain, May. 2017

Events

- 2nd and 3rd Global Young Vietnamese Scholars Forum, Vietnam — Nov. 2019, Nov. 2020
- 7th Heidelberg Laureate Forum, Germany — Sep. 2019
- Young Engineers and Scientists Tokyo Meeting, Tokyo, Japan — Nov. 2014
- Volunteer for conferences: IEEE ICC 2017, IEEE ISIT 2019

Other

- **Administrator** of telecom-vn – a Facebook group for Vietnamese researchers in telecommunications. Organize regular seminars.
- **Organize** several online workshops on information and communication technologies for the Vietnamese community.

Skills

Computer and Programming

- MATLAB/Simulink, C/C++, python
- GNU Radio framework for Software-Defined Radio
- LaTeX, Microsoft Office

Mathematics

- Linear Algebra, Probability and Statistics, Real and Complex Analysis, Optimization

Languages

Vietnamese: Native **English:** Fluent **French:** Elementary (A2)

Selected Honors, Awards, and Scholarships

- **Best Paper Award**, Int. Conf. Adv. Technol. Commun. (ATC), Vietnam — 2021
- "**Impact Science**" **Second Prize** for Ph.D. thesis, CentraleSupélec Foundation, France — 2021
- **Signal, Image & Vision Ph.D. Thesis Prize** by EEA, GRETSI and GdR-ISIS, France — 2021
- **Romberg Grant** for selected participants of the 7th Heidelberg Laureate Forum (HLF), Germany — 2019
- **10-out-of-200 list** of participants of the 7th HLF, Germany — 2019
- **Graduate with first-class honors** (Master level), CentraleSupélec — 2016
- **Université Paris-Saclay scholarship** for international Master students — 2015–2016
- **Graduate with first-class honors** (Bachelor level), UET, VNU — 2014
- **Excellent Undergraduate Thesis Award**, UET, VNU — 2014
- **Third Prize**, Undergraduate Scientific Research Contest, UET, VNU — 2014
- **Honda Young Engineers and Scientists Award**, Honda Foundation, Japan — 2013
  Awarded to 10 selected students from top 6 Vietnamese universities in natural science, engineering and technology.
- **Undergraduate Research Attachment Programme Grant**, National Univ. of Singapore, — 2012
- **Shinnyo scholarship**, Shinnyo-en Organization, Japan — 2010–2014 (annually)
- **Vallet scholarship**, Rencontres du Vietnam — 2011
  Awarded to 138 outstanding students from the north of Vietnam; granted by Prof. Odon Vallet, France.
- 2nd **Prize** in Physics and 4th **Prize** in Mathematics in provincial contest for high school students — 2010

Extra-curricular

- Vice-president of Student Association of UET, VNU, April 2012–June 2015
- President of Student Club on Presentation of UET, VNU, April 2011–June 2012
- JENESYS 2.0 culture exchange program, Japan, July 2014
- Vietnam - China Youth Festival, Guangxi, China, Nov. 2013

Publications

Google Scholar Profile: https://scholar.google.com/citations?user=RjcW6WwAAAAJ&hl=en
Number of citations (until Feb. 26, 2022): **189** h-index: **7**

Journal papers

1. **Khac-Hoang Ngo**, A. Lancho, G. Durisi, and A. Graell i Amat, "Unsourced multiple access with random user activity," *submitted to IEEE Trans. Inf. Theory*, Jan. 2022.
2. A. U. Rahman, F. Fourati, **Khac-Hoang Ngo**, A. Jindal, and M.-S. Alouini, "Network graph generation through adaptive clustering and infection dynamics: A step towards global connectivity," *IEEE Commun. Lett.*, Jan. 2022, preprint: https://arxiv.org/pdf/2111.10690.pdf.
3. F. Zhang, **Khac-Hoang Ngo**, S. Yang, and A. Nosratinia, "Transmit correlation diversity: Generalization, new techniques, and improved bounds," *IEEE Trans. Inf. Theory*, Jan. 2022, preprint: https://arxiv.org/pdf/2104.09711.pdf (Zhang and Ngo contributed equally to the technical content).
4. G. Gur, P. Porambage, C. de Alwis, Q.-V. Pham, **Khac-Hoang Ngo**, M. Liyanage, and P. Porambage, "A survey on integration of ICN and MEC for efficient B5G realization," *submitted to IEEE Open J. Commun. Soc.*, Dec. 2021.
5. **Khac-Hoang Ngo**, A. Decurninge, M. Guillaud, and S. Yang, "Cube-split: A structured Grassmannian constellation for non-coherent SIMO communications," *IEEE Trans. Wireless Commun.*, **19**, (3), 1948–1964, Mar. 2020.
6. **Khac-Hoang Ngo**, M. Guillaud, A. Decurninge, S. Yang, and P. Schniter, "Multi-user detection based on expectation propagation for the non-coherent SIMO multiple access channel," *IEEE Trans. Wireless Commun.*, **19**, (9), 6145–6161, Sep. 2020.
7. **Khac-Hoang Ngo**, S. Yang, M. Guillaud, and A. Decurninge, "Joint constellation design for non-coherent MIMO multiple-access channels," *submitted to IEEE Trans. Inf. Theory*, 2020, preprint: https://arxiv.org/pdf/2009.11548.pdf.
8. T.-T.-Q. Tran, L. V. Nguyen, **Khac-Hoang Ngo**, L.-T. Nguyen, Q.-T. Nguyen, N.-Q.-B. Vo, X.-N. Tran, E. Bastug, S. Azarian, M. Debbah, and P. Duhamel, "Network coding with multimedia transmission and cognitive networking: An implementation based on software-defined radio," *REV Journal on Electronics and Communications*, **10**, (3-4), 72–84, 2020, Invited Article.
9. **Khac-Hoang Ngo**, S. Yang, and M. Kobayashi, "Scalable content delivery with coded caching in multi-antenna fading channels," *IEEE Trans. Wireless Commun.*, **17**, (1), 548–562, Jan. 2018.

Conference papers

1. **Khac-Hoang Ngo**, G. Durisi, and A. Graell i Amat, "Age of information in prioritized random access," in *55st Asilomar Conference on Signals, Systems, and Computers*, CA, USA, Oct. 2021. https://arxiv.org/pdf/2112.01182.pdf.
2. **Khac-Hoang Ngo**, A. Lancho, G. Durisi, and A. Graell i Amat, "Massive uncoordinated access with random user activity," in *IEEE International Symposium on Information Theory (ISIT)*, Melbourne, Victoria, Australia, 2021, pp.3014–3019. https://arxiv.org/abs/2103.09721.
3. **Khac-Hoang Ngo**, N. T. Nguyen, T. Q. Dinh, T.-M. Hoang, and M. Juntti, "Low-latency and secure computation offloading assisted by hybrid relay-reflecting intelligent surface," in *International Conference on Advanced Technologies for Communications (ATC)*, **Best Paper Award**, Hanoi, Vietnam, Oct. 2021, pp.306–311. https://arxiv.org/pdf/2109.01335.pdf.
4. **Khac-Hoang Ngo** and S. Yang, "A generalized Gaussian model for wireless communications," in *IEEE International Symposium on Information Theory (ISIT)*, Melbourne, Victoria, Australia, 2021, pp.3237–3242. https://research.chalmers.se/en/publication/522211.
5. **Khac-Hoang Ngo** and S. Yang, "A Riemannian metric for non-coherent constellation design and its application to multiple access channel," in *25th International ITG Workshop on Smart Antennas*, French Riviera, France, Nov. 2021.

6. **Khac-Hoang Ngo**, S. Yang, and M. Guillaud, "The optimal DoF for the noncoherent MIMO channel with generic block fading," in *2020 IEEE Information Theory Workshop (ITW)*, Riva del Garda, Italy, Apr. 2021. https://arxiv.org/pdf/2009.11556.pdf.
7. **Khac-Hoang Ngo**, S. Yang, M. Guillaud, and A. Decurninge, "Noncoherent MIMO multiple-access channels: A joint constellation design," in *2020 IEEE Information Theory Workshop (ITW)*, Riva del Garda, Italy, Apr. 2021.
8. **Khac-Hoang Ngo**, F. Zhang, S. Yang, and A. Nosratinia, "Two-user MIMO broadcast channel with transmit correlation diversity: Achievable rate regions," in *IEEE Information Theory Workshop (ITW)*, Kanazawa, Japan, Nov. 2021.
9. **Khac-Hoang Ngo**, M. Guillaud, A. Decurninge, S. Yang, S. Sarkar, and P. Schniter, "Non-coherent multi-user detection based on expectation propagation," in *53rd Asilomar Conference on Signals, Systems, and Computers*, CA, USA, Nov. 2019, pp.2092–2096.
10. **Khac-Hoang Ngo**, A. Decurninge, M. Guillaud, and S. Yang, "A multiple access scheme for non-coherent SIMO communications," in *52nd Asilomar Conference on Signals, Systems, and Computers*, CA, USA, Oct. 2018, pp.1846–1850.
11. **Khac-Hoang Ngo**, S. Yang, and M. Guillaud, "The optimal DoF region for the two-user non-coherent SIMO multiple-access channel," in *IEEE Information Theory Workshop (ITW)*, Guangzhou, China, Nov. 2018. https://arxiv.org/pdf/1806.04102.pdf.
12. A. Ghorbel, **Khac-Hoang Ngo**, R. Combes, M. Kobayashi, and S. Yang, "Opportunistic content delivery in fading broadcast channels," in *IEEE Global Communications Conference (GLOBECOM)*, Singapore, Dec. 2017. https://arxiv.org/pdf/1702.02179.pdf.
13. **Khac-Hoang Ngo**, A. Decurninge, M. Guillaud, and S. Yang, "Design and analysis of a practical codebook for non-coherent communications," in *51st Asilomar Conference on Signals, Systems, and Computers*, CA, USA, Oct. 2017, pp.1237–1241.
14. **Khac-Hoang Ngo**, S. Yang, and M. Guillaud, "An achievable DoF region for the two-user non-coherent MIMO broadcast channel with statistical CSI," in *2017 IEEE Information Theory Workshop (ITW)*, Taiwan, Nov. 2017, pp.604–608.
15. **Khac-Hoang Ngo**, S. Yang, and M. Kobayashi, "Cache-aided content delivery in MIMO channels," in *54th Annual Allerton Conference on Communication, Control, and Computing (Allerton)*, IL, USA, Sep. 2016, pp.93–100.
16. **Khac-Hoang Ngo**, S. Yang, M. Kobayashi, and K. Huang, "On the complementary roles of massive MIMO and coded caching for content delivery," in *International Conference on Advanced Technologies for Communications (ATC)*, Hanoi, Vietnam, Oct. 2016, pp.237–242.
17. S. Yang, **Khac-Hoang Ngo**, and M. Kobayashi, "Content delivery with coded caching and massive MIMO in 5G," in *9th International Symposium on Turbo Codes and Iterative Information Processing (ISTC)*, Brest, France, Sep. 2016, pp.370–374.
18. **Khac-Hoang Ngo** and Quoc-Tuan Nguyen, "Implementation of network coding scheme in universal software radio peripheral," in *IEICE International Conference on Integrated Circuits, Design, and Verification (ICDV)*, Hanoi, Vietnam, Nov. 2014.
19. Thai-Mai Dinh Thi, Quoc-Tuan Nguyen, and **Khac-Hoang Ngo**, "Implementation of spectrum sensing scheme in software-defined radio testbed," in *IEICE International Conference on Integrated Circuits, Design, and Verification (ICDV)*, Hanoi, Vietnam, Nov. 2014.

Conference posters

1. **Khac-Hoang Ngo**, S. Yang, and M. Guillaud, "Generalized Gaussian model for data-driven learning in communications," in *International Zurich Seminar on Information and Communication (IZS)*, Zurich, Switzerland, Feb. 2020.
2. T. T. Q. Tran, V.-L. Nguyen, **Khac-Hoang Ngo**, L.-T. Nguyen, Q.-T. Nguyen, E. Bastug, S. Azarian, M. Debbah, and P. Duhamel, "Network coding and information security in industry 4.0," in *1st ASEAN IVO Workshop on Cybersecurity and Information Security in Industry 4.0*, Hanoi, Vietnam, Mar. 2019.

Technical reports

1. Khac-Hoang Ngo, "Solar panel charge controller," Dept. of Electrical and Computer Engineering, National University of Singapore, Singapore, Internship report, Aug. 2012.

Patents

1. **Khac-Hoang Ngo**, A. Decurninge, M. Guillaud, and S. Yang, "Transmitter and receiver communication apparatus for non-coherent communication," U.S. Patent Application 17/243,679, 2021.