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Research topics

- **Antenna design optimizations:** At low frequency, I am interested in antenna miniaturization for applications such as LoRa devices and cellular mobile. Method of optimization is using genetic optimization, to be specific Particle Swarm Optimization [5][6][7][9][11]. At Millimeter-Wave, I studied array designs [4][8].
- **Field measurements:** Analysis of far-field/near-field measurements for 5G system evaluation [1][3][8][10].
- **EM numerical modelling:** Theoretical boundaries of a resonance structure [2].
- **Design RF components and circuits.**

Education

- November 2017 – November 2020, *PhD candidate* on Electronics, Université Côte d’Azur. Thesis title: “*Development of antenna systems for 5G communications.*”
- September 2012 – July 2017, *Engineering Degree (2017)* in Telecommunications from Bach Khoa University (PFIEV) – 1st ranking graduation. Addendum CTI for *Engineering Degree* (Master equivalence) from IMT Atlantique University, France.

Courses

- ESoA: ***Antenna systems for 5G communication*** by Chalmers University of Technology
- ESoA: ***Antennas and Rectennas for IoT Applications*** by Université Côte d’Azur

Projects

- **PhD project at 5G - Millimeter Wave (01/2019 – 11/2020):** Antenna-in-Packet oriented design using low-cost industrial PCB stack-up specifications. Different types of feeding methods for patch antenna are studied. Radiation properties of patch elements in a 4×1 array are measured separately in anechoic chamber and 3D scanner with/without human to evaluate the scattering effects of fingers. The final design integrates Anokiwave phase-shifter working at 24.25 GHz – 27.5 GHz.

- **PhD project at 5G – sub-6GHz (09/2017 – 11/2020):** The full screen design of modern mobile phone restrains the clearance space for antenna. The antenna system is designed to cover 4G bands 690 – 960 MHz and 1.7 – 2.7 GHz, plus 5G band 3.3 – 3.8 GHz. To achieve the global optimal efficiency, the matching network is optimized together with antenna geometry using Particle Swarm Optimization.
- **Assistant lecturer (09/2018 – 05/2020):** Doctorant Contractuel Chargé d'Enseignement (DCCE) Subjects: Analog Electronic and Digital Electronic, for first year bachelor students.
- **Project tutor (09/2019 – 01/2020):** Projet pluridisciplinaire DS4H/Tutorat M2 – Supervising a Master project. In this project, the student analyzes an industrial phase-shifter working at 3.3 – 3.8 GHz in terms of the phase and the amplitude control. He then designed a PCB integrating 3 phase-shifters to realize a 1-to-4 board fully functional.
- **Antenna Front-End design (06/2018 – 08/2018):** RF board with Tx/Rx/Calibration functions working at 3.3 – 3.8 GHz. The constrain is the width of the board must be small to be installed back-to-back with the antenna, whose size is comparable to half wavelength (40mm). The design was fabricated using 4 layers stack-up PCB and used for a project demonstration.
- **Student Intern (02/2017 – 07/2017):** Design of reconfigurable antenna for LoRa system at both European 868 MHz and American 916 MHz. The works include polarization, pattern (using switches) and frequency (using Digital Tunable Capacitor) reconfigurability. Most designs are IFA type to obtain compact form factor and good impedance matching.

Publications

❖ ***Journal paper (1)***

- [1] T. Q. K. Nguyen, M. S. Miah, L. Lizzi, et al., “Experimental Evaluation of User’s Finger Effects on a 5G Terminal Antenna Array at 26 GHz”, *IEEE Antennas and Wireless Propagation Letters*, vol. 19, no. 6, pp. 892–896, 2020.

❖ ***International conference papers (9)***

- [2] T. Q. K. Nguyen, B. L. G. Jonsson, F. Ferrero, L. Lizzi, “On limitation of impedance bandwidth for integrated antennas in mobile terminals with narrow clearance,” in *EuCAP 2021, Virtual conference*, March 2021
- [3] T. Q. K. Nguyen, I. Santamaria, L. Lizzi, et al., “Measurement of Finger Effects on Coverage Efficiency for User Equipment Mm-Wave Antenna”, in *2020 IEEE International Symposium on Antennas and Propagation and North American Radio Science Meeting*, IEEE, Montreal, Canada, Jul. 2020, pp. 1–2. [Online]. Available: <https://hal.archives-ouvertes.fr/hal-02511917>.
- [4] K. Nguyen, F. Ferrero, and L. Lizzi, “Feeding Techniques for Multilayer PCB Mmwave Array Antenna for UE”, in *2020 International Workshop on Antenna Technology (iWAT)*, 2020, pp. 1–4.
- [5] I. Santamaria, T. Q. K. Nguyen, L. Lizzi, et al., “2-Port Antenna with Matching Network for Dual-band IoT Terminal”, in *IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting - AP-S/URSI 2019*, IEEE, Ed., Atlanta, Georgia, Jul. 2019. [Online]. Available: <https://hal.archives-ouvertes.fr/hal-02085949>.

- [6] L. Santamaria, T. Q. Khai Nguyen, F. Ferrero, et al., "Flexible reconfigurable antenna robust to folding in wearable applications", in 2019 IEEE International Symposium on Antennas and Propagation and USNC-URSI Radio Science Meeting, 2019, pp. 1–2.
- [7] T. Q. K. Nguyen, F. Ferrero, and L. Lizzi, "PSO-based Combined Antenna and Matching Network Optimization for Mobile Terminals", in EuCAP 2019, Krakow, Poland, Mar. 2019. [Online]. Available: <https://hal.archives-ouvertes.fr/hal-01963416>.
- [8] F. Ferrero, P. Ratajkzack, and T. Q. K. Nguyen, "Assessment of beamforming capabilities of a 4-element array in a smartphone at 26 GHz", in 12th European Conference on Antennas and Propagation (EuCAP 2018), 2018, pp. 1–3.xx.
- [9] T. Q. Khai Nguyen, L. Lizzi, and F. Ferrero, "Dual-Matching for Single Resonance Miniaturized Antenna for IoT applications", in 2018 IEEE International Symposium on Antennas and Propagation USNC/URSI National Radio Science Meeting, 2018, pp. 793–794.
- [10] L. H. Trinh, V. X. Bui, F. Ferrero, et al., "Signal propagation of LoRa technology using for smart building applications", in 2017 IEEE Conference on Antenna Measurements Applications (CAMA), 2017, pp. 381–384.

❖ **National conference paper (1)**

- [11] F. Ferrero, T. Q. K. Nguyen, and L. Lizzi, "Co-Optimisation antenne et circuit d'adaptation pour terminaux mobiles de nouvelle génération", in JNM 2019 - 21èmes journées Nationales Micro-Ondes, Caen, France, May 2019, pp. 1,4. [Online]. Available: <https://hal.archives-ouvertes.fr/hal-02070845>.

Awards

- Second prize for the **Student antenna design competition** in *21ièmes Journées Nationales Micro-ondes*, Cean 2019.
- First Prize of **Smart Water Innovation Contest 2016**, held by Embassy of Sweden in Ha Noi and the Vietnam's Ministry of Natural Resource and Environment, invited to *World Water Week 2016* in Stockholm
- **Sunflower Mission Engineer & Technology Excellent Program 2015** from Esilicon for engineering students