George R. MacCartney, Jr.

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Education

- **New York University (NYU) Tandon School of Engineering** Brooklyn, NY
  Ph.D., Electrical Engineering *2013-2018*
  - The Dante Youla Award for Graduate Research Excellence in ECE (April 2017)
  - The Marconi Society - Paul Baran Young Scholar Award Recipient(2016)
  - GAANN Fellowship Recipient
  - Concentration: Millimeter-wave channel sounder prototyping, channel measurements and models, with a focus on base station diversity and human blockage.
    - Built end-to-end direct-correlation and sliding correlator channel sounder system and software.
    - Led measurement campaign, data processing, data analysis, and model development.
  - Led 73 GHz mmWave UMi propagation campaign in 2013, with data processing, analysis, and modeling.
  - PhD Mentoring: Sijia Deng (MSEE, Spring 2016); JP Ryan (BSEE, Fall 2016)
  - Graduate TA: *Lectured, created homeworks, quizzes, exams, and solutions for the following courses*
    - Electrical Engineering for Computer Scientists - Spring 2015 (Undergraduate Level)
    - Fundamentals of Electric Circuits I - Fall 2014 (Undergraduate Level)
    - Probability and Stochastics - Fall 2013 (Graduate Level)
- **Villanova University** Villanova, PA
  M.S., Electrical Engineering (Overall GPA: 3.76/4.0) *2011*
  - Certificates: High Frequency Systems & Wireless and Digital Communications

  B.S., Electrical Engineering (Overall GPA: 3.68/4.0) *2010*
  - Dean's List All 8 Semesters, Tau Beta Pi, Eta Kappa Nu Association, IEEE, ECE Tutoring
  - Recipient of Joseph Kozikowski Award for senior capstone design project

Work Experience

- **Apple, Inc.** Cupertino, CA
  Wireless RF Intern *June 2017 - Sept. 2017*
  - RF propagation and wireless channel measurements and characterization.
- **SiBeam (A Lattice Semiconductor Company)** Sunnyvale, CA
  Wireless Intern *June 2015 - Aug. 2015*
  - 60 GHz backhaul link margin test and validation of RF phased-array systems and WiGig baseband.
- **Newfield Wireless** Berkeley, CA
  RF Field Engineer *Oct. 2012 - Jan. 2013*
  - 3G & LTE DAS site audits and in-building penetration loss measurements in major markets
- **Lockheed Martin Corporation: Advanced Technology Laboratories** Cherry Hill, NJ
  Member of Engineering Staff *2012*
  - Developed embedded systems and algorithms for spectrum awareness and surveillance.
  - Ad-hoc antenna prototyping for direction finding purposes on small UAVs.
  - Wireless Protocol Research: WiMAX, WCDMA, & CDMA2000 w/ USRPs, GNU Radio, & BTS.
- **Lockheed Martin Corporation: IS&GS** King of Prussia, PA
  Software Engineer *2011-2012*
  - Provided hardware, software, and facility engineering support for multi-user, multi-facility, real time command and control systems and center, w/ Linux and Unix Systems.

  College Student Tech Intern *2008-2011*
  - Maintained hardware, built & tested comms. cables, designed database reports w/ BIRT and SQL*Plus, ands solved database and code issues by developing Perl scripts.

Technical Skills

Proficient: MATLAB, LabVIEW, LabVIEW-FPGA, RF Test Equipment, Propagation Fundamentals and Measurements, Channel Sounding Design and Measurements, Wireless Channel Modeling, Drive Testing, LaTeX.
Familiar: XILINX System Generator, Simulink, Antenna Prototyping, Ansoft, USRPs & GNU Radio, Python, SCPI, Perl, C, VHDL, AutoCAD, Solidworks, AIX, Linux.

Honors-Awards

- The Dante Youla Award for Graduate Research Excellence in ECE 2017
- *The Marconi Society - Paul Baran Young Scholar Award* 2016
- *Co-author and organizer of IEEE VTC2016-Spring Conference Best Paper* 2016
- *GAANN Fellowship - NYU Tandon School of Engineering* 2013-2017
- *Rev. Francis D. Dougherty, O.S.F.S. Endowed University Scholarship* 2009-2010
- *Lockheed Martin I.S.&G.S. Edward Reese Fellows Scholarship* 2008-2010
- *Pepsi-co Scholarship* 2006-2010
- *Dean's Award for Academic Excellence* Villanova University
- *Habitat for Humanity Volunteer Award: Delaware County*

Interests

- **Athletics:** Baseball, Basketball, Football, Weightlifting, & Running
- **Outdoors:** Bouldering, Hiking, & Mountain Biking
- **Others:** Reading, Drawing, & Project Euler

Publications

Journals, Letters, and Magazines

[1] T. S. Rappaport, **G. R. MacCartney, Jr.**, S. Sun, H. Yan, and S. Deng, "Small-scale, local area, and transitional millimeter wave propagation for 5G communications," *IEEE Transactions on Antennas and Propagation*, Dec. 2017, *to be published*

[2] T. S. Rappaport, Y. Xing, **G. R. MacCartney, Jr.**, A. F. Molisch, E. Mellios, and J. Zhang, "Overview of millimeter wave communications for fifth-generation (5G) wireless networks (Invited Paper)," *IEEE Transactions on Antennas and Propagation*, Dec. 2017, *to be published*

[3] **G. R. MacCartney, Jr.** and T. S. Rappaport, "A flexible millimeter-wave channel sounder with absolute timing," *IEEE Journal on Selected Areas in Communications*, vol. 35, pp. 1402–1418, June 2017

[4] **G. R. MacCartney, Jr.** and T. S. Rappaport, "Rural macrocell path loss models for millimeter wave wireless communications," *IEEE Journal on Selected Areas in Communications*, vol. 35, pp. 1663–1677, July 2017

[5] A. I. Sulyman, A. Alwarafy, **G. R. MacCartney, Jr.**, T. S. Rappaport, and A. Alsanie, "Directional radio propagation path loss models for millimeter-wave wireless networks in the 28-, 60-, and 73-GHz bands," *IEEE Transactions on Wireless Communications*, vol. 15, pp. 6939–6947, Oct. 2016

[6] **G. R. MacCartney, Jr.**, T. S. Rappaport, S. Sun, and S. Deng, "Indoor office wideband millimeter-wave propagation measurements and channel models at 28 GHz and 73 GHz for ultra-dense 5G wireless networks (Invited Paper)," *IEEE Access*, vol. 3, pp. 2388–2424, Oct. 2015

[7] **G. R. MacCartney, Jr.**, T. S. Rappaport, M. K. Samimi, and S. Sun, "Millimeter-wave omnidirectional path loss data for small cell 5G channel modeling," *IEEE Access*, vol. 3, pp. 1573–1580, Aug. 2015

[8] T. S. Rappaport, **G. R. MacCartney, Jr.**, M. K. Samimi, and S. Sun, "Wideband millimeter-wave propagation measurements and channel models for future wireless communication system design (Invited Paper)," *IEEE Transactions on Communications*, vol. 63, pp. 3029–3056, Sept. 2015

[9] M. K. Samimi, T. S. Rappaport, and **G. R. MacCartney, Jr.**, "Probabilistic omnidirectional path loss models for millimeter-wave outdoor communications," *IEEE Wireless Communications Letters*, vol. 4, pp. 357–360, Aug. 2015

[10] A. I. Sulyman, A. T. Nassar, M. K. Samimi, **G. R. MacCartney, Jr.**, T. S. Rappaport, and A. Alsanie, "Radio propagation path loss models for 5G cellular networks in the 28 GHz and 38 GHz millimeter-wave bands," *IEEE Communications Magazine*, vol. 52, pp. 78–86, Sept. 2014

[11] S. Deng, C. J. Slezak, **G. R. MacCartney, Jr.**, and T. S. Rappaport, "Small wavelengths - big potential: Millimeter wave propagation measurements for 5G," *Microwave Journal*, vol. 57, pp. 4–12, Sept. 2014

[12] A. Ghosh, T. A. Thomas, M. C. Cudak, R. Ratasuk, P. Moorut, F. W. Vook, T. S. Rappaport, **G. R. MacCartney, Jr.**, S. Sun, and S. Nie, "Millimeter-wave enhanced local area systems: A high-data-rate approach for future wireless networks," *Selected Areas in Communications, IEEE Journal on*, vol. 32, pp. 1152–1163, June 2014

Conferences

[13] **G. R. MacCartney, Jr.**, T. S. Rappaport, and A. Ghosh, "Base station diversity propagation measurements at 73 ghz millimeter-wave for 5g coordinated multipoint (comp) analysis," in *2017 IEEE Globecom Workshops (GC Wkshps)*, pp. 1–7, Singapore, Dec. 2017

[14] **G. R. MacCartney, Jr.**, T. S. Rappaport, and S. Rangan, "Rapid fading due to human blockage in pedestrian crowds at 5G millimeter-wave frequencies," in *2017 IEEE Global Communications Conference (GLOBECOM)*, pp. 1–7, Singapore, Dec. 2017

[15] **G. R. MacCartney, Jr.** and T. S. Rappaport, "Study on 3GPP rural macrocell path loss models for millimeter wave wireless communications," in *2017 IEEE International Conference on Communications (ICC)*, pp. 1–7, May 2017
[16] **G. R. MacCartney, Jr.**, H. Yan, S. Sun, and T. S. Rappaport, "A flexible wideband millimeter-wave channel sounder with local area and NLOS to LOS transition measurements," in *2017 IEEE International Conference on Communications (ICC)*, pp. 1–7, May 2017
[17] S. Sun, **G. R. MacCartney, Jr.**, and T. S. Rappaport, "A novel millimeter-wave channel simulator and applications for 5G wireless communications," in *2017 IEEE International Conference on Communications (ICC)*, pp. 1–7, May 2017
[18] S. Sun, H. Yan, **G. R. MacCartney, Jr.**, and T. S. Rappaport, "Millimeter wave small-scale spatial statistics in an urban microcell scenario," in *2017 IEEE International Conference on Communications (ICC)*, pp. 1–7, May
[19] J. Ryan, **G. R. MacCartney, Jr.**, and T. S. Rappaport, "Indoor office wideband penetration loss measurements at 73 GHz," in *2017 IEEE International Conference on Communications Workshops(ICCW)*, pp. 1–6, May 2017
[20] S. Deng, **G. R. MacCartney, Jr.**, and T. S. Rappaport, "Indoor and outdoor 5G diffraction measurements and models at 10, 20, and 26 GHz," in *2016 IEEE Global Telecommunications Conference (GLOBECOM)*, pp. 1–7, Dec. 2016
[21] **G. R. MacCartney, Jr.**, S. Sun, T. S. Rappaport, Y. Xing, H. Yan, J. Koka, R. Wang, and D. Yu, "Millimeter wave wireless communications: New results for rural connectivity," in *Proceedings of the 5th Workshop on All Things Cellular: Operations, Applications and Challenges: in conjunction with MobiCom 2016*, ATC '16, (New York, NY, USA), pp. 31–36, ACM, Oct. 2016
[22] **G. R. MacCartney, Jr.**, S. Deng, S. Sun, and T. S. Rappaport, "Millimeter-wave human blockage at 73 GHz with a simple double knife-edge diffraction model and extension for directional antennas," in *2016 IEEE 84th Vehicular Technology Conference (VTC2016-Fall)*, pp. 1–6, Sept. 2016
[23] **G. R. MacCartney, Jr.**, S. Deng, and T. S. Rappaport, "Indoor office plan environment and layout-based mmWave path loss models for 28 GHz and 73 GHz," in *2016 IEEE 83rd Vehicular Technology Conference (VTC Spring)*, pp. 1–6, May 2016
[24] M. Samimi, **G. R. MacCartney, Jr.**, S. Sun, and T. S. Rappaport, "28 GHz millimeter-wave ultrawideband small-scale fading models in wireless channels," in *2016 IEEE 83rd Vehicular Technology Conference (VTC2016-Spring)*, pp. 1–6, May 2016
[25] K. Haneda, **G. R. MacCartney, Jr.**, *et al.*, "Indoor 5G 3GPP-like channel models for office and shopping mall environments," in *2016 IEEE International Conference on Communications Workshops (ICCW)*, pp. 694–699, May 2016
[26] K. Haneda, **G. R. MacCartney, Jr.**, *et al.*, "5G 3GPP-like channel models for outdoor urban microcellular and macrocellular environments," in *2016 IEEE 83rd Vehicular Technology Conference (VTC2016-Spring)*, pp. 1–7, May 2016
[27] S. Sun, **G. R. MacCartney, Jr.**, and T. S. Rappaport, "Millimeter-wave distance-dependent large-scale propagation measurements and path loss models for outdoor and indoor 5G systems," in *2016 10th European Conference on Antennas and Propagation (EuCAP)*, pp. 1–5, Apr. 2016
[28] S. Sun, **G. R. MacCartney, Jr.**, M. K. Samimi, and T. S. Rappaport, "Synthesizing omnidirectional antenna patterns, received power and path loss from directional antennas for 5G millimeter-wave communications," in *2015 IEEE Global Communications Conference (GLOBECOM)*, pp. 3948–3953, Dec. 2015
[29] **G. R. MacCartney, Jr.**, M. K. Samimi, and T. S. Rappaport, "Exploiting directionality for millimeter-wave wireless system improvement," in *2015 IEEE International Conference on Communications (ICC)*, pp. 2416–2422, June 2015
[30] **G. R. MacCartney, Jr.**, M. K. Samimi, and T. S. Rappaport, "Omnidirectional path loss models in New York City at 28 GHz and 73 GHz," in *IEEE 25th International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC)*, pp. 227–331, Sept. 2014
[31] T. A. Thomas, H. C. Nguyen, **G. R. MacCartney, Jr.**, and T. S. Rappaport, "3D mmWave channel model proposal," in *2014 IEEE 80th Vehicular Technology Conference (VTC2014-Fall),*, pp. 1–6, Sept 2014
[32] H. C. Nguyen, **G. R. MacCartney, Jr.**, T. A. Thomas, T. S. Rappaport, B. Vejlgaard, and P. Mogensen, "Evaluation of empirical ray-tracing model for an urban outdoor scenario at 73 GHz E-Band," in *2014 IEEE 80th Vehicular Technology Conference (VTC2014-Fall)*, pp. 1–6, Sept 2014
[33] **G. R. MacCartney, Jr.** and T. S. Rappaport, "73 GHz millimeter wave propagation measurements for outdoor urban mobile and backhaul communications in New York City," in *2014 IEEE International Conference on Communications (ICC)*, pp. 4862–4867, June 2014
[34] S. Nie, **G. R. MacCartney, Jr.**, S. Sun, and T. S. Rappaport, "28 GHz and 73 GHz signal outage study for millimeter wave cellular and backhaul communications," in *2014 IEEE International Conference on Communications (ICC)*, pp. 4856–4861, June 2014
[35] S. Sun, **G. R. MacCartney, Jr.**, M. K. Samimi, S. Nie, and T. S. Rappaport, "Millimeter wave multi-beam antenna combining for 5G cellular link improvement in New York City," in *2014 IEEE International Conference on Communications (ICC)*, pp. 5468–5473, June 2014
[36] **G. R. MacCartney, Jr.**, J. Zhang, S. Nie, and T. S. Rappaport, "Path loss models for 5G millimeter wave propagation channels in urban microcells," in *2013 IEEE Global Communications Conference (GLOBECOM)*, pp. 3948–3953, Dec 2013
[37] S. Nie, **G. R. MacCartney, Jr.**, S. Sun, and T. S. Rappaport, "72 GHz millimeter wave indoor measurements for wireless and backhaul communications," in *2013 IEEE 24th International Symposium on Personal Indoor and Mobile Radio Communications (PIMRC)*, pp. 2429–2433, Sept. 2013