

# Iñigo del Portillo Barrios

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## Education

- 2015–Present **PhD in Aeronautics and Astronautics**, *Massachusetts Institute of Technology*, Cambridge, MA. GPA: 4.9/5.0.
- **System Architecture Lab** Advisor: Edward Crawley Expected graduation in October 2019
  - *Research interests*: Optical Space Communication Networks, Free Space Optics, Network Architecture
  - *Relevant coursework*: Optical Networks, Data Networks, Heterogeneous Networks, Communication Systems and Networks
  - *Thesis title*: *Global broadband: A tradespace of architectures for space and aerial connectivity to the rest of the world*
    - Explore the tradespace of architectures for space (GEO, MEO, LEO) and aerial (UAV, balloon, ) communication network concepts to extend global connectivity.
    - For each system, develop end-to-end system models that include the RF propagation, atmospheric channel, power and mass sizing, system dynamics, and costs.
- 2015–2016 **MSc in Aeronautics and Astronautics**, *Massachusetts Institute of Technology*, Cambridge, MA. GPA: 5.0/5.0.
- *Relevant Coursework*: *Applied Probability, Optical Networks, Space Communications, Dynamic Systems and Control*
  - *Thesis title*: *Optimal Locations for the Ground Segment of optical Space Communications Networks*
    - Conducted research on optical ground station optimal location for Free Space Optical communications. Integrated models of weather effects (cloud coverage and atmospheric turbulence) on the optical link in the optimization tool.
- 2012–2015 **MSc in Electronics Engineering**, *UPC-BarcelonaTech School of Telecommunications Engineering*, Barcelona, Spain. GPA: 9.05/10. Valedictorian: ranked first in the class out of 52 students.
- *Relevant Coursework*: *Digital and Analog Circuit Design, Electronics for Communications, RF Electronics*
  - *Thesis title*: *Contributions to ITACA: A Tool to Architect Space Communication Networks*
    - Developed computational tools to model the space communications network of NASA in order to explore different alternatives for their future space-based network. Briefed at NASA Headquarters about architectural considerations in the replacement of several \$300M communication satellites.
- 2008–2014 **BSc in Telecommunications Engineering**, *UPC-BarcelonaTech School of Telecommunications Engineering*, Barcelona, Spain. GPA: 8.99/10. Ranked second in the class out of 152 students. Awarded national prize for academic excellence (second best national transcript among graduating students in the same year).
- *Relevant Coursework*: *Electromagnetism, Digital and Analog Communications, Network Protocols, Signal Processing*
  - *Thesis title*: *On Scalability of Fractionated Satellite Networks*
    - Analyzed scalability of networks of satellites where resources (comms, power, computing) are shared amongst satellites. Modeled resource sharing and allocation using mixed-integer programming.
- 2008–2014 **BSc in Mechanical Engineering**, *UPC-BarcelonaTech School of Industrial Engineering*, Barcelona, Spain. GPA: 8.94/10. Ranked third in the class out of 384 students.
- *Relevant Coursework*: *System Dynamics and Control, Mechanics, Structure Analysis*

## Professional experience

- Feb 2014 – present **Graduate Research Assistant**, *System Architecture Lab at the Massachusetts Institute of Technology*, Cambridge, MA, USA.
- May 2017 – **Optical Engineering Intern**, *Facebook*, Woodland Hills, USA.
- Aug 2017
- Conducted techno-economical studies for different technologies to expand global connectivity (Satellite, mmWave towers, low altitude platforms).
  - Developed a tool to simulate optical propagation through the atmospheric channel
  - conducted analyses for the design of satellite optical feeder links
  - analyzed trade-offs in the design of networks of low and high aerial platforms (LAPs, HAPs) to provide connectivity
- Jun 2016 – **Optical Engineering Intern**, *Facebook*, Woodland Hills, USA.
- Sept 2016
- Developed a tool to conduct architecture trade-studies about different technologies to expand global connectivity (ultra-high throughput satellites, UAVs).
  - Implemented atmospheric models according to ITU recommendations to estimate attenuation on RF links.
  - Developed a tool to simulate atmospheric turbulence for optical links.
- Jun 2013 – **Summer Internship**, *Procter & Gamble*, Frankfurt, Germany.
- Sept 2013
- Software Engineer in the IT department. Coordinated a project to improve performance and usability of a tool used by more than 6,000 people in the company. Improved productivity by 40% and user satisfaction by 68%
- Jan 2013 – **Research Assistant**, *Nanosatellite Laboratory UPC-BarcelonaTech School of Telecommunications Engineering (ETSETB)*, Barcelona, Spain.
- Feb 2014
- Led the system integration of a 3U Cubesat. Produced assembly diagrams for the satellite and developed code to simulate mission operations.
- Jun 2012 – **Summer Internship**, *GKN Landsystems*, Cologne, Germany.
- Sept 2012
- Defined a process to sell obsolete products using IT. Worked with different departments (Marketing, Sales, Customer Services, Logistics). Built a prototype website to sell the products. Presented the project to the GKN European Executive board

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## Technology

<b>Python</b>	advanced	<b>MATLAB</b>	advanced	<b>Java</b>	intermediate
<b>VBA</b>	intermediate	<b>HTML</b>	intermediate	<b>VHDL</b>	intermediate
<b>C</b>	basic	<b>CSS</b>	basic	<b>SQL</b>	basic

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## Awards and Fellowships

- 2018 **Spanish Ministry of Education**, *second prize at National Award for Excellence in Academic Performance among Telecommunications Engineering graduates in 2013/2014 in Spain*, (2,650€).
- 2015 **La Caixa Fellowship**, *full funding for two years of doctoral program*, (\$150,000).
- 2013 **Spanish Ministry of Education**, *introduction to research award*, (\$2,000).
- 2013 **Formula Santander Fellow**, *partial funding for a one year's master thesis stay at MIT*, (\$5,000).
- 2013 **CFIS PFC Fellow**, *partial funding for a one year's master thesis stay at MIT*, (\$5,000).
- 2008-2013 **CFIS Fellow**, *five-year, full funding for the Degrees in Telecommunications Engineering and Industrial engineering at UPC-Barcelona Tech*, (\$15,000).

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## Languages

<b>Spanish</b>	Native speaker	<b>English</b>	Professional proficiency	<b>Catalan</b>	Limited working proficiency
<b>Chinese</b>	Elementary proficiency	<b>Basque</b>	Elementary proficiency		

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## Selected Publications

- [1] **Inigo del Portillo**, Bruce G. Cameron, and Edwards F. Crawley. A technical comparison of three low earth orbit satellite constellation systems to provide global broadband. In *2018 International Aeronautical Conference*. IAF, 2018.
- [2] **Inigo del Portillo**, Bruce G. Cameron, and Edwards F. Crawley. Ground segment architectures for large leo constellations with feeder links in ehf-bands. In *2018 IEEE Aerospace Conference*. IEEE, 2018.
- [3] **Inigo del Portillo**. ITU-Rpy: A python implementation of the ITU-R P. Recommendations to compute atmospheric attenuation in slant and horizontal paths. <https://github.com/iportillo/ITU-Rpy/>, 2017.
- [4] **Inigo del Portillo**, Marc Sanchez-Net, Bruce G. Cameron, and Edward F. Crawley. Uncertainty quantification of network availability for networks of optical ground stations. In *Free-Space Laser Communication and Atmospheric Propagation XXIX*, volume 10096, page 100961B. International Society for Optics and Photonics, 2017.
- [5] **Inigo del Portillo**, Marc Sanchez, Bruce G. Cameron, and Edward F. Crawley. Optimal Location of Optical Ground Stations to Serve LEO Spacecraft. In *2017 IEEE Aerospace Conference*, 2017.
- [6] **Inigo del Portillo**, Marc Sanchez, Bruce G. Cameron, Edward F. Crawley, and Daniel Selva. Architecting the ground segment of an optical space communication network. In *2016 IEEE Aerospace Conference*, 2016.
- [7] **Inigo del Portillo**, Elisenda Bou, Eduard Alarcon, Marc Sanchez-Net, Daniel Selva, and Angel Alvaro. On scalability of fractionated satellite network architectures. In *Aerospace Conference, 2015 IEEE*, pages 1–13. IEEE, 2015.
- [8] Marc Sanchez Net, **Inigo del Portillo**, Bruce Cameron, Edward F Crawley, and Daniel Selva. Integrated tradespace analysis of space network architectures. *Journal of Aerospace Information Systems*, pages 1–15, 2015.
- [9] Marc Sanchez, **Inigo del Portillo**, Bruce G. Cameron, and Edward F. Crawley. Assessing the impact of real-time communication services on the space network ground segment. In *2016 IEEE Aerospace Conference*, pages 1–13, 2016.
- [10] Carles Araguz, Angel Alvaro, **Inigo del Portillo**, Kenny Root, Eduard Alarcon, and Elisenda Bou-Balust. On autonomous software architectures for distributed spacecraft: A local-global policy. In *Aerospace Conference, 2015 IEEE*, pages 1–9. IEEE, 2015.

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## Other

**Activities**, *Held positions of Sports Chair, Secretary, Vice-president and President of Spain@MIT, Vice-president of IEEE Barcelona Student Branch, Student representative at ETSETB BarcelonaTech.*

**Interests**, *Traveling, reading, sports (soccer, running, scuba-diving), pottery.*