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Location: 📍 Ciudad Real, Spain

Professional Profile

Civil Engineer from Pontificia Universidad Javeriana (Colombia), officially recognized as equivalent to the Official Master's Degree qualifying the holder to practice as a Civil Engineer in Roads, Canals and Ports, with full legal standing in Spain ; Master's Degree in Transport, Territory and Urban Planning from the Polytechnic University of Valencia (Spain), where I specialised in the modelling and integrated planning of various transport systems (land, air, maritime and rail). Currently a PhD candidate in Territory, Infrastructure and Environment at the University of Castilla-La Mancha (UCLM, Spain) and contracted researcher at the same institution. My solid track record spans from overseeing civil works and managing infrastructure projects to developing specialised software (such as DGIS for urban and interurban accessibility analysis and Productivos.org) and data engineering. I focus on cutting-edge mobility solutions, including Mobility as a Service (MaaS) and transport system optimisation, with particular emphasis on demand-responsive transport (DRT/DART) and improving accessibility across diverse territorial contexts. I lead the application of big data and advanced tools (Python, MATLAB, ArcGIS, Docker, OSRM) for territorial analysis and the development of innovative solutions. Through this work, I aim to merge practical engineering experience with leading-edge research to generate positive social impact and drive the digital transformation of the transport sector.

Professional Experience

Contracted RD Researcher for the Mob&UP Group 02/2023 – Present, Ciudad Real, Spain
University of Castilla-La Mancha (UCLM)

- **EsMaaS Project (TED2021-129623A-100):** The role of MaaS in the digital transition of mobility in rural areas: sustainable and inclusive strategies for transportation optimization in 'empty Spain'.
 - Designed and implemented an innovative heuristic methodology for optimizing Demand-Responsive Transport (DRT) routes in rural environments using Python and genetic algorithms.
 - Developed a territorial characterization framework for Castilla-La Mancha using hierarchical clustering (Ward's method) with 7 key variables.
 - Programmed in Python and MATLAB for complex data analysis; used ArcGIS Pro and OSRM for territorial and mobility analysis with mobile phone big data.
 - Comparative assessment of accessibility to essential services (education, health) and quantification of spatiotemporal inequities.
 - Created and tested an interactive web platform (PHP/JS/Leaflet) for DRT service requests and generation of inputs for optimization algorithms.

Civil Engineer
Independent Projects

01/2021 – 12/2021, Cali, Colombia

- Comprehensive management and technical supervision of multiple civil projects (houses and a laboratory), including design and use of AutoCAD and Revit.
- Civil works for the construction of residential projects, ensuring quality and adherence to deadlines.

Engineering Coordinator, Editor, and Auditor
Productivos.org Foundation

2016 – 2019, Cali, Colombia

- Conducted software quality control and audits. Managed internal account review processes.

- Technical management of the corporate website and its database. Proactive resolution of software engineering and programming issues.

Resident Civil Engineer
Constructora Bolívar

12/2016 – 06/2017, Cali, Colombia

- Direct supervision of large-scale residential complex construction works.
- Efficient management of on-site material and personnel resources, optimizing costs and timelines.

Formal Academic Background

PhD in Territory, Infrastructures, and Environment (in progress) 2023 – Present, Ciudad Real, Spain
University of Castilla-La Mancha (UCLM)

- Research line: Mobility as a Service (MaaS) solutions and transportation optimization in rural and peri-urban areas.
- Higher Technical School of Civil Engineering (Roads, Canals, and Ports).

Recognition of Equivalence to the Official Master's Degree in Civil Engineering: Roads, Canals and Ports 09/05/2025, Madrid, Spain
Ministry of Science, Innovation and Universities of Spain
Directorate-General for University Degrees and Academic Planning of Spain

- Civil Engineer (Pontificia Universidad Javeriana, Colombia), officially recognized as equivalent to the Official Master's Degree qualifying the holder to practice as a Civil Engineer in Roads, Canals and Ports, with full legal standing throughout Spain.
- Credential (case file): /2025/H06782.
- Online verification: <https://run.gob.es/hsblF8yLcR>.
- CSV (Secure Verification Code): GEN-82b5-fc1f-37f1-ed27-a04a-64c9-0d01-9777.

Master's Degree in Transportation, Territory, and Urbanism 10/2020 – 01/2022, Valencia, Spain
Universitat Politècnica de València (UPV)

- Outstanding Thesis (10/10): *Development of the DGIS tool for evaluating public collective transport accessibility. Practical application to Santiago de Cali (Colombia).*
- Thesis link: <https://www.davidalejandroramirezcajigas.com/desarrollo-de-herramienta-dgis-para-la-evaluacion-la-de-laaccesibilidad-del-transporte-publico-colectivo-aplicacionpractica-a-santiago-de-cali-colombia-trabajo-fin-de-master-tesis-maestria/>

Main areas of study and specialization covered:

- Advanced transportation modeling and demand analysis.
- Territorial planning and sustainable urbanism.
- Traffic management, logistics, and freight transport.
- Port and maritime infrastructure engineering and management:
 - Port planning and management, maritime traffic, and port operations.
 - Design of coastal infrastructures (ports, breakwaters, dikes, beaches) and their maintenance.
- Design and operation of railway systems (including high-speed rail).
- Smart mobility and intelligent transportation systems (ITS).
- Strategic environmental assessment of transportation projects.

Bachelor's Degree in Civil Engineering
Pontificia Universidad Javeriana

01/2013 – 03/2018, Cali, Colombia

- Emphasis on road design, infrastructure, and construction.
- Distinguished Thesis (4.9/5): *Design of the spatial distribution of MIO system routes according to perceived service quality in commune 18.*
- Thesis link: <https://www.davidalejandroramirezcajigas.com/disenio-de-la-distribucion-espacial-de-las-rutas-del-sistema-mio-de-acuerdo-con-la-calidad-del-servicio-percibido-en-la-comuna-18-trabajo-de-grad-tesis-de-grad/>

Professional Development and Specialized Courses

Expert Course in Technologies and Tools for the Digitalization of Transport, Logistics, and their Infrastructures 02/2025 – 06/2025 (4th Edition), Madrid, Spain (Online)
Polytechnic University of Madrid (UPM)

- Key modules: Big Data, Artificial Intelligence, Machine Learning, Cloud Computing, Digital Twins.
- Practical applications: Infrastructure design and management, traffic management, railway, port, and airport operations, advanced planning and logistics.

English as a Second Language, Semester Program (275 hours) July 2022 – December 2022,
 Calgary, Canada (On-site)
University of Calgary, Canada

- Level achieved: Intermediate-Advanced. Focus on academic and professional communication.

MATLAB Onramp (Online)
MathWorks.com

2023

- Practical and advanced introduction to MATLAB for data analysis and scientific programming.

Airport Engineering: Airside Design (Online)
ICAO EdX UPValenciaX

2020

- Fundamentals of airport infrastructure planning and design (airside).

Basic Level in Revit Architecture (On-site)
Universitat Politècnica de València (UPV)

2019, Valencia, Spain

- Introduction to Building Information Modeling (BIM) with Autodesk Revit.

Key Technical Skills

- **Programming:** Python (Pandas, NumPy, Scikit-learn, GeoPandas, Jupyter), MATLAB, SQL.
- **GIS and Transportation Modeling:** ArcGIS Pro (Network Analyst, ModelBuilder), QGIS, OSRM, PTV Visum (fundamentals).
- **Big Data Analysis:** Processing and analysis of mobile phone data (CDR), aggregation and anonymization techniques, visualization of large data volumes.
- **Web Development (Prototyping):** HTML, CSS, JavaScript (Leaflet.js), PHP, WordPress.
- **DevOps and Collaboration Tools:** Docker, Git, GitLab/GitHub.
- **Civil Design Software:** AutoCAD, Revit Architecture, AutoCAD Civil 3D.
- **Optimization and Mathematical Models:** Genetic algorithms, heuristics for vehicle routing problems (VRP/DARP), simulation modeling.
- **Professional Office Suite:** Microsoft Office Suite (Word, Excel, PowerPoint).

Relevant Projects and Software Contributions

EsMaaS Project (TED2021-129623A-100) - *Key Researcher*

University of Castilla-La Mancha (02/2023 – 05/2025)

- **Main contribution:** Designed and implemented an innovative heuristic methodology for optimizing Demand-Responsive Transport (DRT) routes in rural environments using Python and genetic algorithms. [Results in P1]
- Developed a territorial characterization framework for Castilla-La Mancha (hierarchical clustering with 7 key variables), enabling the design of personalized and effective mobility strategies. [Published in P2]
- Exhaustive analysis of accessibility to essential services (education, health) and influencing factors, combining GIS (ArcGIS Pro) and network data (OSRM). [Presented at conferences]
- Comparative evaluation of real mobility (derived from Nommon big data) versus existing public transport supply, quantifying spatiotemporal inequities. [Presented at conference]
- Creation of a functional web platform (PHP/JS/Leaflet) as an interface for requesting DRT services and structured data collection for optimization.
- I belong to the MobUP - Mobility and Urban Planning research group at UCLM <https://www.uclm.es/grupos/MobUP/Miembros>.

DGIS - Spatial Accessibility Analysis Tool for Public Transport

Self-developed as part of Master's thesis (2021 – 2022)

- Software developed in Python for automated accessibility assessment in public transport systems, integrating spatial and network data. Successfully applied to the Santiago de Cali case study.
- Tutorial and documentation available at: <https://www.davidalejandroramirezcajigas.com/dgis-software-tutorial/>

Productivos.org Platform - *Development and Technical Coordination*

Productivos.org Foundation (2016 – 2019)

- Collaboration in the design, development, and maintenance of an online platform for business evaluation and training, improving its functionality and user experience.
- Link: <https://www.productivos.org/>

Publications and Theses

Academic Theses

- **Doctoral Thesis (in progress):** *Provisional title: Mobility as a Service (MaaS) Strategies for Transportation Optimization and Accessibility Improvement in 'Empty Spain': A Big Data and Advanced Modeling Approach.* (Started 2023 - Expected 2026/2027). University of Castilla-La Mancha (UCLM), Ciudad Real, Spain.
 - *Main research lines:* Development of optimization methodologies for Demand-Responsive Transport (DRT) in rural contexts, territorial characterization using clustering and GIS analysis, accessibility assessment with big data (mobile phone data), and design of integrated MaaS solutions. Partial contributions published/presented in [Ref. Pub 1], [Ref. Pub 2], [Conferences C1-C6].
- **Master's Thesis:** *Development of the DGIS tool for evaluating public collective transport accessibility. Practical application to Santiago de Cali (Colombia) and international comparative analysis.* (January, 2022). Universitat Politècnica de València, Spain. Grade: 10/10.
 - *Abstract:* Development and validation of DGIS software, an innovative tool for public transport accessibility analysis. The work integrated urban design and urbanism principles to evaluate and propose improvements in Cali (Colombia), and demonstrated its applicability through a comparative analysis of spatial accessibility in 34 cities worldwide, including the **27 capitals of the European Union**.

Link: <https://www.davidalejandroramirezcajigas.com/desarrollo-de-herramienta-dgis-para-la-evaluacion-la-de-la-accesibilidad-del-transporte-publico-colectivo-aplicacion-practica-a-santiago-de-cali-colombia-trabajo-fin-de-master-tesis-maestria/>
- **Bachelor's Thesis:** *Design of the spatial distribution of MIO system routes according to perceived service quality in commune 18.* (March, 2018). Pontificia Universidad Javeriana, Cali, Colombia. Grade: 4.9/5.

- *Abstract:* Applied research on the optimization of the MIO transport system in Cali (Commune 18), combining user perception analysis and topological accessibility metrics to propose a redistribution of routes and stops aimed at improving service quality.

Link: <https://www.davidadejandroramirezcajigas.com/disenio-de-la-distribucion-espacial-de-las-rutas-del-sistema-mio-de-acuerdo-con-la-calidad-del-servicio-percibido-en-la-comuna-18-trabajo-de-grado-tesis-de-grado/>

Books (Co-authored)

- **Business Reorganization.** (September, 2024). Colombia. ISBN: 978-958-505-699-2. Link: <https://portal.delibros.unal.edu.co/gpd-reorganizaci-n-empresarial-9789585056992-675c377cce4cb.html>
- **Business Diagnosis and Action Plan.** (February, 2023). Colombia. ISBN: 978-958-503-609-3 / 978-958-503-610-9. Link: [https://www.ecoediciones.com/producto/diagnostico-y-plan-de-accion-empresarial-1ra-edicion-ebook/...](https://www.ecoediciones.com/producto/diagnostico-y-plan-de-accion-empresarial-1ra-edicion-ebook/)
- **Sustainable Companies Generate Wealth.** (November, 2022). Colombia. ISBN: 978-958-505-059-4 / 978-958-505-060-0. Link: <https://portal.delibros.unal.edu.co/gpd-empresas-sostenibles-generan-riqueza-9789585050594.html>
- **Dynamic Business Models.** (2021). Colombia. ISBN: 9789587719307. Link: [https://www.ecoedicione.com/producto/modelos-de-negocio-dinamicos-1ra-edicion-impreso/...](https://www.ecoedicione.com/producto/modelos-de-negocio-dinamicos-1ra-edicion-impreso/)

Journal Articles (Transportation and Territory)

- 2025 **Ramírez-Cajigas, D.A., Moyano, A.** Characterization of territorial structures in rural areas and their influence on transport services. The case of Castilla-La Mancha, Spain. *EURE – Latin American Journal of Urban and Regional Studies*, 51(153), 1–21. DOI: 10.7764/EURE.51.153.02 [P1]
- 2025 **Ramírez-Cajigas, D.A., Moyano, A., Sánchez-Cambronero, S.** Methodological proposal for route assignment in demand-responsive transport in rural areas: case study applied to Castilla-La Mancha, Spain. In preparation. [P2]

Journal Articles (Business Management and Sustainability)

- 2020 *Entrepreneurial Keys: A Simulator for Creating Sustainable Businesses.* Revista Espacios, 41(19). <https://www.revistaespacios.com/a20v41n19/a20v41n19p15.pdf> [–]
- 2020 *Production Capacity and Sustainability in New Companies.* Revista Espacios, 40(43). <https://red.uao.edu.co/bitstream/handle/10614/13425/Capacidad%20de%20producci%C3%B3n%20y%20sostenibilidad%20en%20empresas%20nuevas.pdf?sequence=3&isAllowed=y> [–]
- 2022 *The Advanced Break-Even Point (PEA): A Tool to Ensure Business Sustainability.* Revista Criterio Libre, 20(37). <https://revistas.unilibre.edu.co/index.php/criteriolibre/article/view/9571> [–]

Conference Papers and Presentations (Transportation and Territory)

- August 2024 **Presenter.** Accessibility and mobility evaluation in rural areas: a big data approach for analysing transport spatial inequalities in Castilla-La Mancha, Spain. 35th International Geographical Congress (IGC), Dublin, Ireland. [C2]
- April 2024 **Presenter.** Accessibility and mobility analysis for identifying spatiotemporal inequities in transport services in rural areas of Castilla-La Mancha. 5th FIT Scientific Campus, Cercedilla, Madrid, Spain. [C1]
- December 2023 **Co-author.** Evaluating spatial inequalities in the access to education and health facilities in rural areas: The case of “Empty Spain” (presented by A. Moyano). 27th International Conference HKSTS, Hong Kong. [C3]
- November 2023 **Presenter (poster).** Identification of territorial structures in rural areas of Castilla-La Mancha and effects on mobility patterns to basic services. 11th UCLM Doctoral Conference, Ciudad Real, Spain. [C4]
- September 2023 **Presenter.** Transport operators servicing rural areas: Factors influencing accessibility values for education and health mobility in Castilla-La Mancha, Spain. EUGEO 2023, Barcelona, Spain. [C5]
- June 2023 **Presenter.** Characterization of territorial structures in rural areas and their influence on transport and mobility services. 15th CIT Congress, La Laguna, Spain. [C6]

- 2021**Presenter.** DGIS: Software for analysis and design of urban and interurban transport based on accessibility. 10th CIOT Congress, Valencia, Spain. [C7]

Languages

- **Spanish:** Native.
- **English:** Intermediate (275 hours of training at the University of Calgary).