

# **Impact of Electric Vehicle Inclusion on the Driver Shift Scheduling Problem**

**Luis F. Mujica**

Student

Technological University of Pereira

Pereira, Colombia

**Juan P. Chavez, César A. Marin and Laura M Escobar**

Project coordinator, Research manager, Research coordinator

*I+D+I* - Integra S.A

Pereira, Colombia

[pchavez@integra.com.co](mailto:pchavez@integra.com.co), [cmarin@integra.com.co](mailto:cmarin@integra.com.co), [lmescobar@integra.com.co](mailto:lmescobar@integra.com.co)

## **Abstract**

Climate change has generated a growing interest in green technologies and their integration across various economic sectors. This has significantly impacted the automotive industry, particularly the rapid bus transit (BRT) system, which currently relies on internal combustion engine vehicles, resulting in high greenhouse gas emissions that affect the city's air quality. In response, companies have focused on incorporating electric vehicles into their fleets and assessing their impact on route distribution. Due to the expenses associated with purchasing new vehicles and the necessary adaptations to parking facilities for potential charging, a gradual transition to a mixed fleet of electric and traditional vehicles is being pursued. To address this challenge, the Mixed Fleet Vehicle Scheduling Problem (MFCSP) aims to optimize driver assignments and routes, considering operational efficiency and electric vehicle autonomy limitations. In this specific study, a modified mathematical model is proposed for the Megabus mass transit system in Pereira, Colombia, considering Integra S.A.'s future modernization plans.

## **Keywords**

Electric vehicles, Mathematical optimization, Mixed bus fleet, MFCSP, BRT.

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## **Biographies**

**Luis Fernando Mujica Reyes** Computer Electronics Engineer pursuing a master's degree in electrical engineering, specializing in leveraging computational methods and programming languages to solve complex theoretical and industrial applications. Experienced in developing efficient software solutions across diverse areas, including home automation, robotics, and biomedical systems. Skilled in website development and proficient in database management. Passionate about tackling complex engineering problems with innovative technological solutions involving mathematical optimization and artificial intelligence.

**Juan Pablo Chavez Candamil** Master's Degree in Operations Research and Statistics from the Technological University of Pereira, Technologist and Industrial Administrator from the Technological University of Pereira. With over 9 years of experience in the production sector, constructing and leading processes aimed at optimizing resources,

methods, and times, achieving positive results within organizations. Additionally, has administrative experience and has led purchasing processes within companies and in projects executed with the Technological University of Pereira, the Administrative Department for Social Prosperity (DPS), and MINTIC. Worked on projects with Minciencias, developing research focused on collision-free trajectory systems, packaging, and computer vision.

**César Augusto Marín Moreno** PhD from the Technological University of Pereira, MBA from the University of Phoenix Arizona, specialist in finance from the Catholic University of Pereira and Specialist in Senior Management from the Free University. Project Management Professional (PMP ®) Associate, Master and Manager of the Global Innovation Management Institute USA, associate researcher of Colciencias and director of the TransFórmate research group, certified consultant of the Universidad del Rosario, direct projects of different universities, manager of the Technological Development Innovation Program of SENA for the Coffee Region, Peer Evaluator of Projects of Colciencias, SENA and different universities nationwide. Manager of Research Development and Innovation of Integra S.A. Nationally recognized by Colciencias as a highly innovative company, with more than 40 managed co-financing projects, six software programs registered with the Ministry of the Interior and with experience in approved projects to access Tax Benefits. ORCID: <https://orcid.org/0000-0002-7354-7838>

**Laura Monica Escobar Vargas** Electrical engineer, with a master's in electrical engineering from the Technological University of Pereira - Colombia and a Ph.D. in Electrical Engineering from Universidade estadual paulista "julio de Mezquita Filho" - Brasil. Currently is a professor and researcher in the Technological University of Pereira in the Electrical Engineering program, and the Master and Ph.D. in electrical engineering program, and part of the investigation group I+D+I in Integra S.A operator of the Bus Rapid Transit System of Pereira, Colombia. Has experience implementing optimization techniques, mathematical modeling for the electrical transmission system planning, and hydrothermal generation, and 3 years of research focused on the development and improvements of mathematical optimization techniques, and work schedule planning and routing for the public transport system, applied in his postdoctoral studies with the company Integra S.A and the Universidad de los Andes. ORCID: <https://orcid.org/0000-0003-2904-4130>.