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# Carlos Aleixo Domingues

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November 10<sup>th</sup>, 2022

Dear Scholarship Team Member,

*I hope this finds you safe and healthy.*

*I'm Carlos Aleixo de Lima Domingues, MU# 14390257, an Honor Industrial Engineering student at Mizzou. Please consider me for Jay Holstine Scholarship Program. Since I was little, playing with my Leggos, I found manufacturing fascinating! And I knew I wanted to help build a better world. But it was when I was accepted at Mizzou that a world of uncountable opportunities has opened to me. When I graduate, I will be the first member of my family to study abroad and get an engineering degree. I will be the first honor student my high school has ever had. And, one day I hope to open my own sustainable factory! For that I am CPT as a manufacturing associate at Ikarria design company, a planet friendly industry! I am also working on developing engineering and management skills. I feel very grateful and honored to be at Mizzou. It's like living one of Saint Agostine's quotes: "The words printed here are concepts. You must go through the experiences."*

*As a Mizzou student, I am involved in many student associations and two research projects. In the first one we analyze Minority-Focused News as a Locus of Empowerment (Communications), understanding how people make sense of the news they consume. Our findings can be translated into better user experiences for consuming news on digital news platforms. We hope to contribute to a more inclusive scenario in the news. The second research I am involve in is about the optimization of Saint Louis Metro for People with Disabilities. We are analyzing data and making simulations to make suggestions on developing a new system that is more considerate and inclusive in St. Louis area. It is tangible research that will impact the lives of the community around me! I am attaching the research folder for your appreciation.*

*Meanwhile, besides my engineering skills, I am also a musician. I help play on masses. I am also a volunteer at loaves and fishes helping to cook and distribute food to homeless and food insecure people in Columbia area. Lastly, in august I joined Mizzou's volunteer student welcome leader team to welcome the new engineering students for the fall of 2022. As Gandhi said, we need to be the change we want to see.*

*I'm a motivated problem solver and diligent learner. I also work at campus dining service. And even after working many hours to afford college tuition, I have maintained an excellent academic record. My GPA last semester was 4.0. My short-term goal is to get enough scholars to focus on engineering and dedicate more to non-profitable academic positions. This scholarship will help me tremendously! Sometimes, concentrating is tough! I worry if I will be able to afford so many bills! It's hard because, as an F-1 holder, even though I am in financial need, I don't qualify for governmental help. Last semester, I most profoundly regret was having to decline robotics to work at campus dining service. We were building a cheaper programmed drone to help local farmers detect erosion and flood areas on farmland.*


So, I kindly ask you to consider me for this Scholarship Program. I promise you will have no regrets!

Please allow me to share a link about an academic accomplishment as a first-year student at Mizzou: <https://generaleducation.missouri.edu/hesburgh/2022-winners/>

Please choose me!


Warmly,

Carlos Aleixo de Lima Domingues



## Optimization of Saint Louis Metro for People With Disabilities

Suchi Rajendran and Carlos Aleixo Domingues  
University of Missouri



### Introduction

Public transit agencies across the US are struggling to meet the constantly increasing demand for *paratransit services* that connect disabled/aged passengers with their communities. Current paratransit service operates under several restrictions, such as 24-hour advance booking requirements, limited operating hours, wide pickup time windows, and a lack of real-time communication with the riders. With the recent evolution of intelligent technologies, traditional dial-a-ride paratransit services could be transformed into on-demand services using a smart application interface (referred to as *iTrans*). The proposed *iTrans* application will optimize the usage of existing lift-equipped vehicles from several available transportation providers to offer smart, on-demand ride-sharing transportation connectivity for paratransit and traditional passengers. We will conduct our pilot study in St. Louis.

### Discussion

In the backend of the application, customer information (such as pickup/dropoff location, pickup time, presence of an accompanying attendant and type of assistance required) would be integrated into novel mathematical models and algorithms to optimally allocate and route the different types of available vehicles (e.g., ADA-compliant minivans, lift-equipped buses) from numerous transportation service providers. The developed optimization models would consider several conflicting criteria, such as passenger waiting time and fleet utilization, while making the allocation and routing decisions.

### Methods

We will (i) identify and define specific challenges related to paratransit operations by interviewing transportation service providers and city planners, (ii) understand the paratransit customers' needs through surveying disabled and elderly passengers as well as from existing data sources, (iii) gather the data required for developing the software application based on the inputs received in the previous steps, (iv) preprocess data and conduct preliminary analyses, and (v) assess the potential untapped demand for this service, considering several parameters, such as attitude towards using a ride-sharing service and travel duration.

### What is Metro?

It is the transportation system of Saint Louis. Three types:

1. MetroLink.
2. MetroBus.
3. Metro Call-a-Ride.

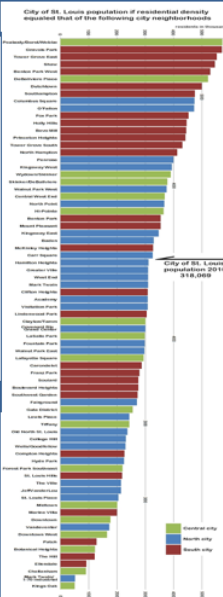
In Metro Call-a-Ride:

- Schedule a special van that transports you.
- It is commonly used by people with disabilities.
- **Problem:** it has to be schedule, and is not available on urgent occasions.

### Solution:


#### Special Bus designed to carry people with disability

- ✓ All people would be able to use it
- ✓ Available at urgent times
- ✓ Expected to reduce CO<sub>2</sub> emissions and climate change
- ✓ Enable the economic growth community by connecting second- and night-shift ADA-eligible employees to their workplace

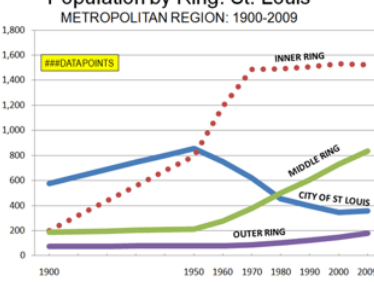


### High Frequency Bus Service in St. Louis

Beginning September 30<sup>th</sup>, 2019



### Population by Ring: St. Louis METROPOLITAN REGION: 1900-2009



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