
ROSHAN NAJAR

PRESENTATION

POWER STRIDE



NOVEMBER 2024

PROTOTYPE

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INTRODUCTION

↗

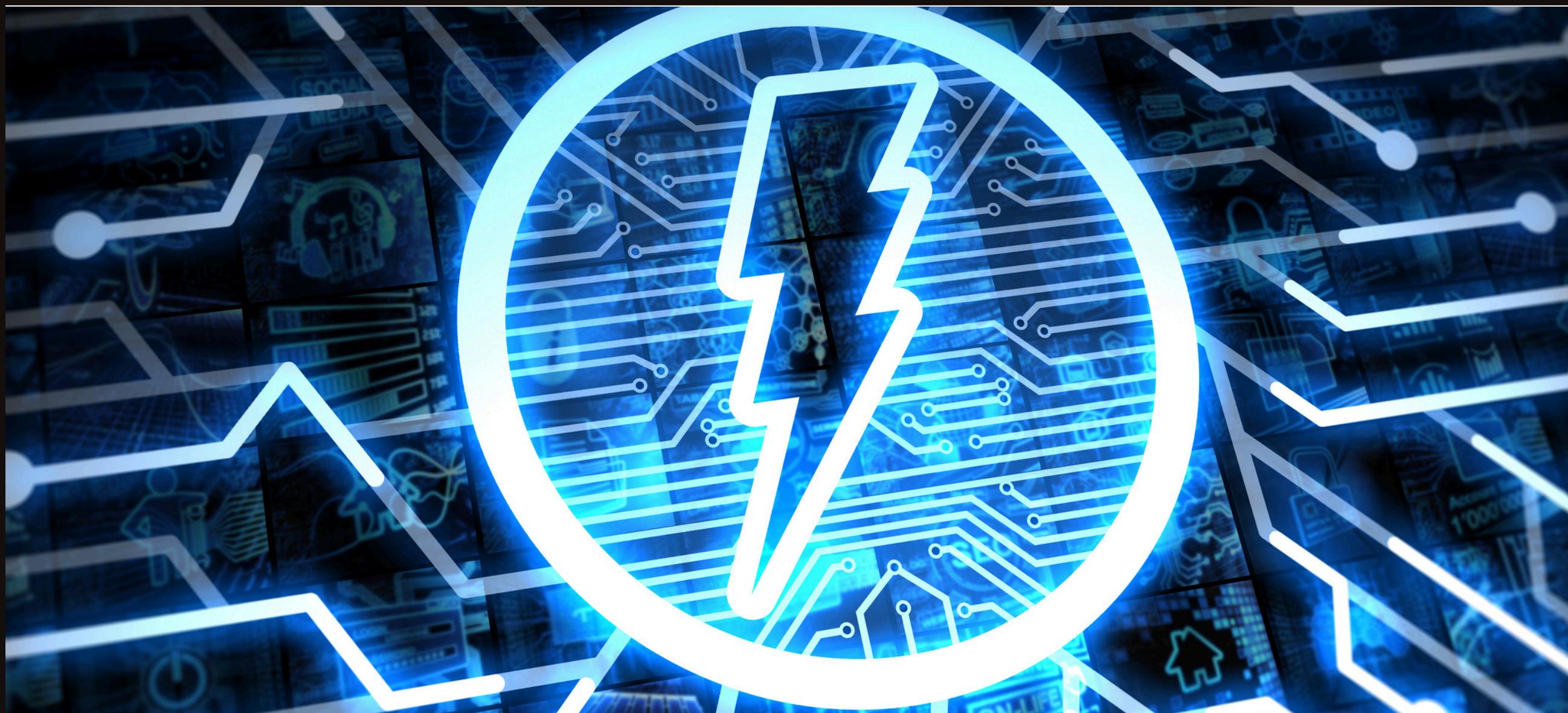
PROBLEM + SOLUTION



Public transportation faces challenges in reducing emissions while encouraging more ridership. Current systems lack engaging incentives for passengers to actively support sustainability.

‘PowerStride’ leverages piezoelectric technology and a reward system, empowering riders to help power buses and earn rewards, fostering greener, more engaged public transit.

ABOUT THE CONCEPT



The concept involves strategically installing piezoelectric tiles on the bus floor to harness energy generated by passengers' footfalls, thereby powering the bus. My calculations indicate that this system can produce more than enough energy to meet the buses' requirements, allowing for a return on the implementation costs within just a few days. Furthermore, this innovation could potentially eliminate the need for traditional refueling, as the energy generated from foot traffic may exceed the buses' energy demands.

To complement this initiative, I propose integrating a new feature into the Leap top-up app. This section will focus on the piezoelectric application, designed to encourage greater public transport usage. I plan to offer incentives, rewarding passengers with travel credits ranging from 10 to 20 euros each time a bus generates 1,000 kWh of electricity. The reward will go to the last individual who taps their Leap card and is closest to the 1,000 kWh mark, thereby motivating more people to utilize public buses.

1

THE CHALLENGE



1

The Campaign

A global call to action, the United Nations Sustainable Development Goals (SDGs) aim to eradicate poverty, safeguard the environment, and guarantee prosperity for all by 2030. In order to fulfill these lofty goals, member countries have committed to meeting 169 particular objectives spanning 17 different sustainable development goals.

Objective

#11: The goal of sustainable cities and communities is to make them human communities that are sustainable, safe, resilient, and inclusive.

Goal #13: Addressing Climate Change

Aims to lessen the effects of climate change by lowering emissions from conventional modes of transportation. Encouraging eco-friendly modes of transportation, such as walking, cycling, and

Taking public transportation lowers carbon emissions, pollution, and creates healthier, more effective urban settings, which directly contribute to both objectives.

2

Keep Things on Track

A nationwide initiative called TFI Smarter Travel assists institutions and employers in motivating employees and students to take more environmentally friendly trips. This entails encouraging walking, bicycling, and public transportation in addition to facilitating flexible work schedules. Campuses are urged to incorporate Smarter Travel into their student projects and coursework. Step Challenges, Cycle Challenges, and other similar activities encourage active commuting and better living.

MY GOALS

↗ Promote Sustainable Transit:

Reduce reliance on traditional fuels by generating renewable energy from passenger footfall, making public transportation greener.

↗ Encourage Public Transport Use:

Increase bus ridership by rewarding passengers with travel credits when energy milestones are reached, fostering a positive association with eco-friendly transit.

↗ Engage and Incentivize Riders:

Create a unique, interactive experience where passengers feel a tangible connection to sustainability efforts, motivating more consistent use of public transit.

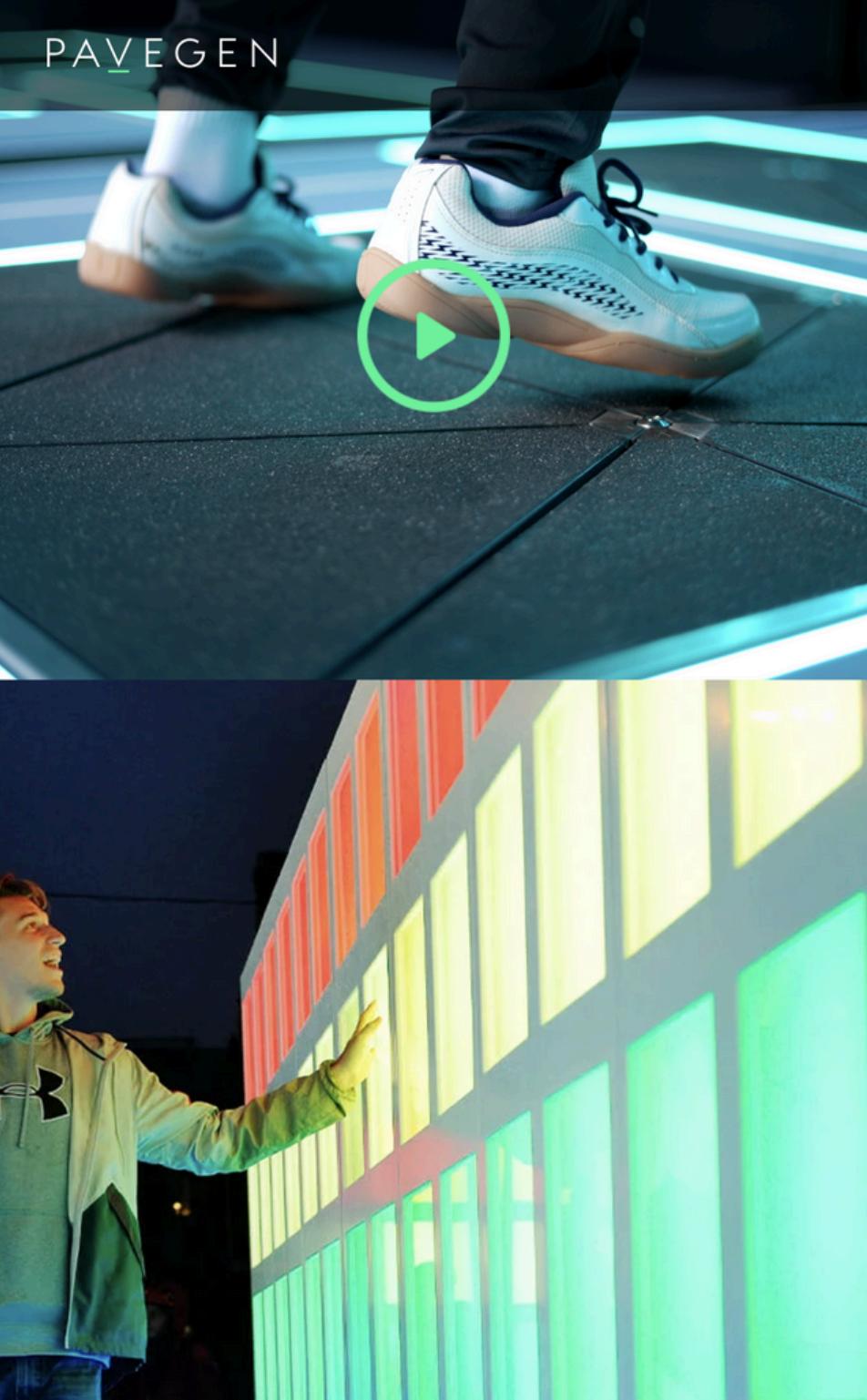
↗ Reduce Carbon Emissions:

Minimize the environmental impact of urban transport by transitioning buses to renewable energy sources, contributing to cleaner cities.

↗ Demonstrate Viable Green Technology:

Showcase how innovative solutions like piezoelectric flooring can generate significant energy, proving the potential for widespread sustainable applications in public infrastructure.





WHAT IS PAVEGEN?

Pavegen is a smart flooring technology that transforms footsteps into electrical energy, data, and rewards.

Our tech uses the kinetic energy generated by footsteps to power engaging activations that educate, inspire, and enable people around sustainability.

[WHAT PAVEGEN POWERS](#)

WHAT CAN PAVEGEN DO FOR YOU?

Pavegen connects brands and partners with their customers and stakeholders, by building trust and loyalty through interactive experiences.

Each step on our smart flooring creates renewable energy for immersive experiences. From LED displays and gamification to rich data insights and smart street applications, we help curate unique brand experiences.

INDUSTRY

CLEAN TECHNOLOGY AND RENEWABLE ENERGY INDUSTRY

KEY FEATURES

- ENERGY GENERATION
- REAL-TIME DATA COLLECTION
- INTERACTIVE ENGAGEMENT
- DURABILITY AND WEATHER RESISTANCE
- CAN GENERATE UP TO 7 WATTS PER FOOTFALL FROM AN AVERAGE 70KG WEIGHING HUMAN

STRENGTHS

- SUSTAINABLE ENERGY SOLUTION
- ENGAGEMENT POTENTIAL
- DATA DRIVEN INSIGHTS
- BRAND AND INNOVATION RECOGNITION

OPPORTUNITIES

- EXPANSION IN SMART CITY PROJECTS
- PARTNERSHIPS WITH BRANDS FOR INTERACTIVE INSTALLATIONS
- INCREASED DEMAND FOR RENEWABLE ENERGY

OTHER

- DIMENSIONS - 0.43 X 0.59M FOR 1 TILE
- COST - 70-150 EUROS PER SQ FT

AFTER AN EXTENSIVE STUDY, I HAVE FOUND OUT 'PAVEGEN'S' PIEZO TILES TO BE THE BEST VIABLE OPTION.

**ANALOGOUS
BENCHMARKING –
PAVEGEN**

[Pavegen website](#)



Make Every Step Count

Making Fitness Fun & Rewarding

Get Started Now



Winners of Aatmanirbhar Bharat
APP INNOVATION CHALLENGE

In Fitness & Health Category



ANALOGOUS BENCHMARKING – STEP SET GO

INDUSTRY

FITNESS TECHNOLOGY AND REWARDS-BASED WELLNESS

KEY FEATURES

- STEP TRACKING AND REWARDS
- LEADERBOARD AND CHALLENGES:
- IN-APP MARKETPLACE
- REFERRAL PROGRAM
- PERSONALISED INSIGHTS

STRENGTHS

- STRONG INCENTIVE MODEL
- HIGH ENGAGEMENT
- BROAD APPEAL ACROSS DEMOGRAPHICS
- BRAND PARTNERSHIPS
- COMMUNITY GROWTH THROUGH REFERRALS

OPPORTUNITIES

- EXPANDING REWARD OPTIONS AND GLOBAL EXPANSION
- PARTNERSHIPS WITH BRANDS
- INCORPORATION OF HEALTH METRICS

STEP SET GO OPERATES WITHIN THE FITNESS TECHNOLOGY AND REWARDS-BASED WELLNESS INDUSTRY, WITH A FOCUS ON DIGITAL HEALTH, GAMIFIED WELLNESS, AND LIFESTYLE IMPROVEMENT. ITS PLATFORM EMPHASIZES PROMOTING PHYSICAL ACTIVITY THROUGH REWARDS, POSITIONING IT AT THE INTERSECTION OF HEALTH TECH AND CONSUMER ENGAGEMENT. COST - 70-150 EUROS PER SQ FT



A BRIEF INSIGHT

From my benchmark study of these two systems / technologies, I came to the conclusion of implementing an innovative idea of powering buses through people`s footfall and creating a system to reward them for it which will inspire them even more to travel by public transport.

Of course, there will be a lucky winner since its not feasible to reward every passenger. This reward system is inspired from Charlie and the Chocolate Factory, you may say.

FEASABILITY RESEARCH



Can this generate enough electric power for the buses to run?

Can it cover back the cost of implementing this technology and give monetary returns?

CALCULATIONS (ENERGY THAT CAN BE GENERATED)

- Passengers using buses in Dublin in a day = 400,000
- Buses that operate in Dublin = 1000 (approx)
- So, in 1 bus / day = 400 passengers (approx)

That is, 400 guaranteed steps each at entry and exit which results to 800 steps.

- Pavegen states that it can generate upto 7 watts / tile every step by an average weighing 70Kg human

800steps into 7 watts = 5600W

Strategically, place approximately 100 tiles on steps, floors and under seats where footfall can be guaranteed

Now, Energy produced is $5600W \times 100 = 560KWh$ in a day

[NOTE 1] CONSIDERING TILES ARE STEPPED UPON ATLEAST ONCE.

[NOTE 2] WE ARE CONSIDERING ONLY THE FIRST STRIDE AND BARRING ACTIVITIES LIKE WALKING AND STANDING THROUGHOUT THE JOURNEY WHICH WILL INCREASE THE OUTPUT EVEN MORE.

[NOTE 3] WE ARE CONSIDERING EVERY PASSENGER ACTUALLY STEPS ON APPROXIMATELY 100 TILES HYPOTHETICALLY FOR EASE IN CALCULATION.

CALCULATIONS (FEASIBILITY)

- Power required to power 1 EV bus = 180 - 235 kWh every 100kms

We generate more than required

- Cost of tile per sq ft = 70 - 150 euros
- Dimensions = 0.43 x 0.59m
- Area = 0.25 sq m = 269 sq ft

Cost for implementing 100 tiles = 18,830 - 40,350 euros

Cost of charging a bus every month = 3900 euros

The money used to implement this technology, can be regained in around 12 months since we have eliminated the refuelling of the buses. It can be powered by footfall of people as established earlier.

THEREFORE, IT IS FEASIBLE AFTER ALL. ONLY UPFRONT CAPITAL COST IS REQUIRED.

[NOTE 4] ALL THE NUMERICAL DATA STATED HAVE BEEN RESEARCHED AND REFERENCES HAVE BEEN PROVIDED IN THE END. I HAVE WORKED ON THE CALCULATION PART. THE RESULTS ARE DEFINETELY NOT 100% ACCURATE SINCE THERE ARE A LOT OF OTHER FACTORS THAT NEED TO BE CONSIDERED FOR IT TO BE CONCLUDED AS FEASIBLE.

MY MOTIVE IS TO PROVIDE A GENERAL IDEA OF HOW PIEZOELECTRIC TILES CAN BE USED AS A SUSTAINABLE SOLUTION.

STAKEHOLDERS



National Transport Authority (NTA)

The NTA sets policies, allocates funding, and monitors performance. They control service contracts and influence strategic decisions, making them the most critical stakeholder

Dublin Bus

As the main service provider, its operations directly impact passenger satisfaction and system efficiency

Irish Government

The government's role is essential for long-term projects, funding, and alignment with environmental goals



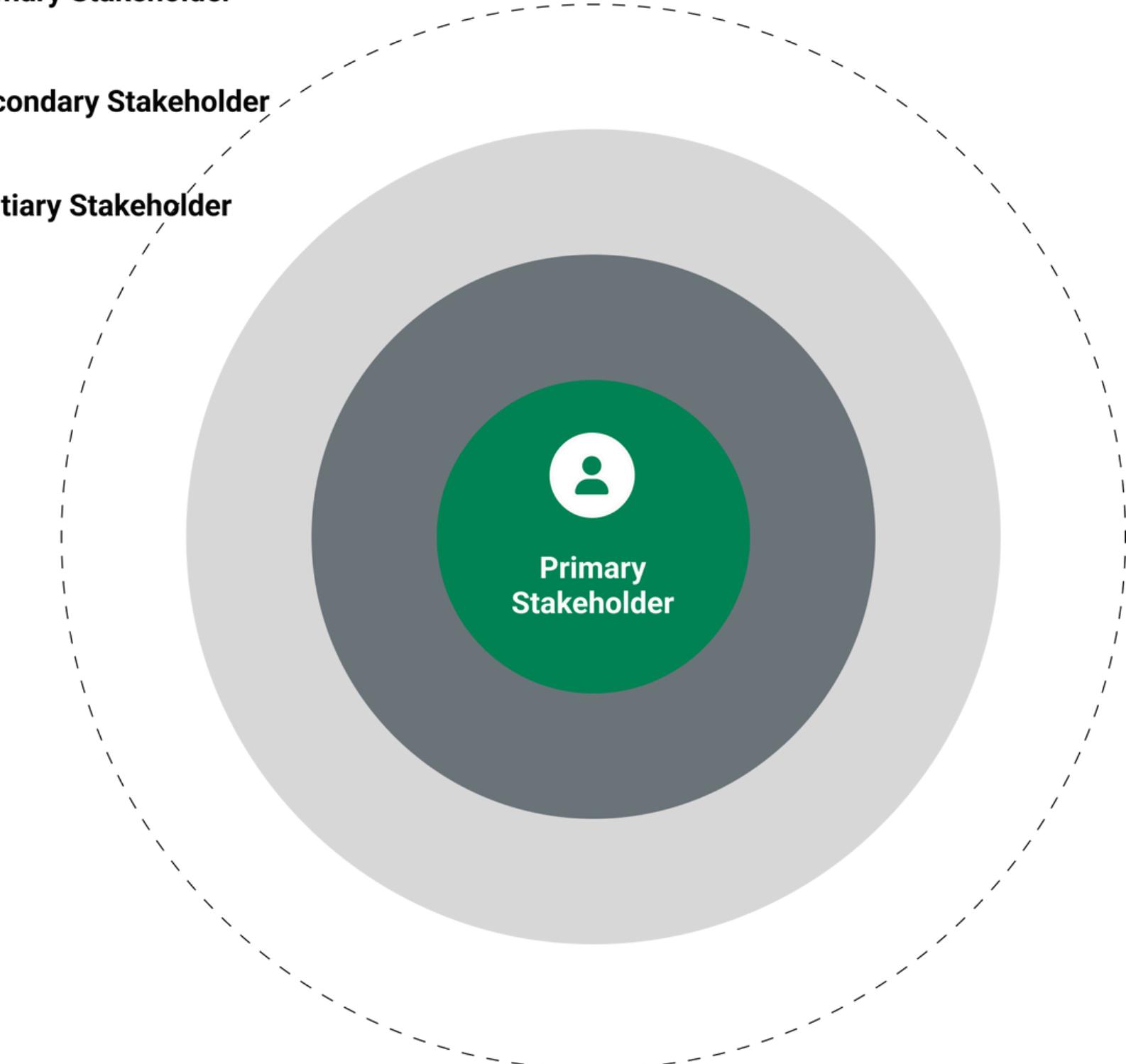
Primary Stakeholder



Secondary Stakeholder



Tertiary Stakeholder



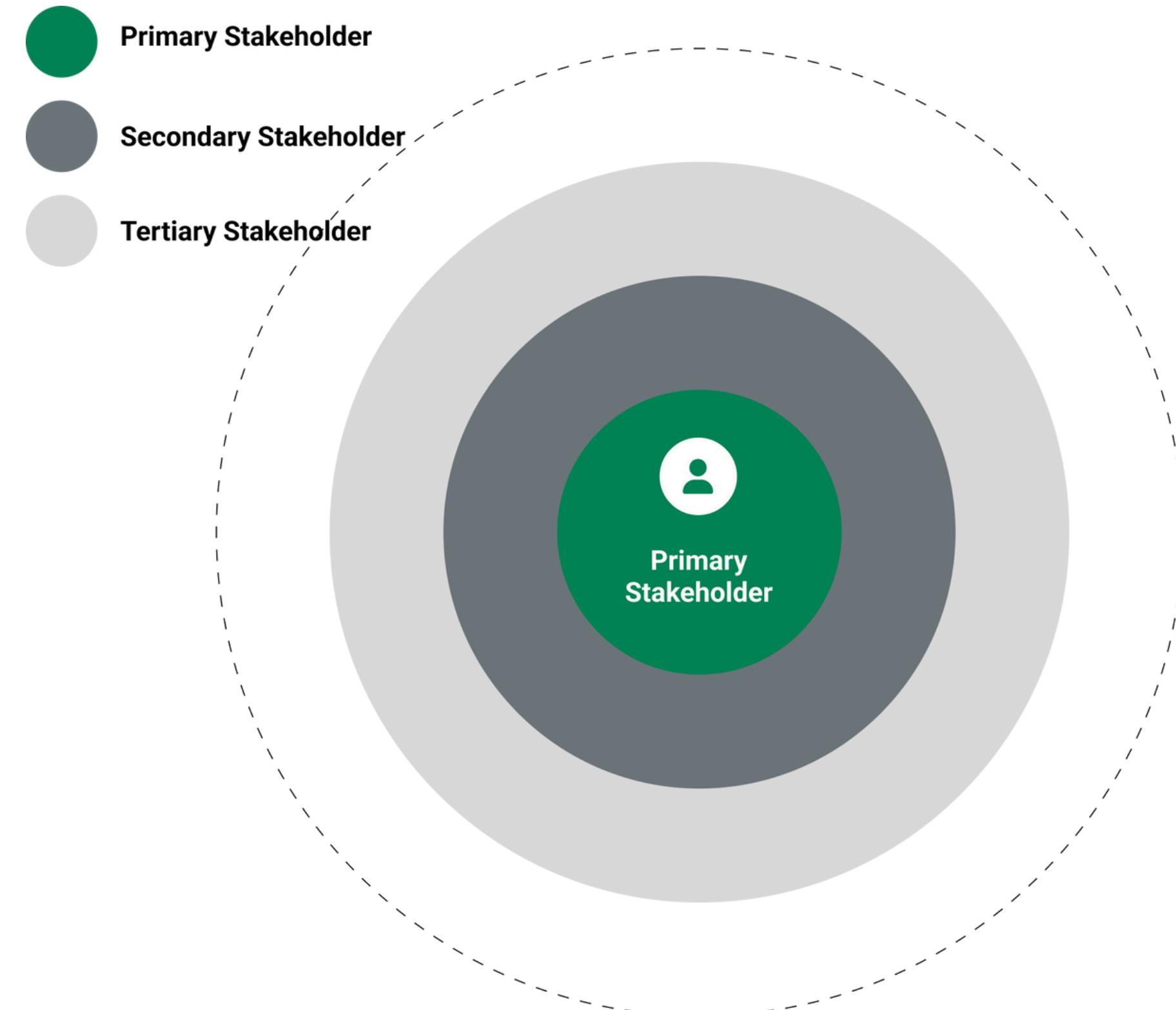
STAKEHOLDERS

Passengers

Passengers are a key focus, as their usage, feedback, and satisfaction guide service improvements. Increased ridership and demand drive the need for expanded services and more frequent routes

City of Dublin and Local Government

Influential in urban planning and infrastructure, the local government works with Dublin Bus on issues like traffic management and transport corridors. Their cooperation is crucial for optimizing routes and minimizing delays



STAKEHOLDERS

Transport Workers

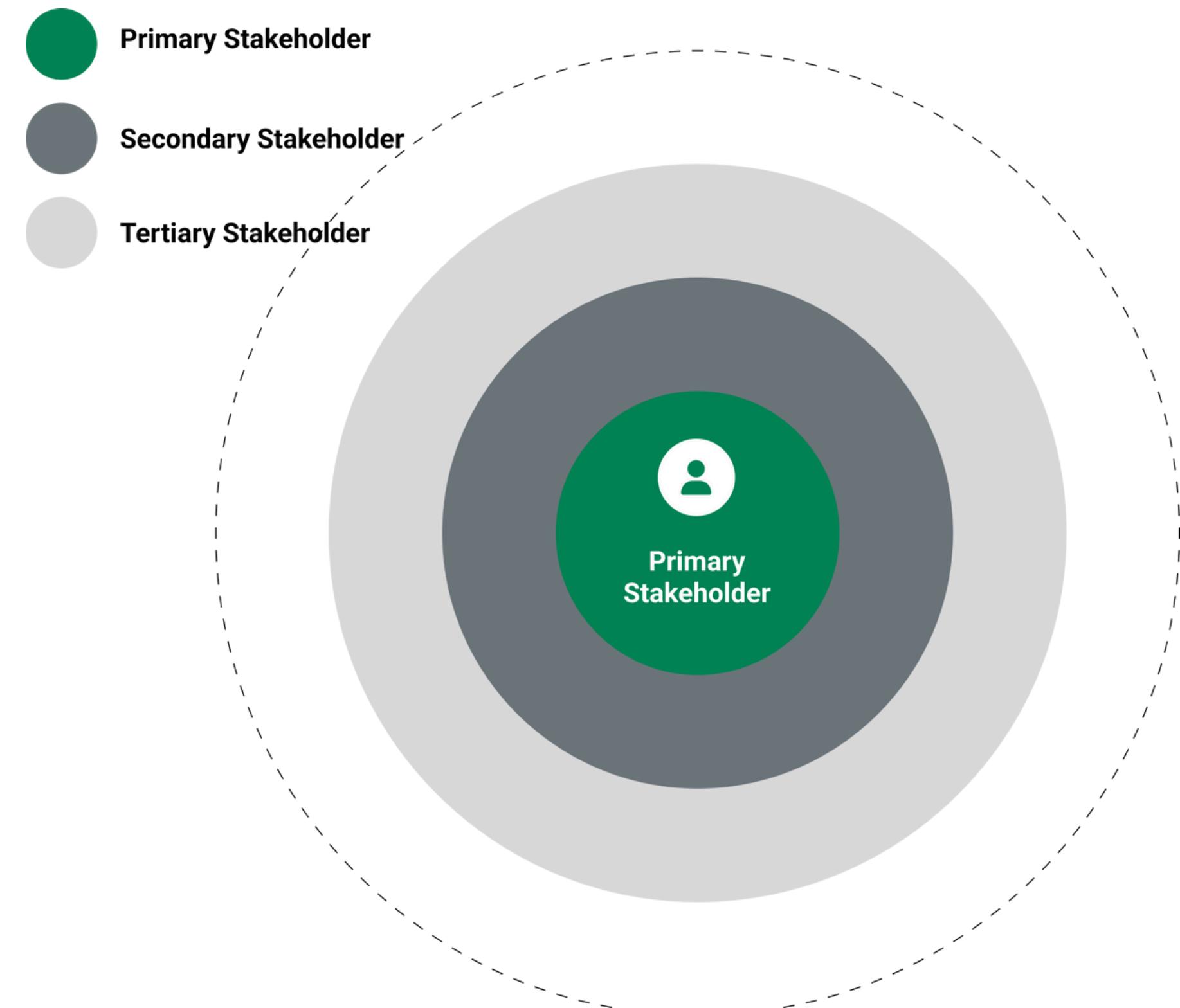
Bus drivers, mechanics, and other staff are essential for daily operations, maintenance, and customer service.

Businesses and Educational Institutions

These stakeholders rely on Dublin Bus for employee and student transportation. Their advocacy for reliable services influences demand patterns and potential corporate partnerships.

Environmental Groups

While not directly involved in day-to-day operations, environmental groups push for eco-friendly practices and help shape public perception of Dublin Bus's environmental initiatives, especially in line with the government's sustainability goals.



JOURNEY MAPPING / PERSONA - ALEX

- **Name:** Alex
- **Age:** 21
- **Commute:** Daily bus commute to Technological University Dublin
- **Travel Time:** 45 minutes each way
- **Goals:** On-time arrival, reliable Wi-Fi, quick transfers

Alex relies on Dublin Bus to commute from home to campus. The journey involves preparing in advance, navigating the bus system, and settling in after reaching campus.



Stage 1: Before the Journey

- Prepares by checking the Dublin Bus app for real-time updates on bus schedules and expected travel time.
- Plans departure time based on app notifications and anticipated travel duration.
- Waits at the bus stop, monitoring bus location and arrival updates.

Stage 2: During the Journey

- Boards the bus, taps the Leap Card, and finds a seat (if available).
- Engages in studying or reading, relying on bus Wi-Fi to complete assignments.
- Transfers at a midway stop if necessary, checking bus schedules for the next leg.

Stage 3: After the Journey

- Arrives at campus and taps off, checking that the bus trip was recorded correctly.
- Reflects on the commute, assessing time efficiency and comfort.
- Prepares mentally for the return journey, making note of any pain points experienced.

JOURNEY MAPPING / PERSONA - ALEX



Pain Points

- Lack of Awareness and Adoption of the Reward System
- Lack Motivation to Participate in Sustainable Travel Initiatives
- Lack of Awareness of the Usability of the Leap Top-Up App for Tracking Energy Progress

Opportunities for Improvement

- Incorporate Gamification Features
- Community Impact Visualization (to create a sense of competition)
- Social Sharing and Leaderboards
- Notifications for Milestone Events
- Integrate with Broader Public Transit Rewards

Threats

- Potential issues with Leap Card tap-off accuracy, affecting fare calculations.
- Lack of a feedback mechanism to report issues immediately.
- Spotty Wi-Fi connection disrupts activities.



SOMETHING

DYNAMIC AND ELECTRIC



COLOR SCHEME



#ffffff



#e1e5e6



#6d767c



#bdde69



#aaca5a



#008555



#007aff



#093c2a

Secondary

Primary

Neutral

LIGHTNING LOGO - TO REPRESENT
POWER/DYNAMICS/ELECTRICITY



Rest State



Pressed State

Continue

Rest State

Continue

Pressed State

A 3D interactive Splash screen was created keeping in mind the abundance of energy which can be generated from piezoelectricity. Hence, a dynamic loading screen.

Hues of greens have been chosen in compliance with the Leap-Top Up App. Additionally, I chose it to represent Nature and Sustainability which is the essence of the Eco-App

Splash Screen GIF

SOMETHING

IMPACTFUL AND DIRECT

Inter / 10 Medium

Inter / 12 Medium

Inter / 12 Semi Bold

Inter / 14 Medium

Inter / 16 Medium

Inter / 16 Semi Bold

Inter / 32 Semi Bold

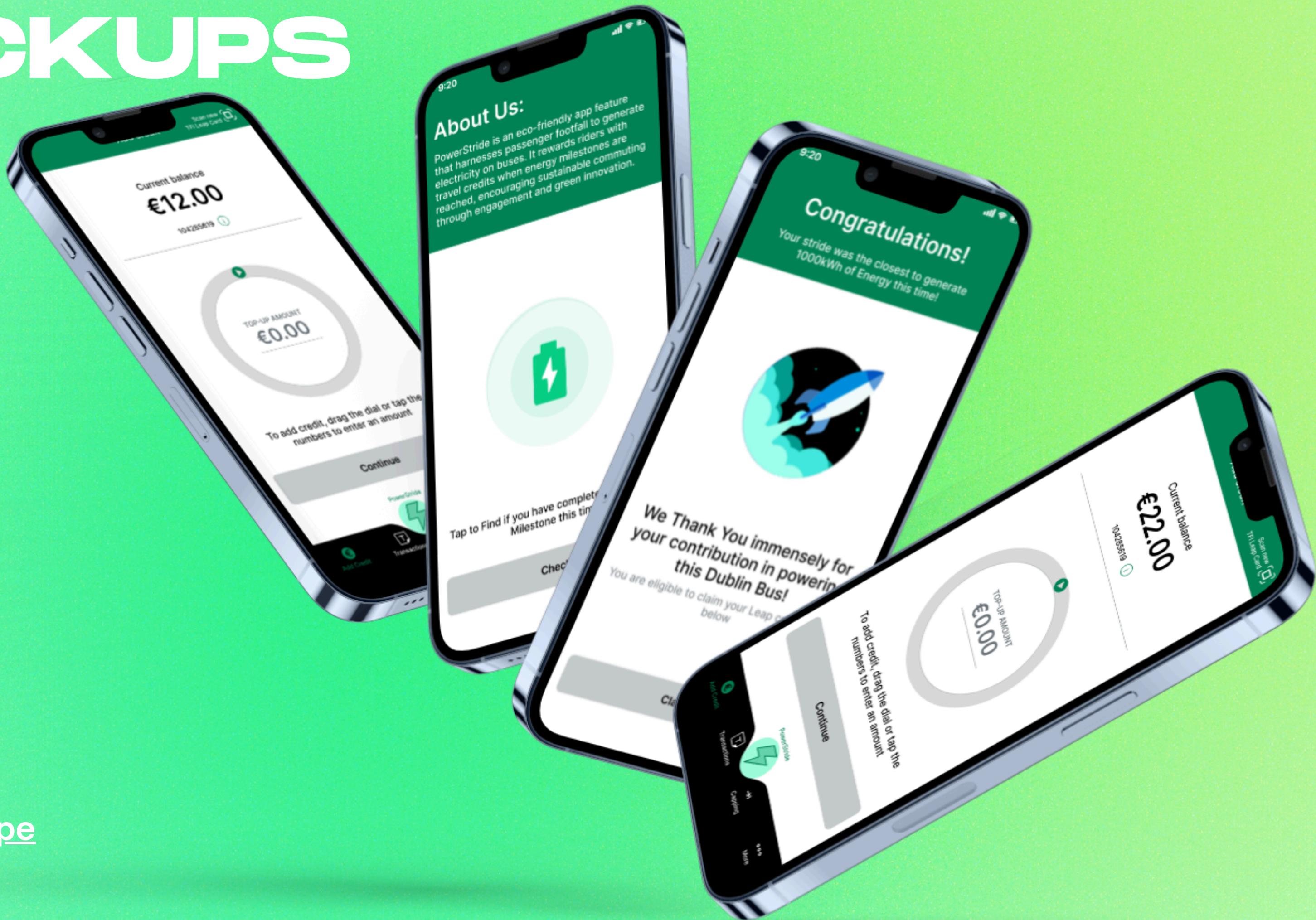
Inter / 40 Semi Bold

Inter was my standard font for all texts since its popular and versatile. Its optimizable for readability and has a simple yet modern aesthetic

IMPACT / 40

I used Impact for the Splash Screen as an opening statement of something bold and innovative. It is easily visible and attention grabbing which I felt was the perfect option. I used it in the Background text for the app name ‘Powerstride’ as well to make a statement.

MOCKUPS



[View Prototype](#)

MOCKUPS



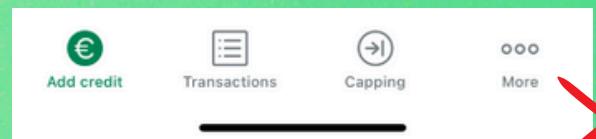
Addition of a new feature/icon for 'PowerStride' in the Home Screen.

When a passenger enters the bus, steps on the tiles and taps their card into the system, they can open PowerStride to see if their 'stride' amounted closest to 1000kWh.

The reward is like a lottery system but contributes well towards sustainability.

DESIGN DECISIONS

I decided to scratch the previous Navigation Menu and designed a new dynamic layout with PowerStride as the central feature.



The color layout has been revamped as well to add additional contrast between the Top Nav/Header ie Green and Black in the bottom.

I have retained the Green color of the Leap UI and used it to design the icons and splash screens from here.

Most of the UI of the existing app has been retained to prevent causing a sense of alienation.

Home Screen - After scanning Leap Card

Description/Accent Screen

Scenario: The passenger clicks on Powerstride and are introduced to the welcoming screen which has a brief description of the initiative every time they click on it.

DESIGN DECISIONS

The description has been kept in the Green color of Leap UI and not in White since it is a sustainable concept that merges with Leap top up.

There is an animation incorporated to make the UI more interactive and user friendly.

Texts have been kept as minimal as possible to convey the idea quickly and decrease user frustration

SCOPE

Adding the 'i' symbol next to 'About Us' for more information which opens a new browser , informing the user more about this initiative if they want to learn more about it

MOCKUPS



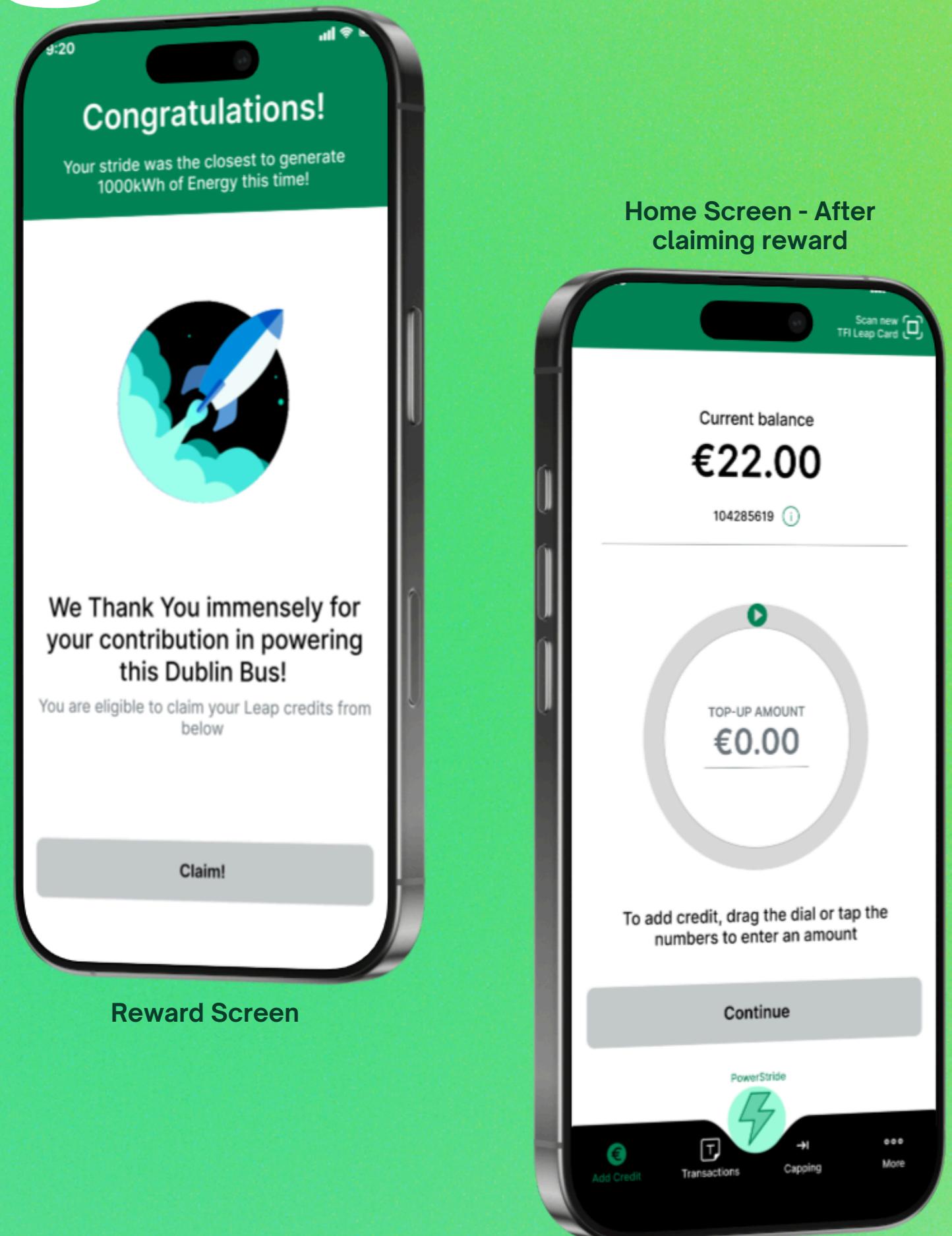
Scenario: The passenger clicks on 'Check' in Powerstride and finds their Leap Card tapped was the closest to 1000kWh mark

The user finds they have won the Golden Ticket (sort off) and are welcomed with a happy screen.

The UI is again kept very user friendly and interactive

SCOPE

Additionally, another screen needs to be designed. What if the user didn't win?

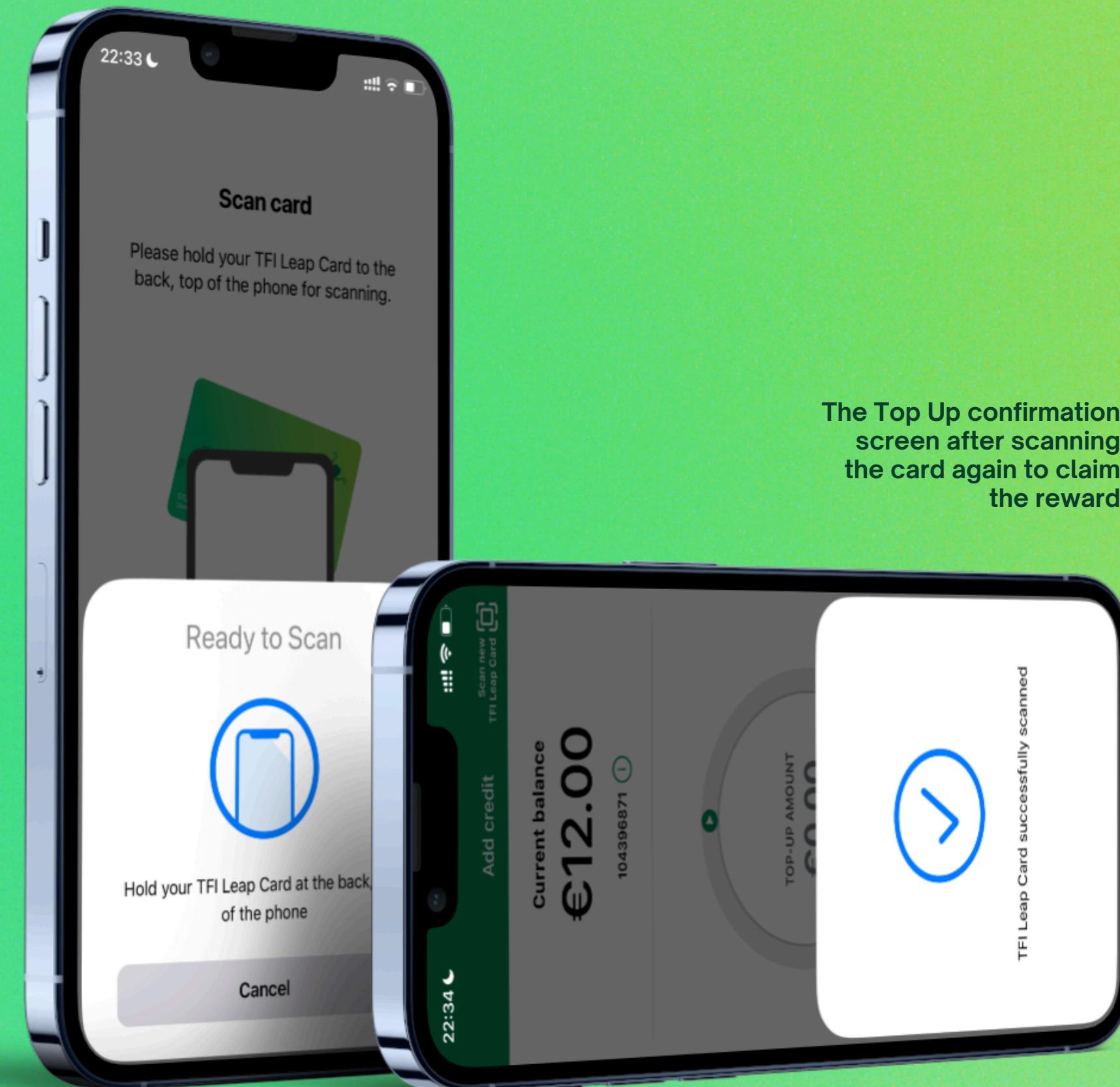


Scenario: The passenger clicks on 'Claim'

There is a loading screen wherein the app asks the user to scan their Leap Card again to install the Top Up awarded to them.

After scanning, their previous balance gets updated and they can use it further for accessing public transport.

MOCKUPS

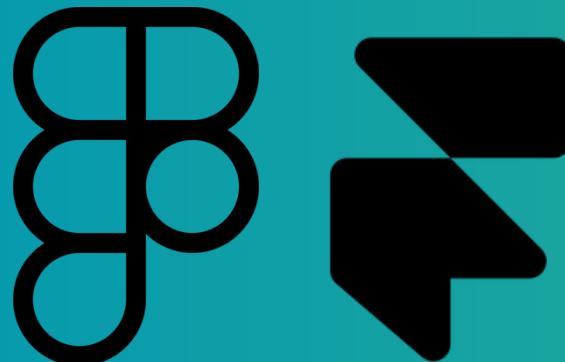


The Top Up confirmation
screen after scanning
the card again to claim
the reward



TOOL STACK

Figma + Framer



Unicorn Studio



Canva



Plugins

- Iconify
- Figma to HTML to Framer
- Lottiefiles
- 3D Transformer
- Mockup Generators
- Quillbot

REFERENCES



PowerStride is an eco-friendly app feature that harnesses passenger footfall to generate electricity on buses.

It rewards riders with travel credits when energy milestones are reached, encouraging sustainable commuting through engagement and green innovation.

Some nice things to inspire creatives.

<https://www.nationalobserver.com/2016/06/13/news/see-futuristic-flooring-lights-city-through-kinetic-energy-harvesting>

<https://edition.cnn.com/2011/10/13/tech/innovation/pavegen-kinetic-pavements/index.html>

<https://en.wikipedia.org/wiki/Pavegen>

<https://en.wikipedia.org/wiki/Pavegen>

<https://www.dublinbus.ie/about-us#:~:text=Our%203%2C000%20drivers%20operate%20our, and%20fully%20Wi%2DFi%20enabled.>

<https://oi.ie/en/why-are-dublin-buses-double-deckers/>

<https://www.transportforireland.ie/news/record-highs-for-public-transport-passenger-numbers-in-2023/#:~:text=Dublin%20Bus%20carried%20over%20145,its%20services%20the%20previous%20year.>

<http://www.dublinbus.cc/vts.htm>

<https://www.sciencedirect.com/science/article/pii/S2772424722000191>

<https://www.sustainable-bus.com/news/electric-bus-range-electricity-consumption/#:~:text=Power%20consumption%20on%20buses%20with,between%20179%20and%20235%20kWh.>

TranSafety data (1997)

Evans, J. (2015). Energy Harvesting Through the Piezoelectric Effect At Sports Venues, (July).<http://www.inspiration.news/>

Football: When the energy of players light up pitches Published on November 4, 2016 in Renewable Energy by Fadya NAZIRKHAN, Manni, M., Coccia, V., Nicolini, A., Marseglia, G., & Petrozzi, A. (2018). Towards zero energy stadiums: The case study of the dacia arena in udine, Italy. Energies, 11(9).

[https://doi.org/10.3390/en11092396.](https://doi.org/10.3390/en11092396)

Piezoelectric energy harvesting solutions: A review Covaci C Gontean A , Sensors (Switzerland)

Hwang S, Jung H, Kim J et al.Designing and manufacturing a piezoelectric tile for harvesting energy from footsteps, Current Applied Physics (2015) 15(6) 669-674

Chew, B. C., Loo, H. S., Bohari, I. A., Hamid, S. R., Sukri, F. H., & Kusumarwadani, R. (2017). Feasibility of piezoelectric tiles adoption: A case study at Kuala Lumpur International Airport (KLIA) Malaysia. AIP Conference Proceedings, 1818(March 2017).

The Walking Site, 2015

National Renewable Energy Laboratory. Foothill Transit Battery Electric Bus Demonstration Results. (<http://www.nrel.gov/docs/fy16osti/65274.pdf>)

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PRESENTATION

THANK YOU.



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PROTOTYPE