STREET NATURE SCORE

A project overview.

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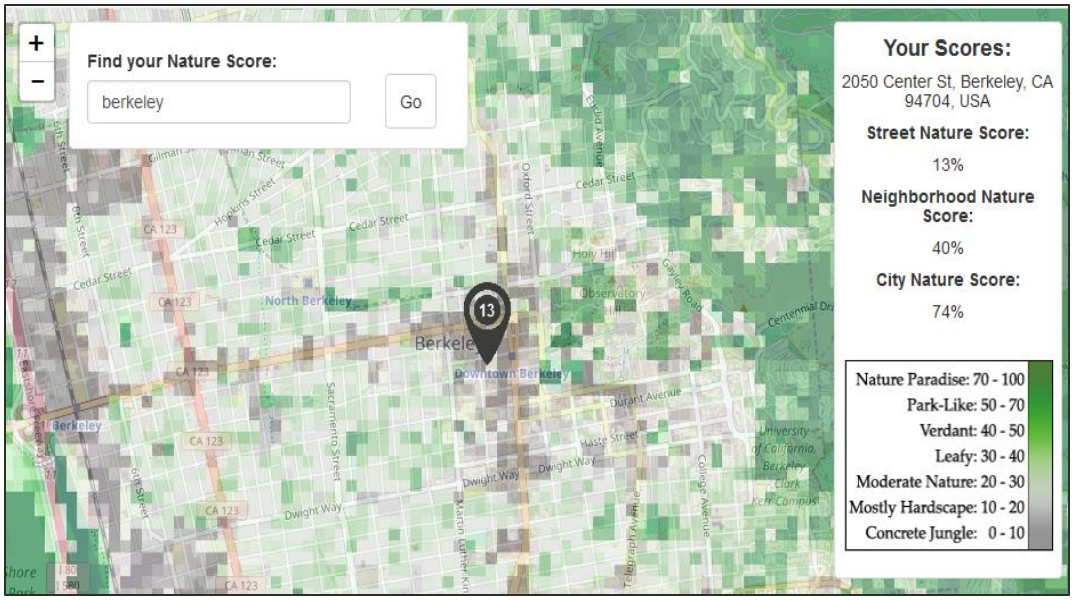
THE PROJECT STREET NATURE SCORE

Street Nature Score aims to promote the benefits of nature by launching a startup that raises awareness for urban nature.

Our team is developing a **web-service targeted at home seekers and real estate companies** which quantifies the amount of nature based on satellite data.

Users are able to **enter any address in the United States** and the website returns a set **of nature scores**. Essentially, the nature score is a measure of the area covered by vegetation in comparison to impervious surfaces such as buildings, concrete pavements and asphalt.



Why is Street Nature Score important?

+ *Benefits of nature*
+ *Our target group*
+ *Market Research*
+ *Competitive Analysis*

01

BENEFITS OF NATURE

Nature has various health and financial benefits – and it mitigates the harmful effects of urbanization.

Urbanization has reached a point where concrete directly replaces nature—the term "**concrete jungle**" can be aptly applied—which has highly devastating effects on our ecosystem and living conditions. Various studies have proved that urbanization is a catalyst for climate change, energy demand, pollution, and a serious threat to biodiversity.

However, **urban nature such as parks and street trees are known to mitigate these harmful drawbacks** on our living conditions. Nature also provides financial benefits which are not immediately apparent. For example, a tree or a park nearby increase property prices.

Two medium-sized trees can provide the oxygen for a single person per year.

Tree People

A tree on a property increases monthly rent by $5.62. A tree on the street adjacent increases the rent by $21.00.

Journal of Urban Forestry & Urban Greening

An acre of mature trees can absorb the amount of CO_2 produced by a car over 26,000 miles.

USDA Forest Service

Also, nature reduces stress, improves the mood, lowers blood pressure and boosts the immune system.

Department of Environmental Conservation

POSSIBLE TARGET GROUPS

Street Nature Score provides value for different groups of people.
However, we decided to focus on home seekers and real estate companies.

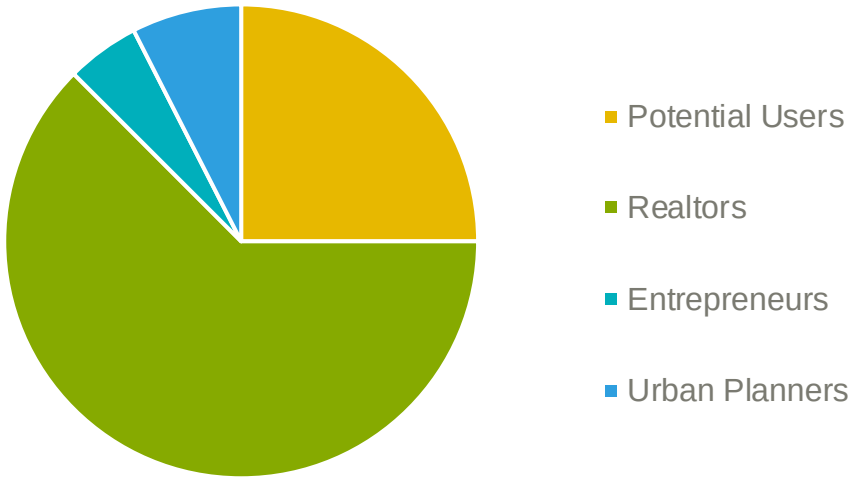
MARKET RESEARCH

We went out of the building to carry out a user research and learn more about our users.

The foundation of our customer and user needs research was interviewing **homeowners, real estate agents, and individuals who are particularly interested in nature**. All the insights gathered during our interviews were individually and collectively analyzed using different methodologies: card sorting, 2x2 user needs matrix, etc. Our user profile was refined by defining a **clear persona** and **use case instance**.

Finally we settled on **four distinct user needs**: depth of information, personalization, recommendations and a visible impact on property value.

+25 interviews conducted

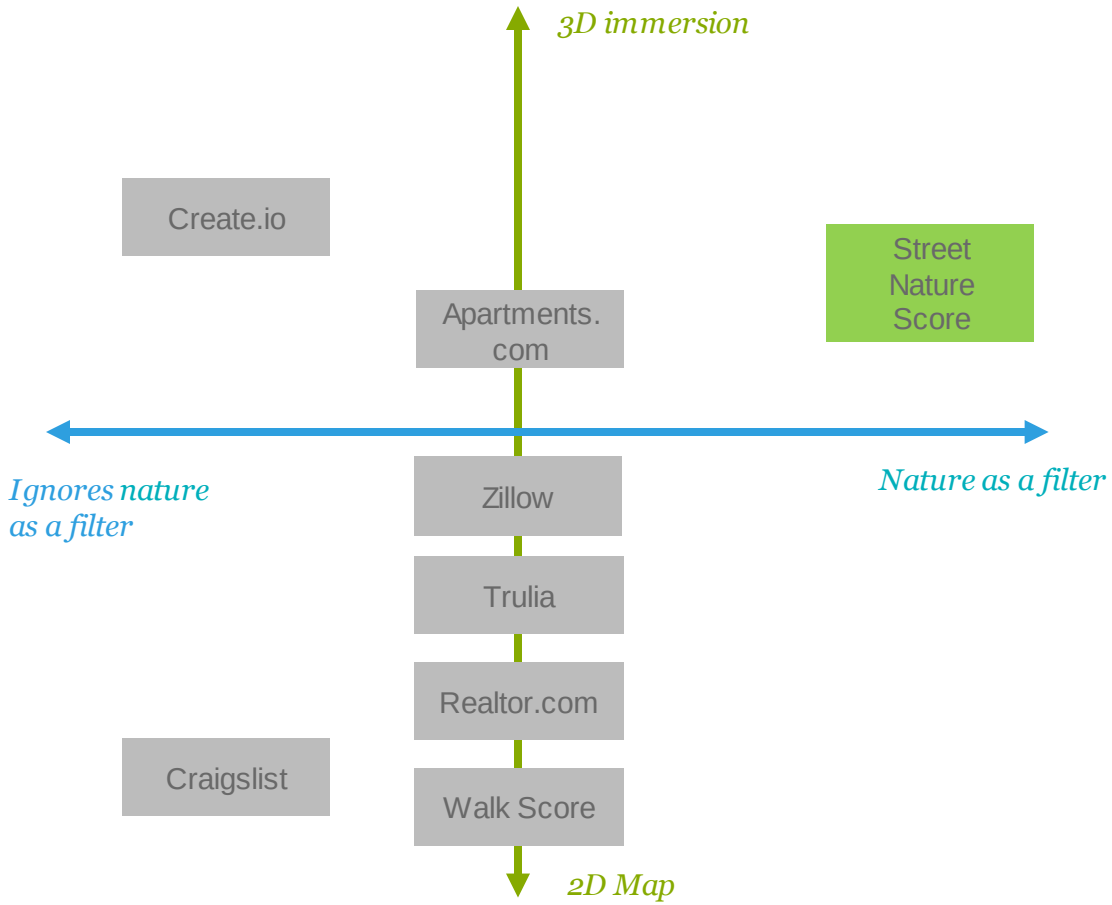


COMPETITIVE ANALYSIS

We conducted a competitive analysis to complete our market research.

The horizontal axis shows if the real estate platforms provide **nature as a research filter**. The vertical axis shows if they propose a **3D visit** of the property.

The first observation is that almost no real estate companies propose a real 3D immersion in the properties they are selling. The second observation is that most of them provide nature as a search filter only via a search bar. Thus, the results are mostly not those expected. This reveals that providing a nature score and proposing a 3D immersion into urban nature can be leveraged to enter the market.



What are the technical steps?

+ Calculating the nature scores

+ Developing a web application

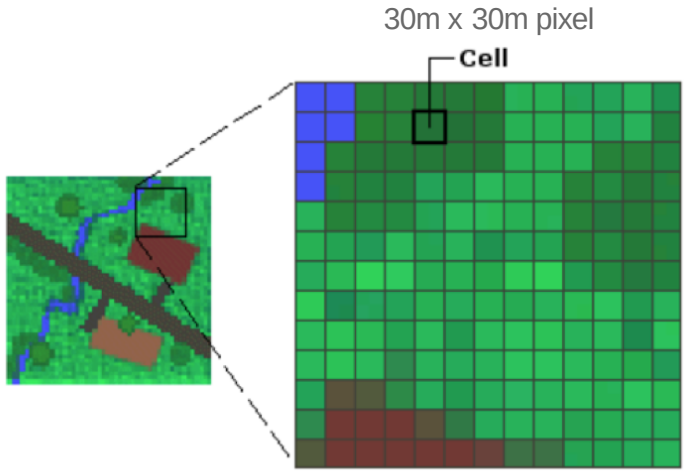
+ Visualizing the nature scores

02

CALCULATING THE NATURE SCORES

We use the Percent Developed Imperviousness dataset from the National Land Cover Database 2011 (NLCD) to calculate the nature scores.

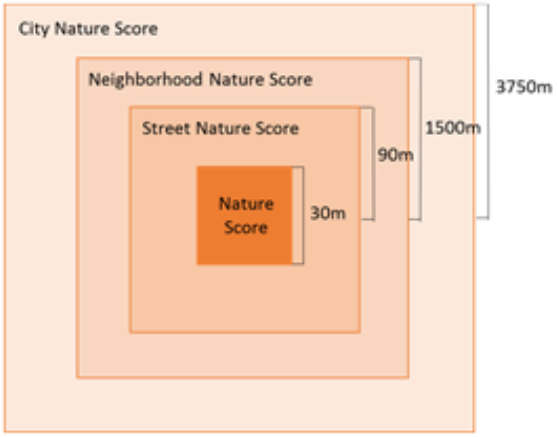
To calculate the nature scores, our algorithm utilizes the Land Cover Database (NLCD) 2011 Percent Developed Imperviousness. This dataset is a satellite **raster** image of the entire US comprising a single data band with the percentage of the amount of developed surfaces such as buildings, roads pavements etc. for every 30m x 30m pixel of the image.



When a user types in an address the website geocodes it into latitude and longitude coordinates and our **algorithm** goes to the corresponding pixel and **calculates** the nature score as:

Nature score = 100 % – Imperviousness %

The Street, Neighborhood and City scores are calculated by taking the average pixel values for square radii of **90m**, **1500m** and **3750m** respectively. The algorithm then passes back the scores for display on the webpage.



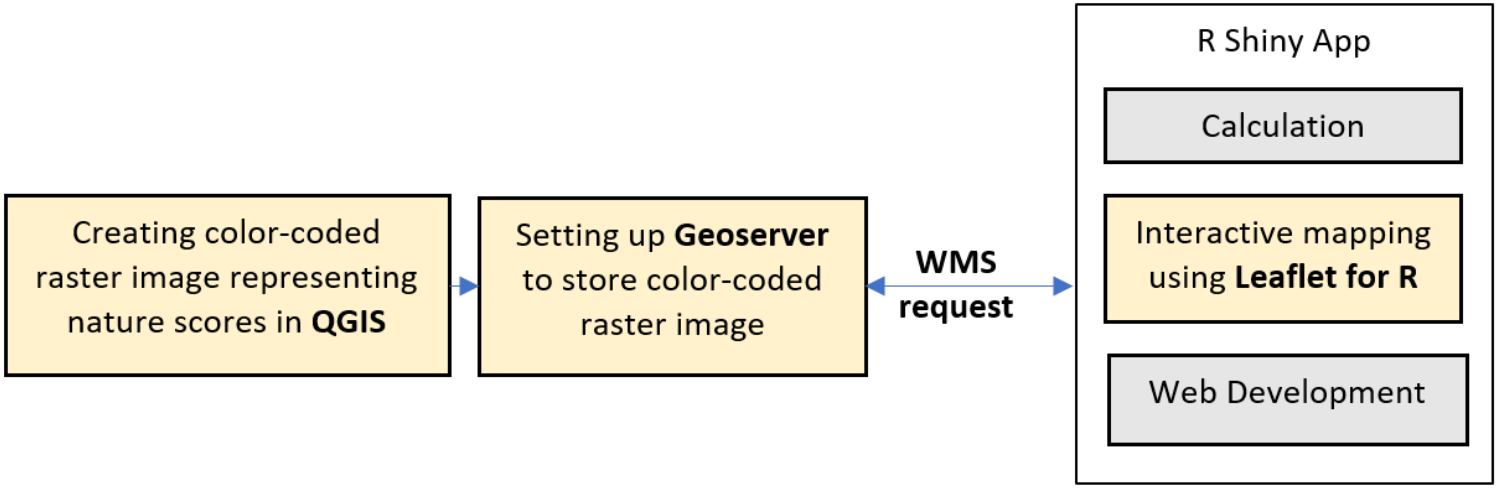
WEB DEVELOPMENT AND INTERACTIVE MAPPING

We developed a map-based web application to enable users look up their nature scores.

We used **R Shiny App** to conduct on-the-fly nature score calculation and the frontend design of the app.

Then, we used open source mapping library **Leaflet** to integrate the interactive mapping to the app.

Finally, we set up the **Geoserver** to visualize the nature scores through WMS (Web Map Service) request.



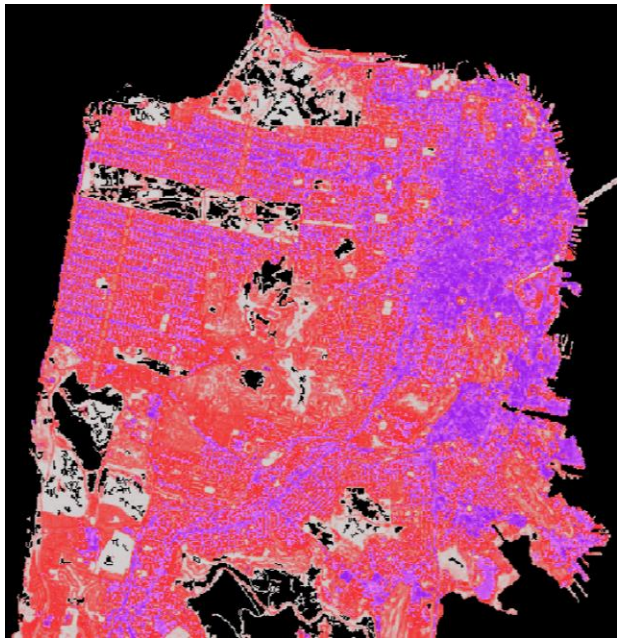
GEOVISUALIZATION

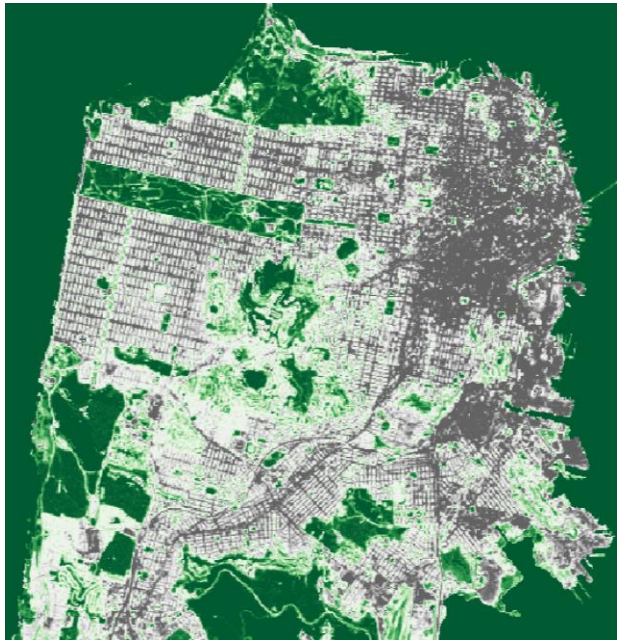
Geographic Visualization is an essential part of the Street Nature Score application and complements with the numeric presentation of nature scores.

One great advantage of using geo-visualization design comes from its **extraordinary explanatory capability**.

We used QGIS to construct **color-coded thematic map** based on satellite image (upper right). We also used a combination of sequential and diverging color schemes to differentiate the nature scores based on their values (bottom right), with the darkest green representing “nature paradise” (areas having highest nature scores) and the darkest gray indicating “concrete jungle” (areas having lowest nature scores).

The intuitive color design required less understanding of the abstract concept of nature score because the colors themselves were **self-explanatory**.





What is our business model?

+ *Business Model Canvas*
+ *Value Proposition for target group*
+ *Financial Projections*

03

BUSINESS MODEL CANVAS TO IDENTIFY CUSTOMERS

We developed a business model canvas to identify our customer segments, how we will interact with them and the value proposition conveyed by Street Nature Score.

Note that we will develop relationships mainly with online real estate marketplaces. We will reach home seekers indirectly through them.

Real estate marketplaces will be connected to us via an API and we will provide customer support by e-mail and phone.

Customer Relationships

→ Provide up-to-date data at any time
→ Our data is accessible at any time for our customer.

Customer Segments:

→ Product Manager of online real estate marketplaces
→ Home seekers (Users)

Channels

→ Connected to our customers website via an API
→ Customer service by e-mail and phone

VALUE PROPOSITION FOR OUR TARGET GROUPS

We are developing a two-sided platform targeted at home seekers and real estate companies. We identified a clear value proposition for both groups.

User → Home seekers:

Home seekers can use our tool to **easily compare different locations** according to the amount of nature. Furthermore, they can compare the score of an address to the score of the neighborhood and city. It allows home seekers to **include nature as a supplementary criterio**n when choosing a property.

Customers → Real estate companies:

Street Nature Score enables real estate companies to increase their market ability by giving quantitative insights to their visitors. Also, it increases traffic on their website, which leads to higher sales and more contracts.

IDENTIFYING CORE ACTIVITIES WITH BUSINESS MODEL CANVAS

Our business model canvas helped us our core activities as well as a relevant marketing strategy.

Street Nature Score will make sure that the website is working properly and that our customers can use up-to-date data at any time.

We also targeted important partnerships in the **green tech media** and in advocacy groups to help us raise interest and popularity in our product. While these partnerships will help us reach our users (home seekers highlighted in blue), our own **advertising and blog will aim at reaching our customers** (real-estate companies highlighted in green).

Key Resources

- → USDA images
- → NLCD database
- → Algorithm to compute the nature score

Key Partners

- → The media (general press like Huffington Post, Global News, MSNBC, etc)
- → Green tech media in Habitat, Tree Hugger
- → Advocacy groups

Key Activities

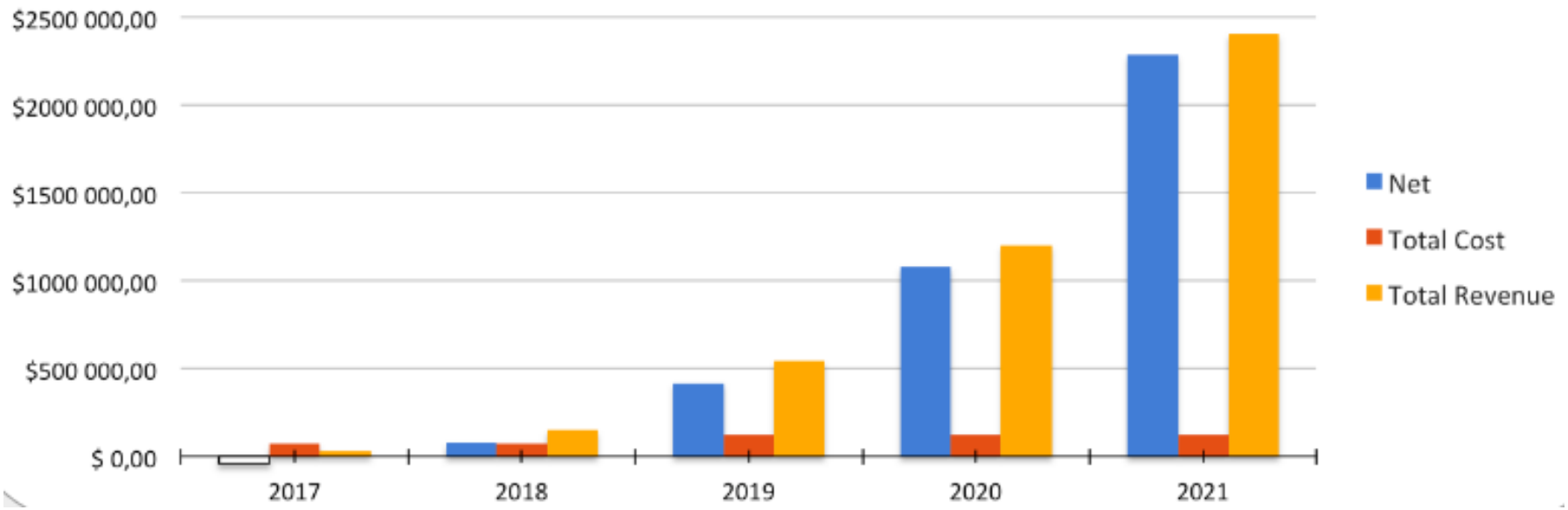
- → Serving storage and maintenance of our data
- → API (badges and map embedding)
- → Advertising
- → Blog posts on Street Nature Score website

FINANCIAL PROJECTIONS

We elaborated financial projections for Street Nature Score for the next five years.

We defined our pricing model as a Software as a Service (**SaaS**) model: Our customer (real estate companies) will pay 500$/month or 1,000$/month according to the number of calls to our API (respectively 50,000 and 500,000 per month).

In terms of costs we counted all the **maintenance costs** due to the website and **operations expenses** such as salaries and offices rents. With our model we plan to be *profitable after two years* of operations.



Who stands behind Street Nature Score?

+ *Jacquelin Hansel, Project Manager*
+ *Pierre Fredenucci, Business Developer*
+ *Tinashe Giyavha, Product Manager*
+ *Siying Chen, Software Developer*

04

MEET THE TEAM

The Street Nature Score project is part of our Master of Engineering program at University of California, Berkeley.

We are working together with the **Berkeley Institute of Design** and the **Fung Institute for Engineering Leadership** to execute this project successfully.

Also, we have access to campus-wide resources such as the **D-Lab**, specialized in data analytics and web applications, as well as the **Geospatial Innovation Facility**, where we have access to cutting-edge mapping technology.

Our team presenting Street Nature Score at the Master of Engineering expo in Berkeley.

JACQUELIN HANSEL

Project Manager

I am pursuing a Master's in Industrial Engineering and Operations Research at UC Berkeley focusing on data analytics.

Having grown up in a small village in the countryside, nature has always been a big part of my life. When moving to the city for my undergraduate studies in Engineering Management in Germany, I realized how difficult it is to find housing near nature in an urban area. I deeply believe that making Street Nature Score a standard criterion when looking for housing will appeal people to increase urban nature.

My previous work experiences in product and project management and my leadership experiences as a managing director of a student consultancy have given me not only technical skills, but also business knowledge and excellent communication skills.

PIERRE FREDENUCCI

Business Developer

I am pursuing a Master's in Mechanical Engineering with a minor in product Design.

Having always been into entrepreneurship, I chose to conduct a capstone project aiming at starting a new business. But I also need to fight for a cause that is really appealing to me. I have Corsican roots: My family comes from a small French island where preserving nature is an important issue.

During my Master of Science in Technological Innovation (with a minor in Entrepreneurship), I did two internships in Parisians start-ups. I acquired skills on elaborating a business plan, teamwork experience as well as knowledge of start-up environment which will help his team launch a successful company.

TINASHE GIYAVHA

Product Manager

I am pursuing a Master's in Industrial Engineering and Operations Research at UC Berkeley.

My decision to join the Street Nature Score team was influenced by my experiences as an entrepreneur in the small-scale gold mining sector in Zimbabwe, an industry that is typically very destructive of the environment. As an advocate for environmental protection, I immediately saw a potential use of the technology to help fight the loss of trees in these mining areas.

My current studies coupled with a mechanical engineering degree provide me with the technical skills to develop the underlying algorithms for Street Nature Score. I utilize my enterprising abilities and business startup experience to develop a viable business model.

SIYING CHEN

Software Engineer

I am a M.Eng. candidate in Civil and Environmental Engineering at UC Berkeley.

Growing up in Beijing, I witnessed how nature was diminishing in my city as a sacrifice of urban development. Wishing to change such situation, I am always seeking a way to encourage a healthy balance between nature and urban development. This project is a great fit for my passion.

Having done my undergraduate study in Geographic Information Sciences, I have hands-on experience in developing interactive online maps. Also, my skills in spatial analysis and knowledge in remote sensing help the team to quantify and improve the accuracy of the nature scores. I wish that our project improves the social awareness of nature environment.

THANK YOU.

If you have any questions, feel free to contact us.

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https://www.youtube.com/watch?v=68VCV7ZBm8M