

Increasing the Population of Bicycle Users

Katherine Xiao, Yutong Ke, Ryan Moore, Nicolas Chan, Janani Manathattai, Jade Niu, Yuyu Wei

Northwood High School

Team Silver

Coach: Emma Zschunke

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Abstract

Located in Southern California with a population of just under four million squeezed into 470 square miles, Los Angeles is our chosen city to promote cycling.¹ Biking offers a multitude of health benefits for both casual and competitive riders, while significantly reducing the carbon footprint and air pollution of urban transportation.² However, despite Los Angeles's pre-existing bike-sharing program called Metro Bike, bike ridership among residents remains stagnant due to contributing factors such as historic car culture, reliability, customizability, and safety.³ As a result, our proposal focuses on further enhancing the current bikes in use to cater a wider demographic of bikers by developing an innovative shared bike system that provides better consumer experience, redesigning infrastructure to reduce fatal accidents, and supplementing bike tires which prevent flat tires.

Key Words: *urban transportation, reliability, customizability, infrastructure, safety*

¹ "Demographics" ([Los Angeles City Planning](#))

² "5 Environmental Benefits of Sustainable Transportation" ([UCLA](#))

³ "LA Metro Possible Ridership Decline Causes And Recommendations to Reverse the Trend" ([Cal State](#))

Introduction

Los Angeles, like many urban cities across the United States, suffers from traffic congestion as a result of the ever-growing car population. Residential automobile use creates 4.6 metric tons of carbon dioxide annually.⁴ However, by turning to bikes, a zero-emission mode of transportation, the city can reduce its carbon footprint. American infrastructure was built around the use of automobiles and wider lanes provide short term solutions to traffic. However, adding more lanes for cars further induces traffic, ultimately leading to greater environmental consequences and limited space for pedestrians and biking.⁵ Therefore, drastic changes must be made to encourage Los Angeles residents to adopt biking as a practical and convenient alternative to individual driving.

⁴ "Greenhouse Gas Emissions from a Typical Passenger Vehicle" ([US Environmental Protection Agency](#))

⁵ "More Lanes Do Not Mean Less Traffic" ([California RMI](#))

Main Body

Innovative Shared Bike System

Accessibility is key to increasing cycling usership, therefore increasing storage and maintenance of bikes is necessary. Placing 100 bikeshare stations in highly populated areas of Los Angeles will make bikes more accessible. With 25 bikes each station, the cost will surmount to around \$4 million including the building and installation costs for stations and bicycles and the cost of app development.

Our new bike share system would be centered around our accessible, easy-to-use app. Users will be prompted to create an account with their name, address, contact information, and preferred payment method. By scanning the QR codes on the dock station, the app will link the user to a specified bike and unlock it. Users will have the option to either select their destination or their preferred biking duration. The app will provide the closest station to dock the bike and automatically calculate the travel distance. Those looking to bike recreationally will have the option to customize their use time, and the app will also provide suggested paths for leisurely cycling. The standard mileage fee is \$0.35 cents per mile, and users will be charged electronically after the bike has been returned to a station.

For users wanting to pay with cash, each station will have a machine that produces a guest version of the app and directs them to choose a bike and destination or duration, and the app will calculate the fee. The only difference between online payment and cash payment is that users must pay beforehand to prevent theft. Once the fee is paid through the ticket machine, the app will detect this and the bike will unlock. The bike will then lock again after the destination or duration is met. The simple mechanics of the app would allow biking-sharing users to find the nearest bike station and to quickly check out a bike, which is ideal for promoting biking

accessibility. There will also be the option to add storage along on the 2 different bike sizes available. To incentivize biking, bikers would be rewarded with coupons for achieving certain mileages, which would accumulate on their accounts as they ride. Publicizing bike attractions such as renovated trails without busy traffic may also bring families to spend their outings biking.

Enhancing Infrastructure

Fatalities of cyclists have increased by 5% over 2021 indicating the need for better utilization of infrastructure to protect bikers.⁶ However, LADOT annual reports revealed a 25.5% decrease in Los Angeles' annual bikeway implementation in 2022 compared to the previous year, suggesting the need for upgrades in both quality and quantity of bikeways.⁷

Implementing protection and expanding the bike lane will provide both physical and psychological safety. In dense traffic areas, bicycle use can be promoted by reducing the number of car lanes to widen the bike lanes to 10 feet (standard car lanes) and by implementing physical barriers like bollards or cones to create a distinct, visual separation between bike and car lanes.⁸ The implementation of bollard for 10 miles of heavy traffic is around \$166,320. After a test period of 2 months, the city will collect data regarding the bike use and how residents are adjusting. If there is a positive growth of bike ridership, lanes would be permanently converted into a bike-only lane.

Poor intersection infrastructure is responsible for nearly half of the traffic injuries of cyclists presenting a critical need for redesigning.⁹ Firstly, the bike boxes could be implemented

⁶ "Dying on the Streets of Los Angeles: 2022 Traffic Fatalities, Why & What Needs to Change" ([Movela](#))

⁷ "L.A. City Bikeway Implementation Decreased in Fiscal Year 2021-22" ([Streetsblog LA](#))

⁸ "Urban Street Design Guide" ([National Association of City Transportation Officials](#))

⁹ "About Intersection Safety" ([Federal Highway Administration](#))

before traffic lanes to widen bicyclists' vision and allow them to do left turns. Secondly, separated bike crossroads in busy areas can improve the security of both pedestrians and cyclists. Lastly, installing bicycle signals can reduce the conflicts between bikes and vehicles during crossing.¹⁰

Innovation

Established trust among users is a critical component of success. Therefore, to reduce the number of possible accidents that result from flat tires, we can replace the inner tubes with Air Foam, a bike insert that ensures a familiar bike riding experience without the fear of punctures. Air Foam is able to withstand Los Angeles' record high temperatures and, unlike EVA foam inserts, is recyclable.¹¹ This would not only reduce Los Angeles' carbon footprint by eliminating the need to throw away punctured tires but also keep Los Angeles' existing shared bike tires in use. Other airless bike tires, such as METL, are made of elastic metal alloys that replace rubber tires entirely. However, such an approach would be costly and harder to seamlessly implement.

Conclusion

Biking should be promoted in Los Angeles to reduce air pollution and also improve safety of the biker. To support this mode of transportation, our proposal focuses on expanding ridership through innovative bike-share programs, improving safety through design innovation, and ensuring the security of cyclists through city infrastructure improvement. The existing bike-share program should allow users to pay through the new app but also through cash. Air Fom will replace the inner tube of the bike to prevent flat tires, and several implementations on

¹⁰ "Intersection Safety Strategies" ([Federal Highway Administration](#))

¹¹ "Airless Bike Tires - No More Flat Tires" ([Air Fom](#))

the road will improve cyclists' security. With the project costing an estimated \$14 million and considering Los Angeles' \$200 million annual budget for transportation, the project is under budget and is allocated multiple years to fully implement all of the desired changes.¹²

¹² "City of Los Angeles: Open Budget" ([LACITY](#))

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Appendix

The average cost per dock station is \$35,000. Our proposal suggests installing 100 stations around Los Angeles primarily around high density areas. This brings the cost of purchasing the dock stations to \$3,500,000. With the redistribution of the current metrobikes to the new stations, there shouldn't be any additional costs. The new air foam for the bikes costs around \$50 per bike and for a total of twenty-five hundred new bikes, adds another \$125,000 to the costs.

With building and installing the bikes, there should be around 200 workers and the cost per worker should be around \$18 per hour. So with the total estimated time of build taking around 15 months. With each cost 35\$, the estimated cost will be \$166,320. The cost for labor should be around \$9.7 million, and the cost to make the app at around \$500,000.

Bollards will be placed 10 feet from each other, and each bollard costs \$35 dollars. For 10 miles of road, bollards will be implemented for 47520 feet, excluding 10% of intersection sessions where bollard is not needed. If implemented for every 10 feet, 47520 bollards are needed. All together, this brings the total cost of the project to \$14 million.