



Enerdrais ⚡



Welcome to the Enerdrais project, an innovative energy solution featuring a bicycle front wheel modular energy generation system. This presentation will highlight its objectives, how it works, and its potential impact.



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Project Overview

The bicycle is the most popular and environmentally friendly means of transportation, as it offers economic savings and health benefits. This project aims to integrate an electromechanical system into the rim of a bicycle front wheel to generate and store electrical energy. The goal is to offer an elegant and functional solution without altering the structure or operation of the bike.



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Problem Statement

Public or private bicycle services in major cities like Berlin, London, and Mexico City generate significant mechanical energy throughout the day, but this energy is currently not being harnessed. During transportation periods ranging from 10 to 45 minutes, residents of these large cities have the potential to convert this mechanical energy into electrical and store it in batteries.



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Proposed Solution



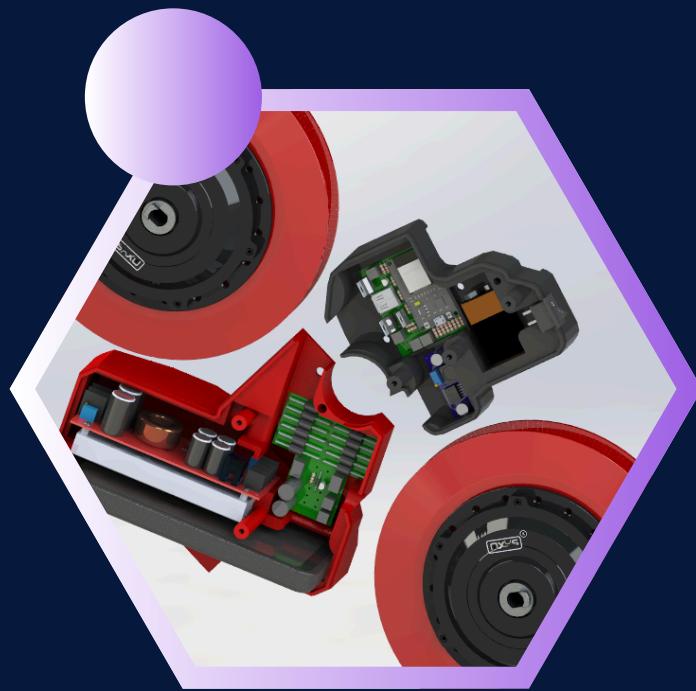
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How It works



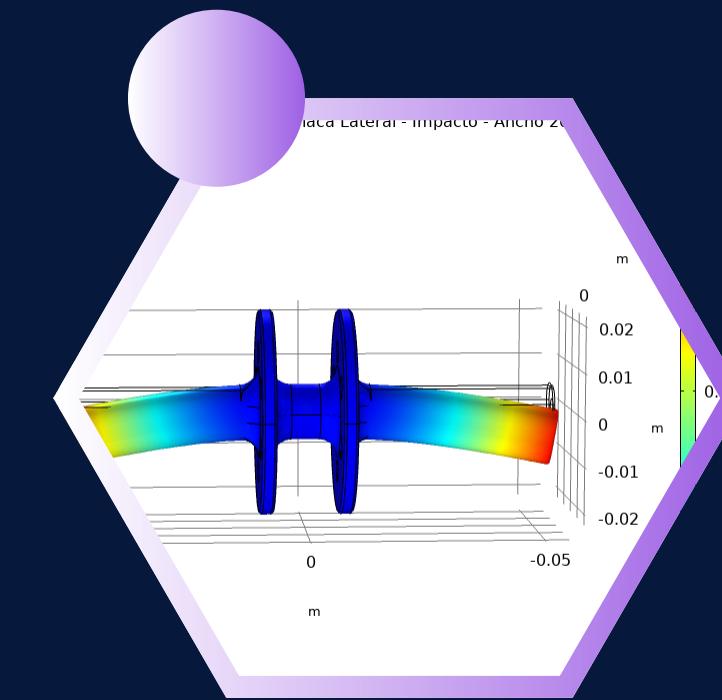
Energy generation

Electrical power generated by BLDCs motors and 3D printed mechanical couplings.



Collection

Customized PCB for electrical energy conditioning & additional features.



Bike Hub & Structure

Bike Hub and structure designed for withstanding a user of maximum 220.5 pounds (100 kg).

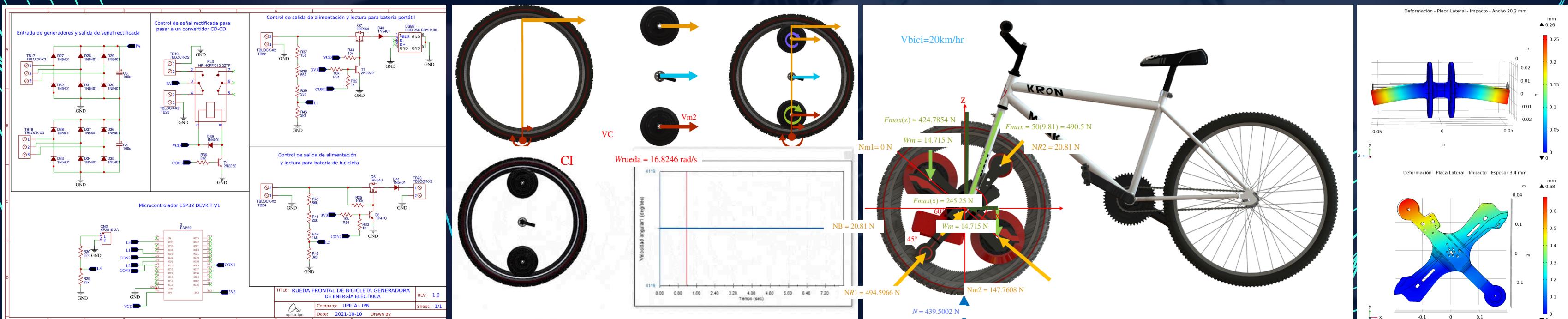


Aluminum Structure

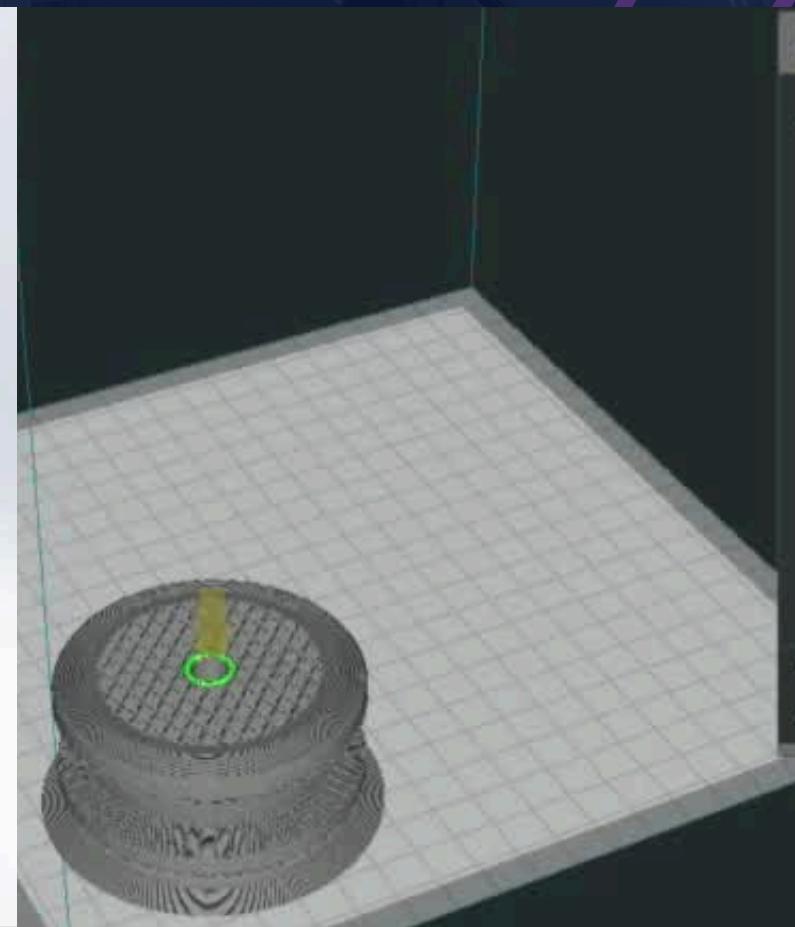
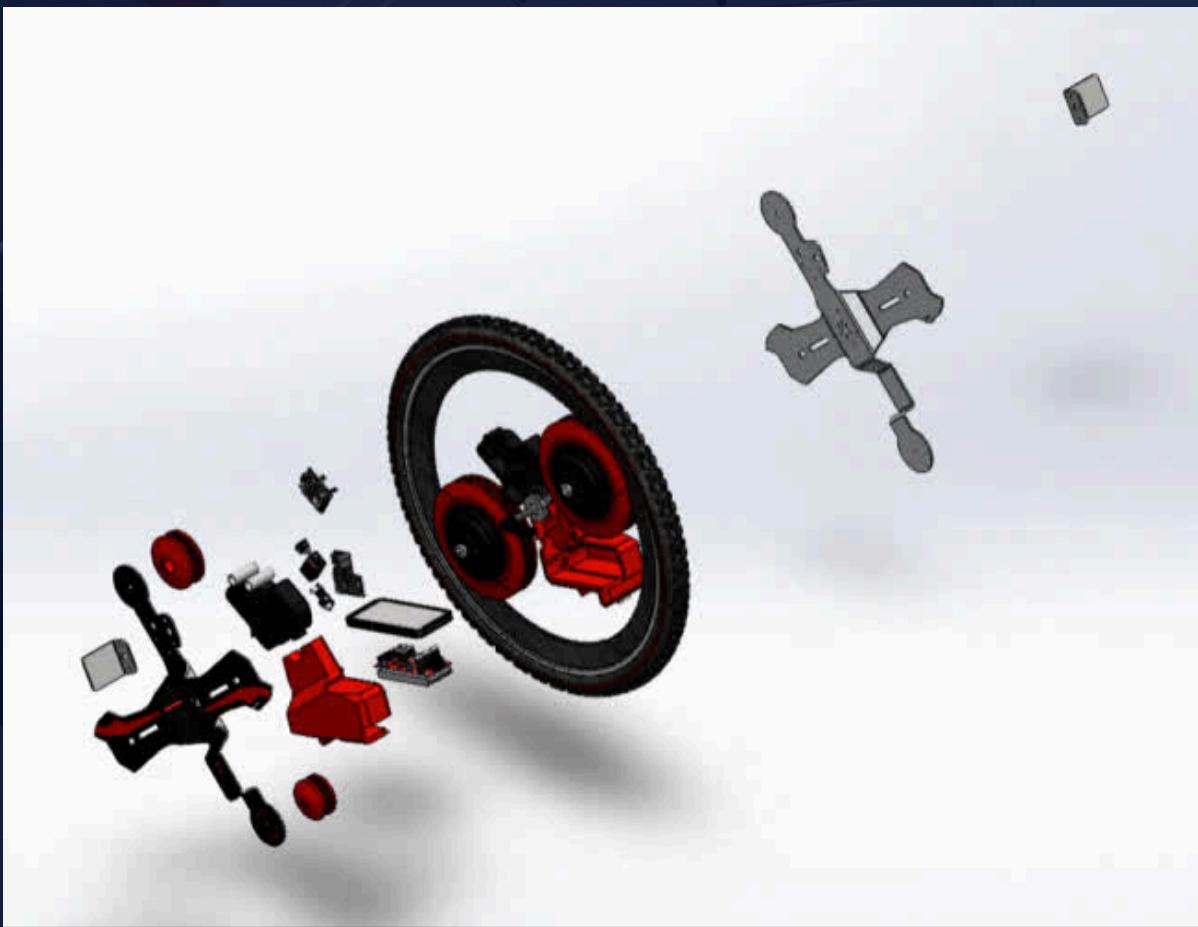
Aluminum structure for minimal wheel weight.

Analysis & Evidence

This project was my undergraduate thesis, so there is already a previous mechanical, embedded, dynamic, impact, vibration and electrical analysis of the whole system, and it is very clear which things worked well in Mark I and which can be improved in Mark II.



Materials & Equipment for Manufacture



Investment:

The following table, divided into two parts, lists the materials and equipment needed to fabricate the wheel prototype. Here is Part 1.



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Equipment/Material	Purpose	Price MXN
<u>Monk Kron R26 18V Bike</u>	Wheel Testing	\$2,987 + Shipping
<u>Bike hub with quick-release axle</u>	Wheel Hub	\$289 + Shipping
<u>26" wheels</u>	Wheel & Rim Prototype	\$1,499 + Shipping
<u>Spatulas For Removing Bike Rims</u>	Wheel Testing	\$89 + Shipping
<u>Ender 5 Plus 3D Printer</u>	Structure Manufacture	\$15,514 + Shipping
<u>Red PLA Filament</u>	Structure Manufacture	\$711.5 + Shipping
Electronic components for PCB	PCB Manufacture	\$300
<u>ESP32</u>	PCB Manufacture	\$172 + Shipping
<u>LM2596 CC Buck</u>	PCB Manufacture	\$107 + Shipping
<u>Boost Module 1200W</u>	PCB Manufacture	\$625 + Shipping
C64 V-Belt	Structure Manufacture	\$600
Aluminum sheet 3003 H14: 0.91X 2.44m	Structure Manufacture	\$3,000
6061-T6 Aluminum round bar - 25 cm	Structure Manufacture	\$250
Subtotal \$:		\$26,143.5 + Shipping

Investment:

The following table, divided into two parts, lists the materials and equipment needed to fabricate the wheel prototype. Here is Part 2.



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Equipment/Material	Purpose	Price MXN
Subtotal \$:		\$26,143.5 + Shipping
<u>Digital Vernier</u>	Measurement Equipment	\$213.91 + Shipping
<u>Digital Laser Tachometer</u>	Measurement Equipment	\$365 + Shipping
<u>MXUS XF07 - BLDC</u>	Energy Generator Test	\$3,849 + Shipping
<u>Dual Shaft Motor - D5312s 330KV</u>	Energy Generator Test	\$1,100 + Shipping
<u>Dual Shaft Motor - D6374 150kv</u>	Energy Generator Test	\$2,219 + Shipping
<u>Eaglepower 8308</u>	Energy Generator Test	\$1,193 + Shipping
<u>Turnigy Aerodrive SK3</u>	Energy Generator Test	\$1,989 + Shipping
<u>SpeedyBee 2006</u>	Energy Generator Test	\$1,565 + Shipping
<u>SURPASS 2216</u>	Energy Generator Test	\$516.93 + Shipping
<u>Sikaflex 221 Black</u>	Structure Manufacture	3*\$395 = \$1,185 + Shipping
CNC Cutting and Bending Service	Structure Manufacture	\$2,500
Branding, Website & Digital Mkt	Advertisement	\$21,000
Total \$:		\$62,654.34



Testing Metrics

For this project, we will test our prototype to achieve a steady 5V output and maximize current to efficiently charge the batteries. By experimenting with multiple types of generators, we aim to find the optimal solution to deliver superior performance and reliability. This approach ensures that our innovative energy system meets high standards and exceeds expectations for sustainable urban cycling.



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Result and Impact



Reducing dependence on non-renewable energy and urban pollution is crucial for our present and future. By harnessing and storing electrical energy during daily commutes in large cities, we offer a solution that promotes environmental sustainability, a healthier lifestyle, and improves urban cycling efficiency. Additionally, companies integrating such clean energy projects into their product portfolio can benefit from tax reductions, further incentivizing sustainable practices.



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Thank You

Let's work together!



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