

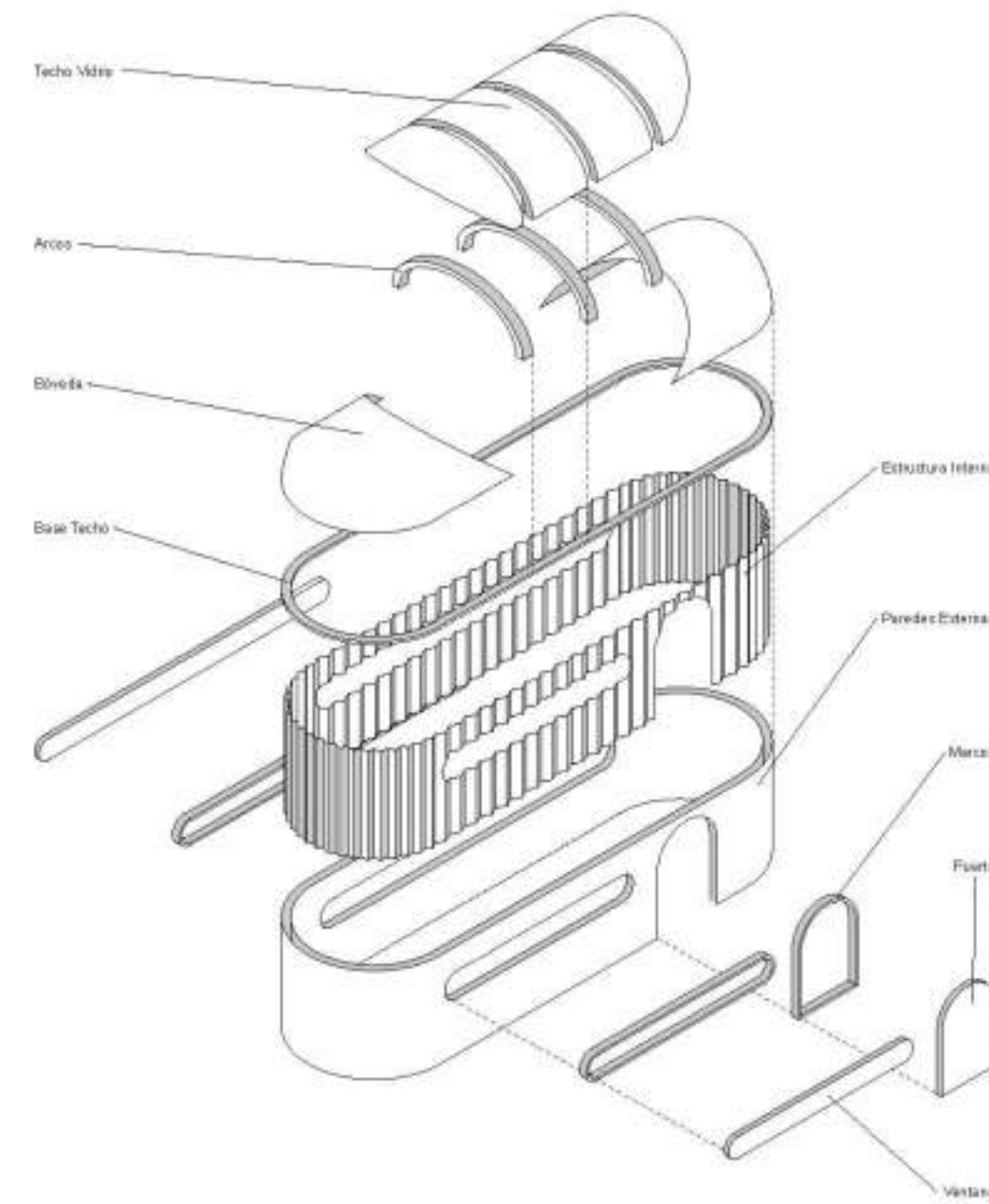
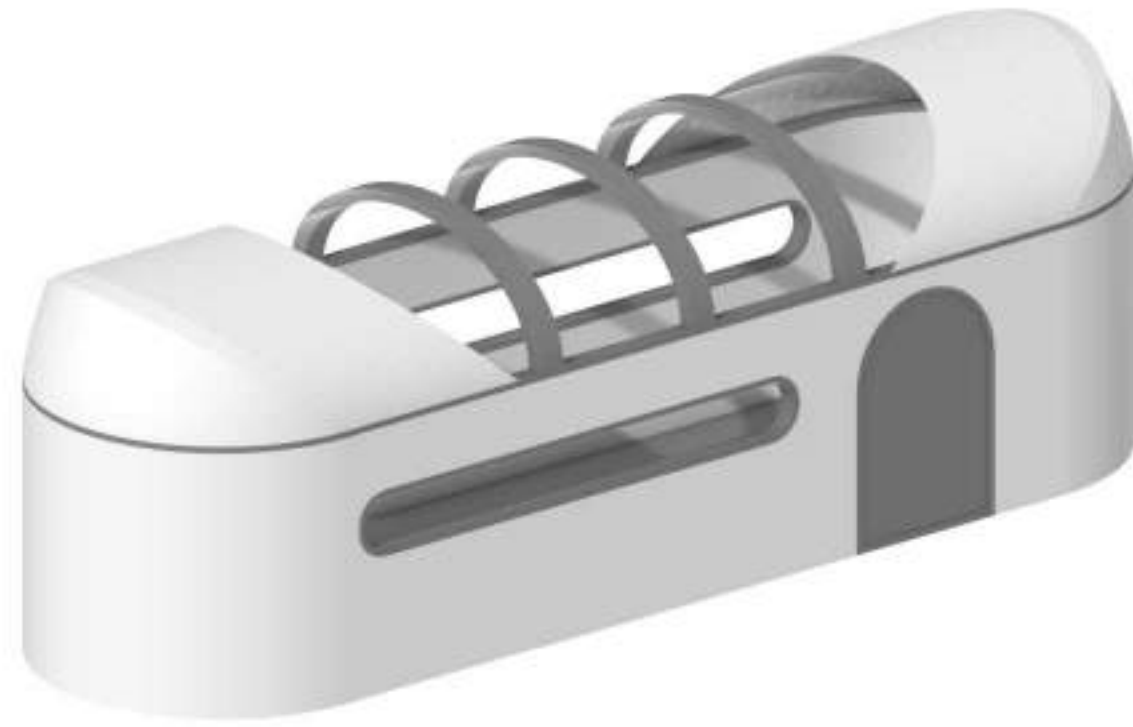
Design Engineer Portfolio



Carlos Lucero

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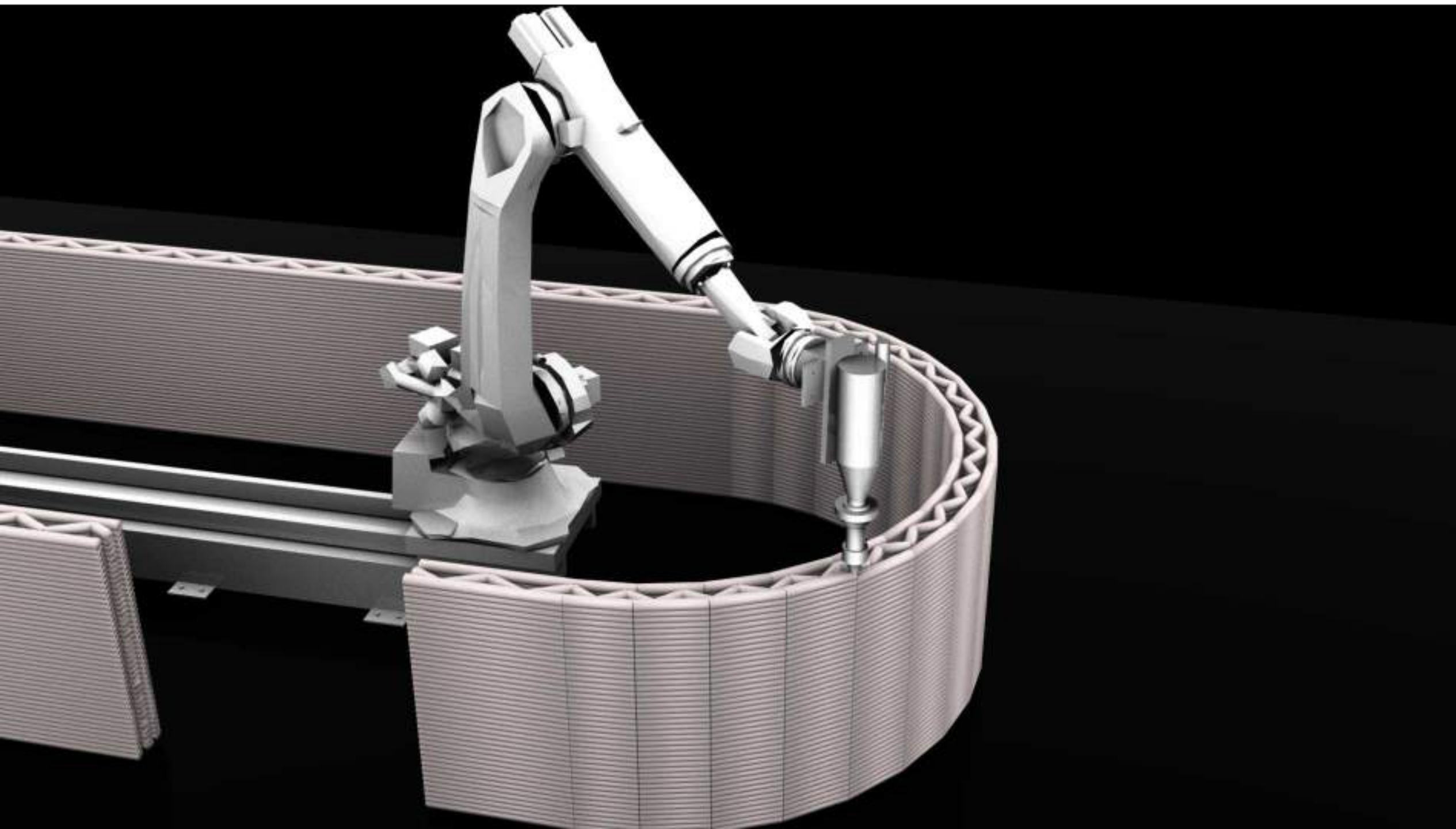
3D House

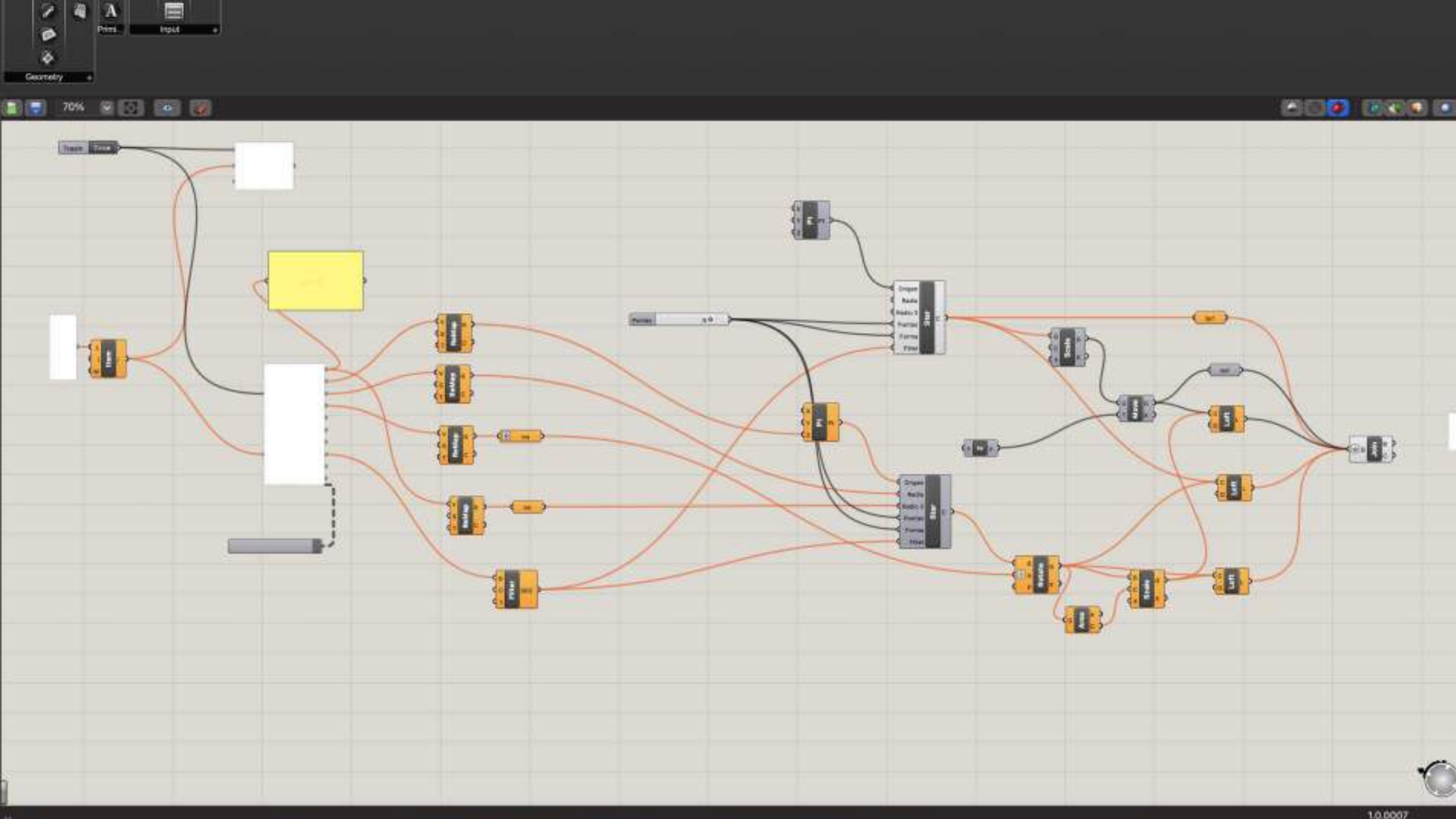
This project develops a parametric house designed for low-cost construction using 3D printing technology with a KUKA robotic arm. The concept focuses on using locally available materials, mainly adobe combined with wood and glass, to reduce transportation costs and environmental impact. The house adopts a hippodrome shape to strategically position the KUKA robot, enabling it to efficiently reach and build all parts. The design is inspired by ancient Nubian vaults, known for their natural strength and versatility, blending traditional materials with advanced fabrication methods.

The design process uses digital fabrication via 3D extrusion printing of adobe, adapting the versatile KUKA robot for this task. Parametric modeling allows precise control of the structure's dimensions and details, integrating elements like windows, doors, and vaulted ceilings. The robot prints walls and structural forms in phases—base, vaults, and arches—followed by assembly of wooden beams, glass panels, and door frames. This approach leverages existing robotic technology to avoid costly specialized machinery, making construction innovative and accessible.

The project's contribution lies in combining a millennia-old, sustainable material with one of today's most revolutionary construction technologies—3D printing houses. By using a widely available robotic arm, it reduces the need for expensive specialized equipment, promoting scalable, affordable housing solutions. The parametric workflow also allows customization while maintaining fabrication efficiency, supporting a vision of replicable, low-cost housing adaptable to various locations.

The result is a digitally fabricated, structurally sound house demonstrating the feasibility of low-cost, robotically 3D-printed construction using traditional materials. The final design shows successful integration of digital modeling, robotic extrusion, and assembly based on the Nubian vault technique. This offers a novel solution for affordable housing that respects local materials and embraces technological innovation, potentially transforming sustainable home building in diverse contexts.





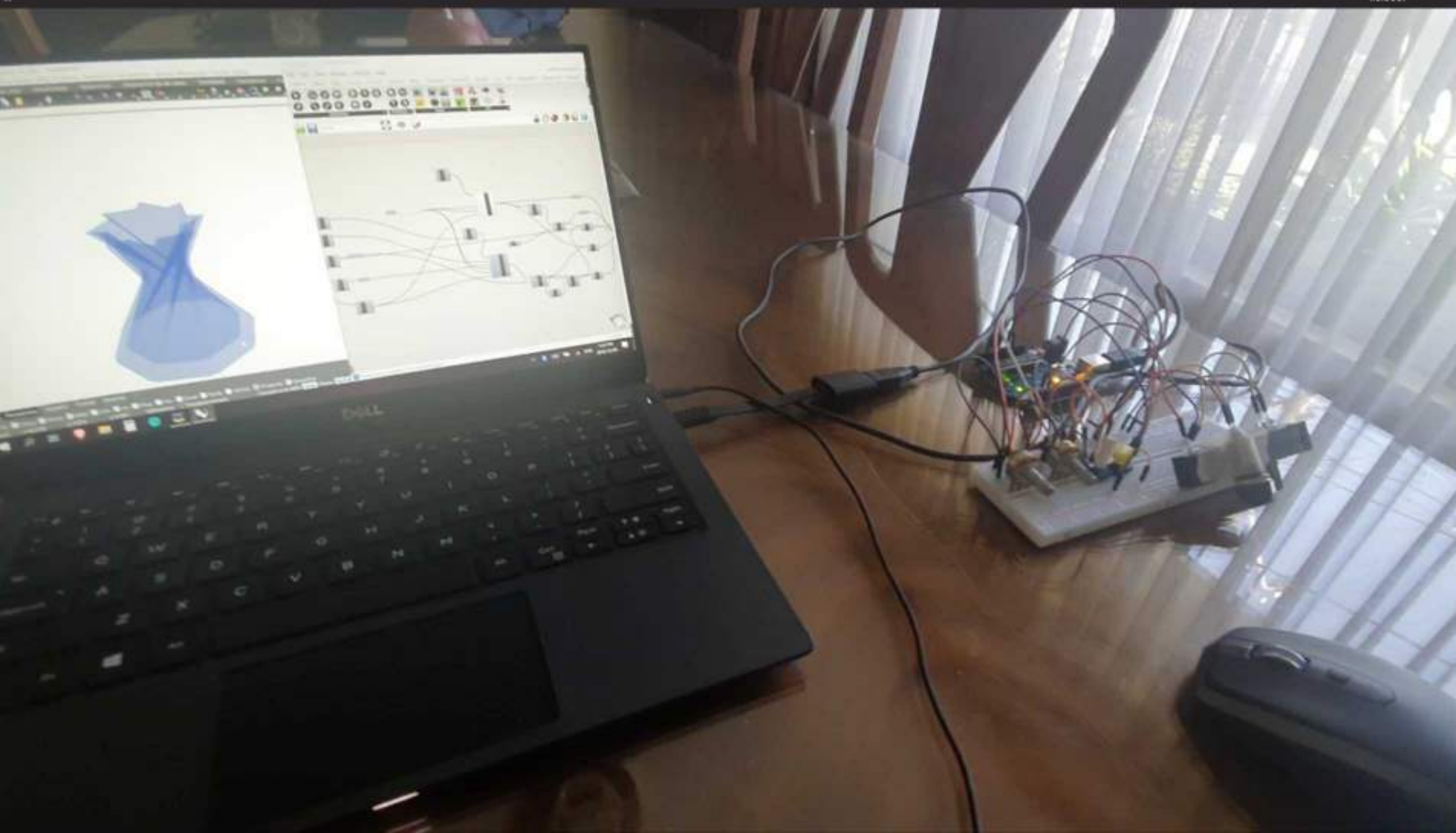
Arduino + GH

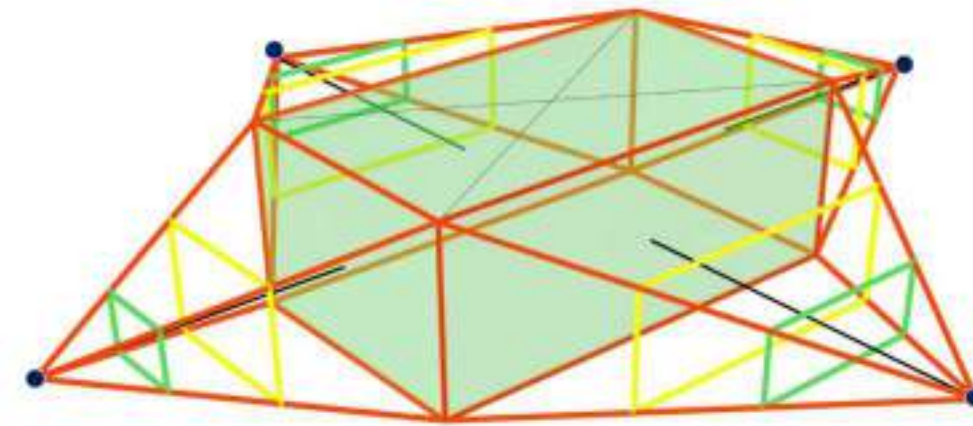
The project explores the intersection between physical interaction and digital modeling by linking hardware components to parametric design software. The main objective was to create a tangible interface that allows users to manipulate virtual 3D geometries through real-world inputs. By combining electronic prototyping with computational design tools, the work investigates new forms of interaction between human gestures and digital form generation.

The design process began with assembling a system composed of levers and sensors connected to an Arduino board. These components captured motion and position data, which were then transmitted to Grasshopper, Rhino's visual programming environment. On the software side, parametric definitions were built to translate analog signals into digital transformations, enabling continuous and intuitive control over shape variations in real time.

My main contribution focused on integrating the electronic and digital domains into a seamless workflow. I developed both the input circuitry and the communication logic between Arduino and Grasshopper, ensuring responsive and accurate translation of data. Additionally, I designed the user interface and physical setup to enhance ergonomic interaction and provide clear feedback to the user during model manipulation.

The final outcome demonstrated how physical gestures can become a direct tool for digital modeling. By moving levers, users were able to sculpt and adjust 3D structures dynamically, fostering a more intuitive connection between hand movement and computational form. The resulting system not only bridged analog and digital processes but also highlighted the creative potential of hybrid design environments.





Bitus

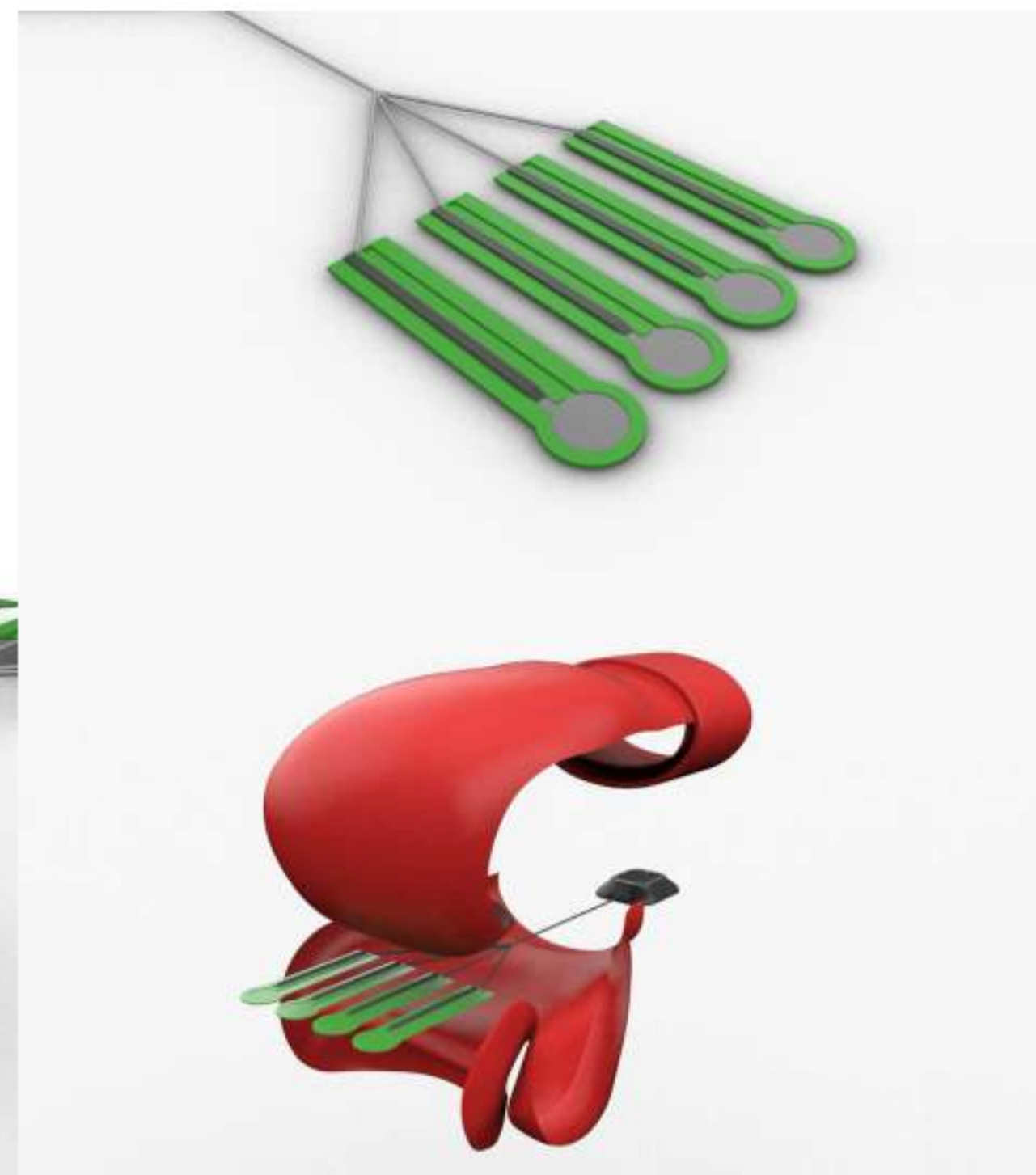
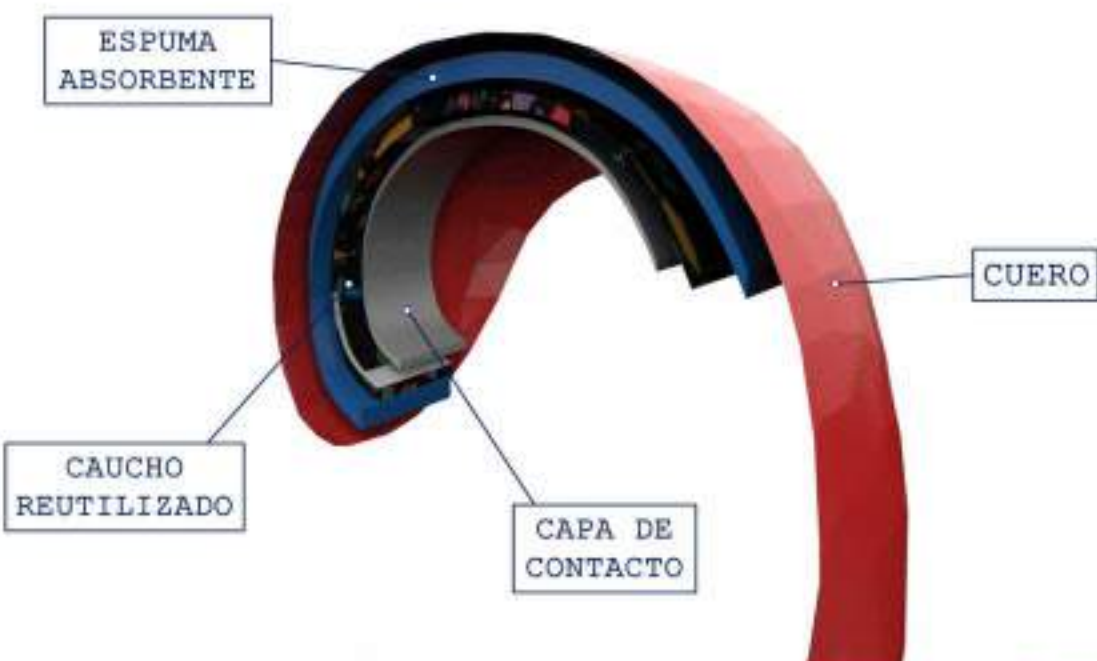
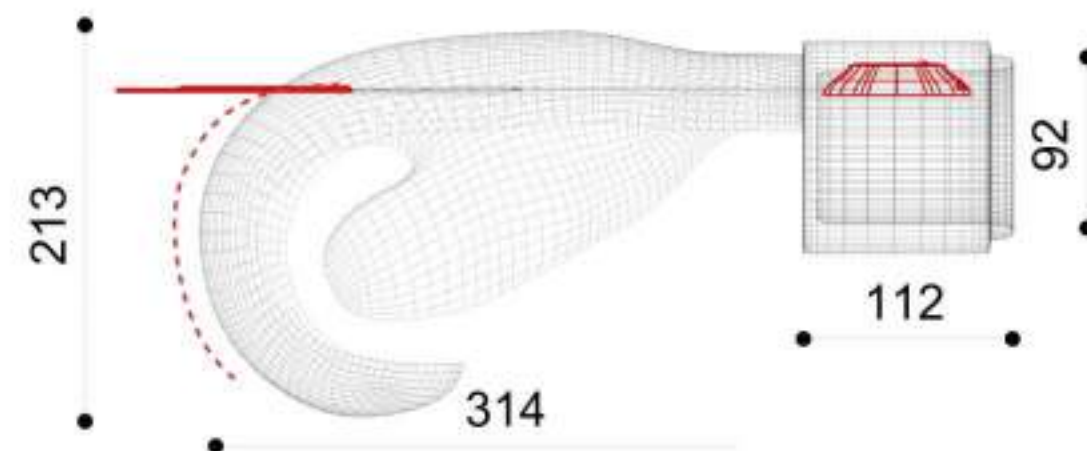
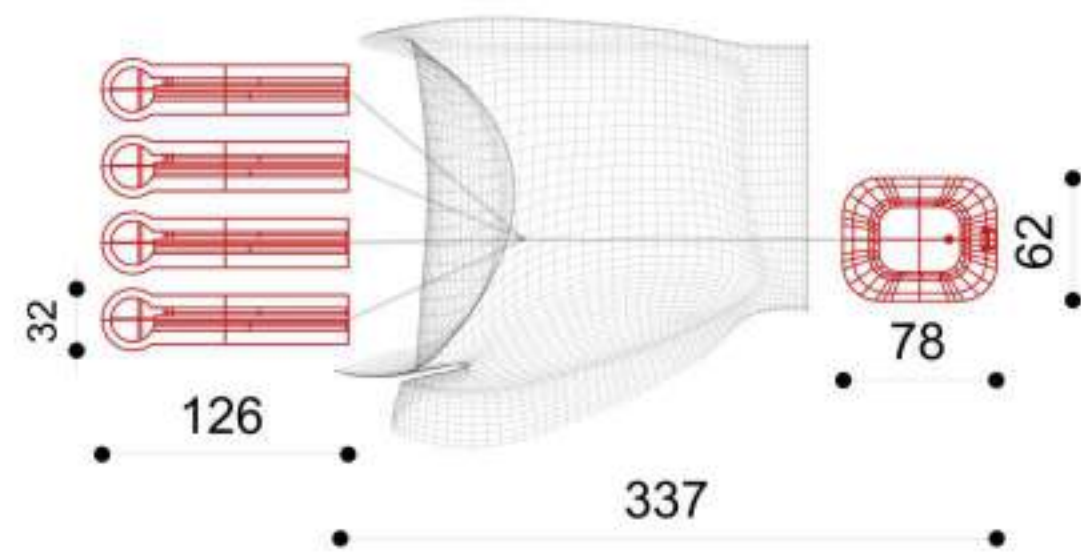
[YouTube Video](#)

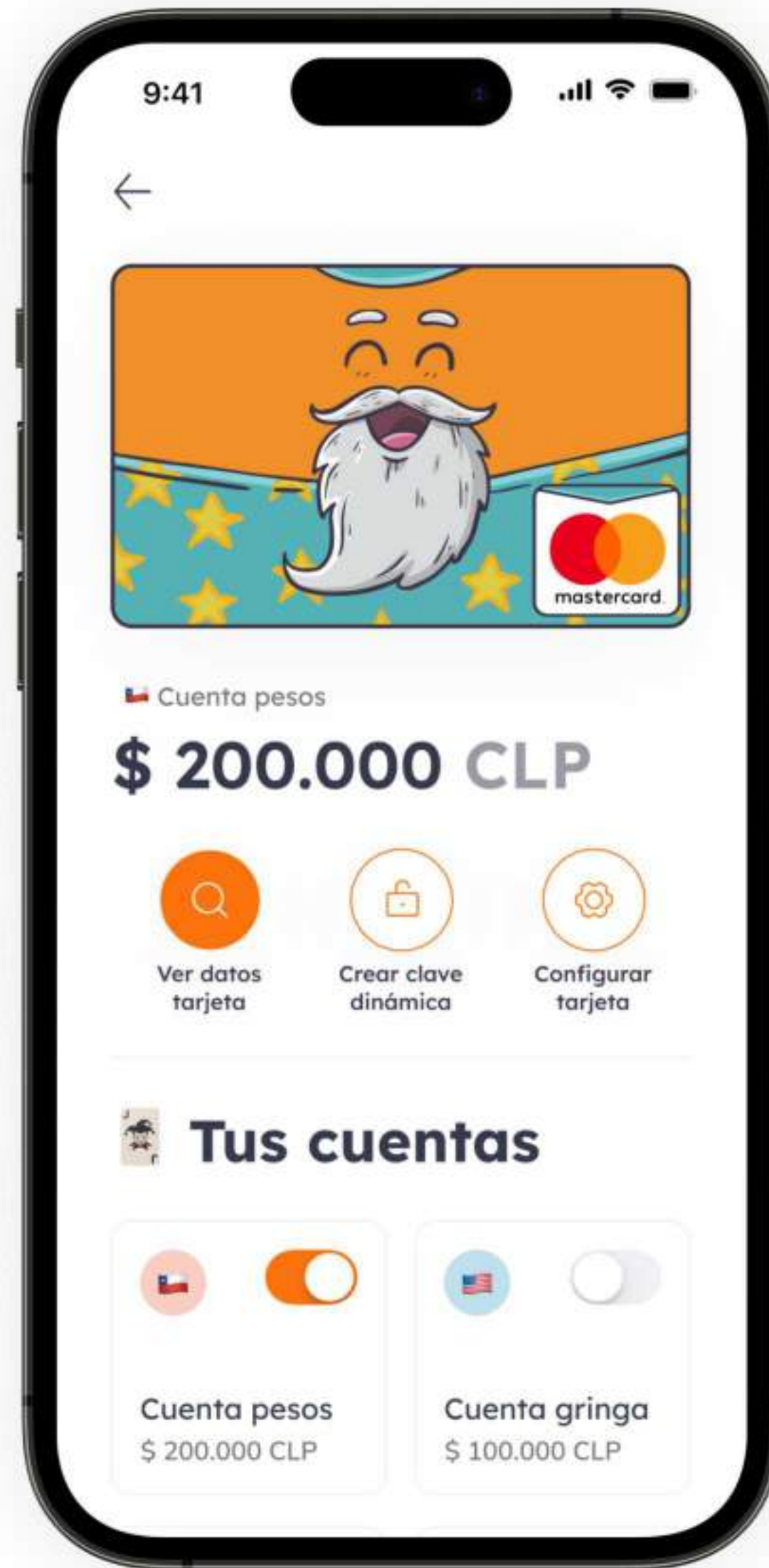
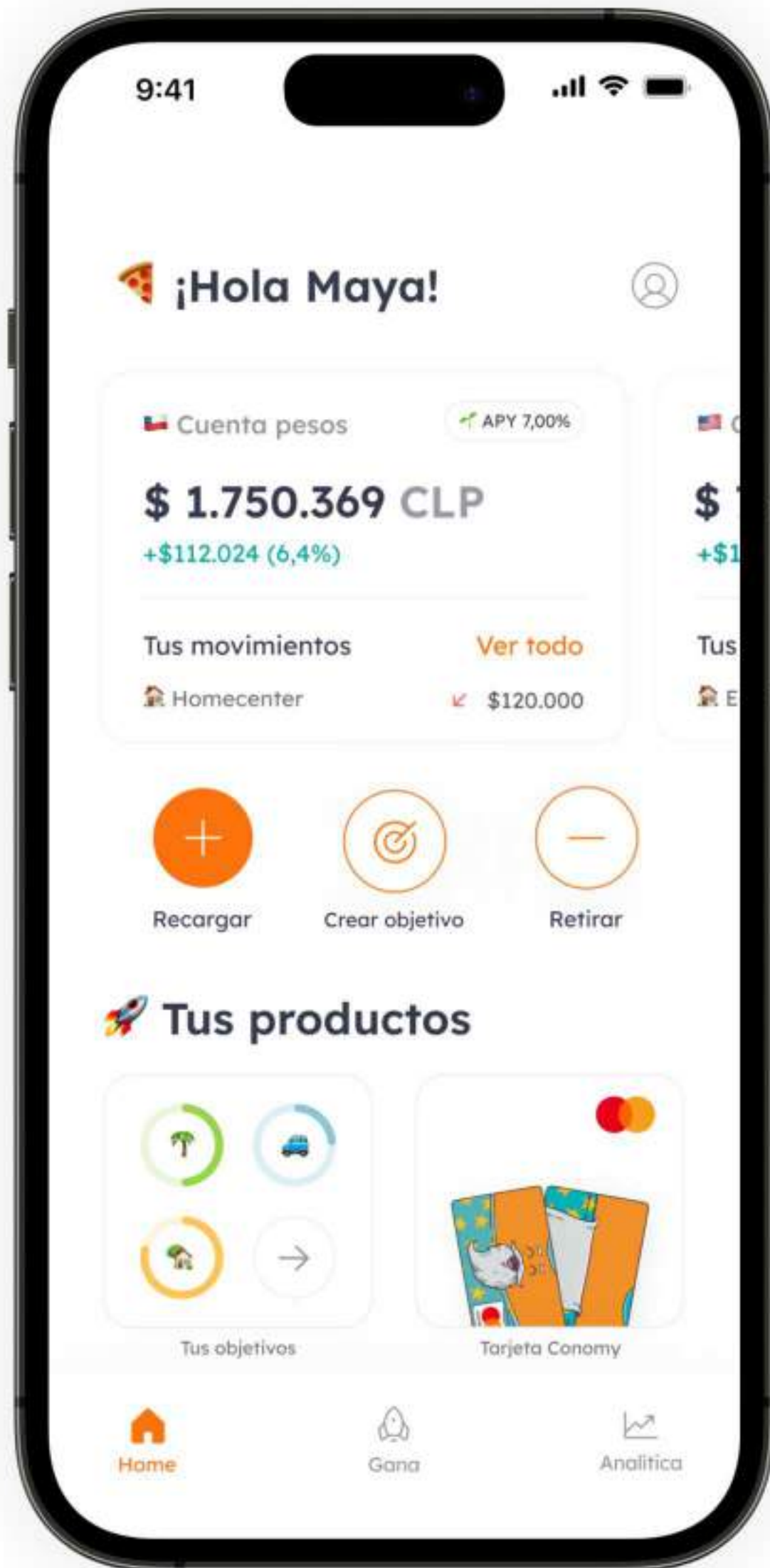
Bitus is a sports technology project aimed at enhancing athletic performance and injury prevention using wearable devices and infrared camera systems. This innovative approach targets the lack of objective data for coaches and sports medicine professionals by providing precise measurements of athlete movements and exercise execution. The project's goal is to reduce injury-related costs in sports, which is a significant market concern, by improving the accuracy of training assessments and real-time feedback.

The design process involved integrating various technologies such as Arduino electronics, sensors embedded in a boxing glove, and PrimeSense infrared cameras like Kinect to capture detailed movement data. Prototyping included developing sensor fusion systems capable of detecting whether exercises were performed correctly, allowing for immediate corrective feedback. Software was developed to interpret the sensor and camera data, enabling objective performance analysis and injury risk assessment during training sessions.

Bitus contributes to the sports and rehabilitation fields by offering a technological toolset that combines wearable hardware and motion capture to monitor and analyze athletic activity precisely. Its use of reusable materials in the glove construction adds an element of sustainability, and its design caters specifically to amateur boxing and MMA practitioners, although it has the potential for broader sports application. This system empowers trainers and athletes with actionable insights to optimize technical skills and prevent injuries before they occur.

The project successfully delivered a working prototype that demonstrated the feasibility of real-time exercise monitoring and correction. Early feedback from users and sports professionals indicates improved training precision and heightened injury awareness. The system's integration of hardware and software serves as a foundation for further development and potential commercialization to serve athletes across various disciplines. Bitus represents a meaningful step toward smarter, safer sports training through design and technology.





Conomy

[Website](#)

Conomy is a mobile application designed to empower individuals in their journey toward financial freedom through strategic saving and investment. It focuses on accessible, alternative assets that provide reliable returns, with an emphasis on dollar-pegged stablecoins. By blending technology with financial expertise, the application presents a user-friendly platform where users can grow their wealth in a secure environment.

The design process centered on creating an intuitive interface that simplified complex investment concepts. This involved mapping user journeys, developing wireframes, and iterating on prototypes based on usability testing. Visual elements were crafted to evoke trust and clarity, while interactive components were streamlined to ensure effortless navigation for both experienced and novice investors.

My contribution included defining the product's visual language and interaction flow, ensuring consistency across multiple user touchpoints. I collaborated closely with developers and financial experts to translate intricate mechanisms—such as stablecoin yield generation—into clear, actionable features. Additionally, I implemented design patterns and microinteractions that enhanced engagement and built user confidence.

The final product launched with a clean, modern interface and a seamless onboarding experience, enabling users to start investing within minutes. Positive feedback highlighted the app's accessible design and its role in demystifying alternative assets. Conomy successfully merged functional performance with approachable aesthetics, fostering greater participation in decentralized finance.

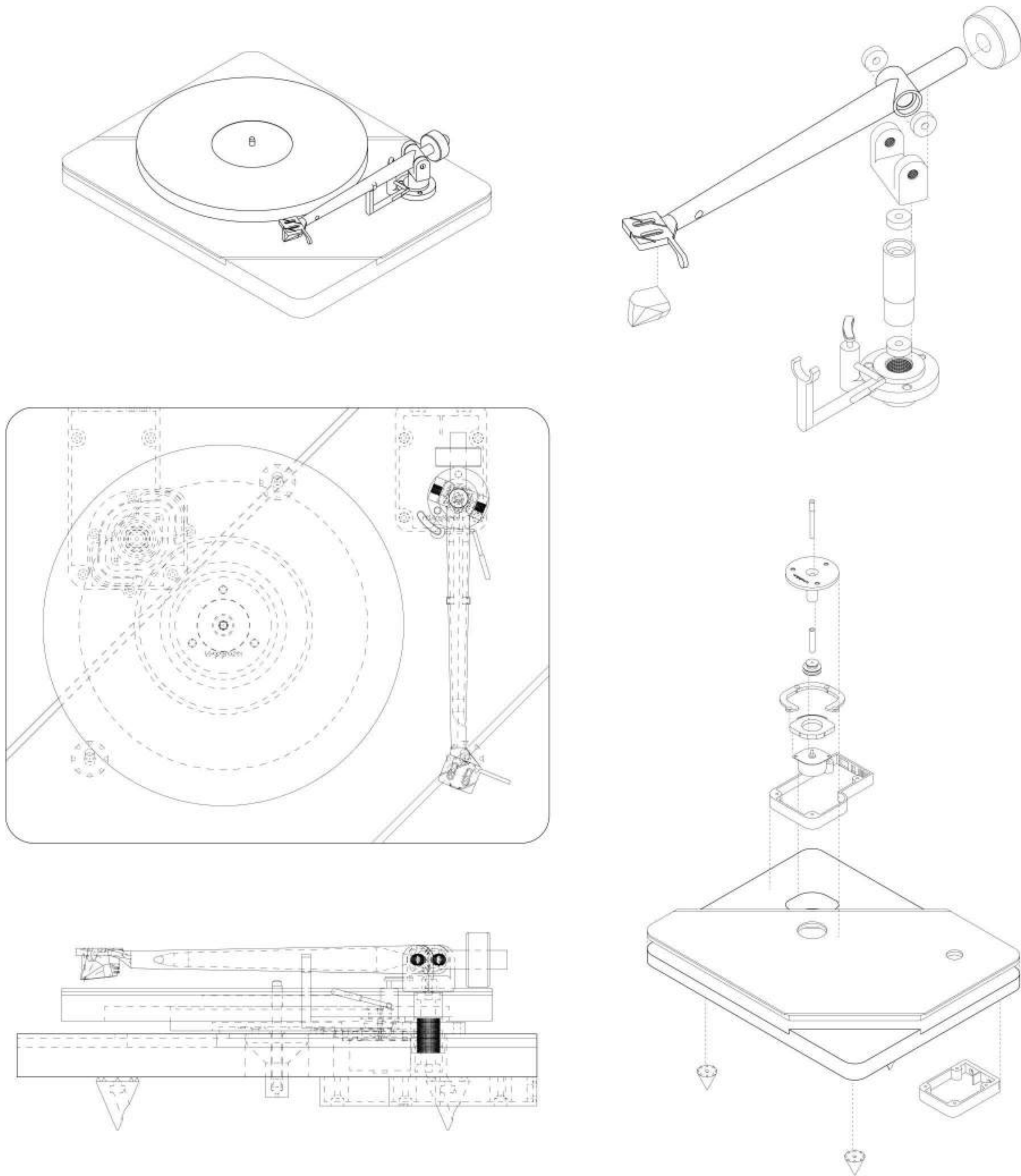
Defoss

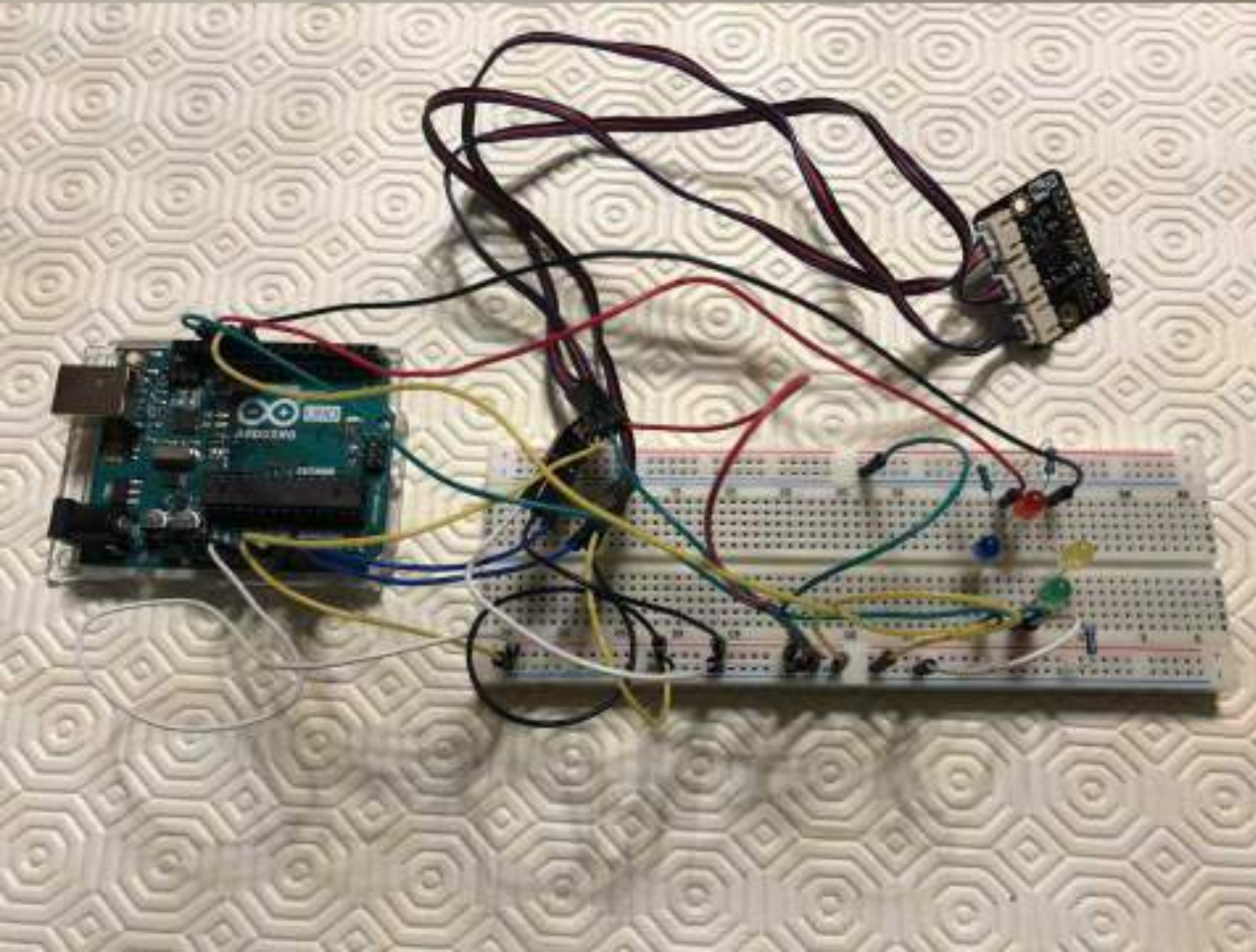
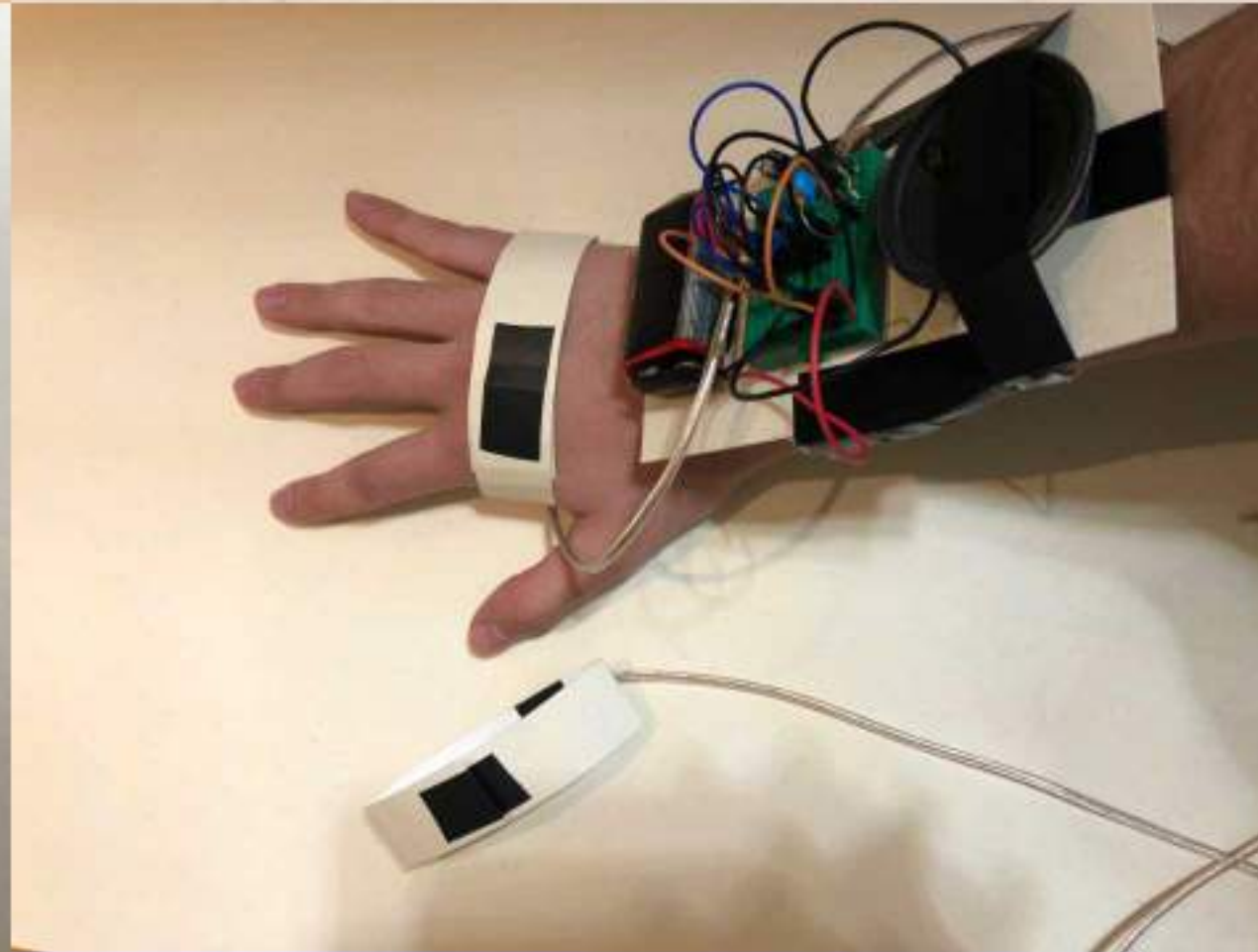
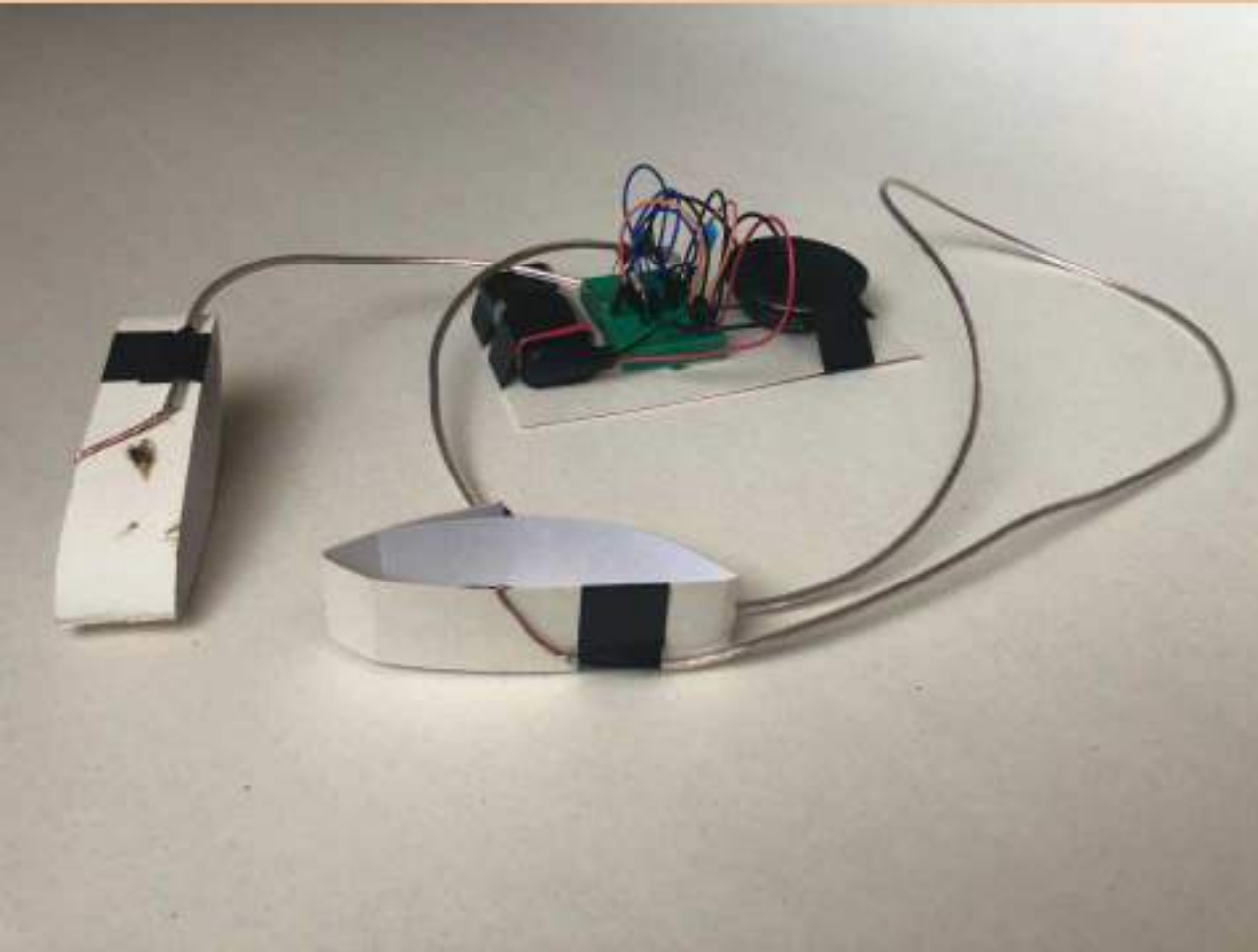
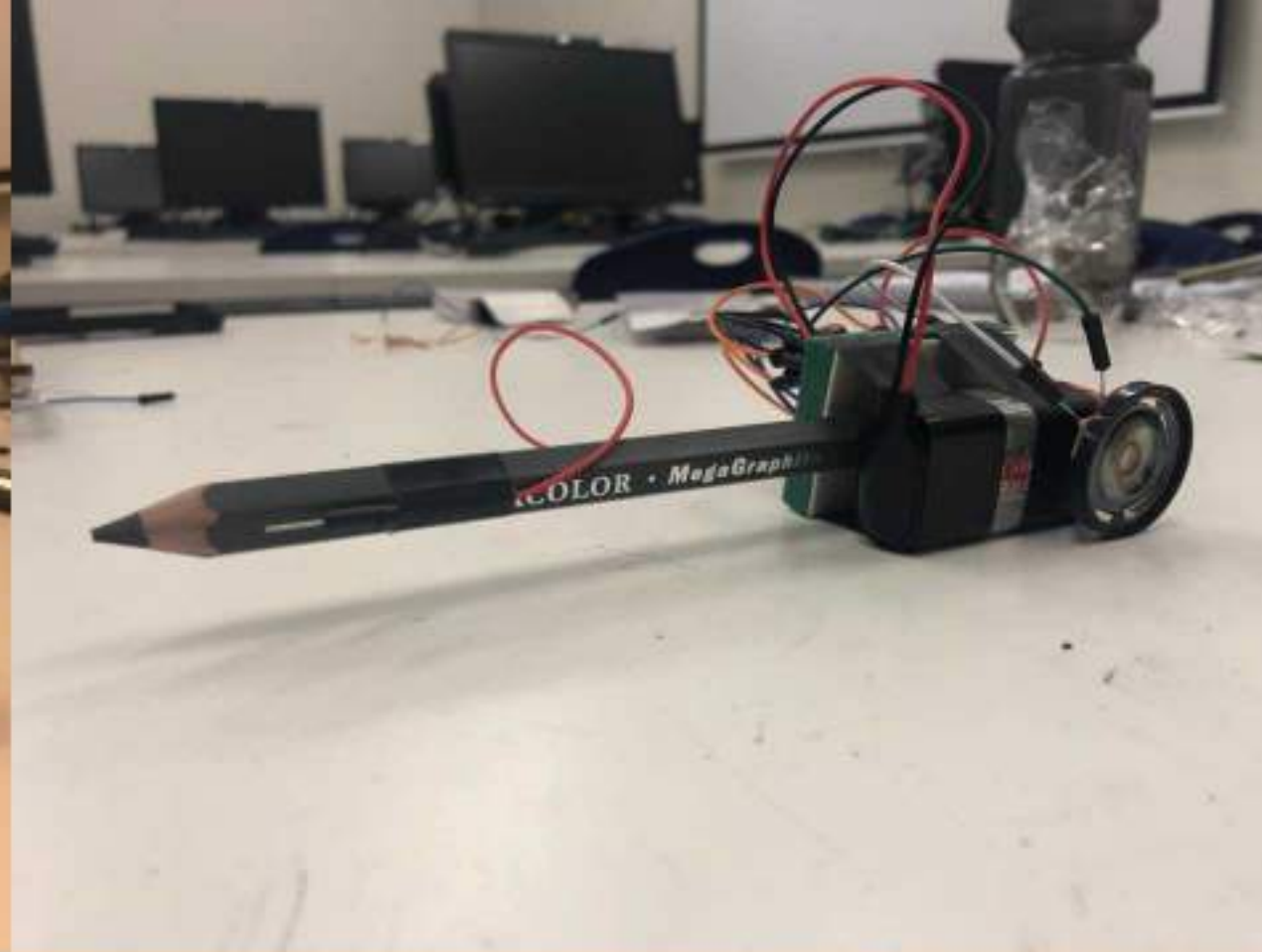
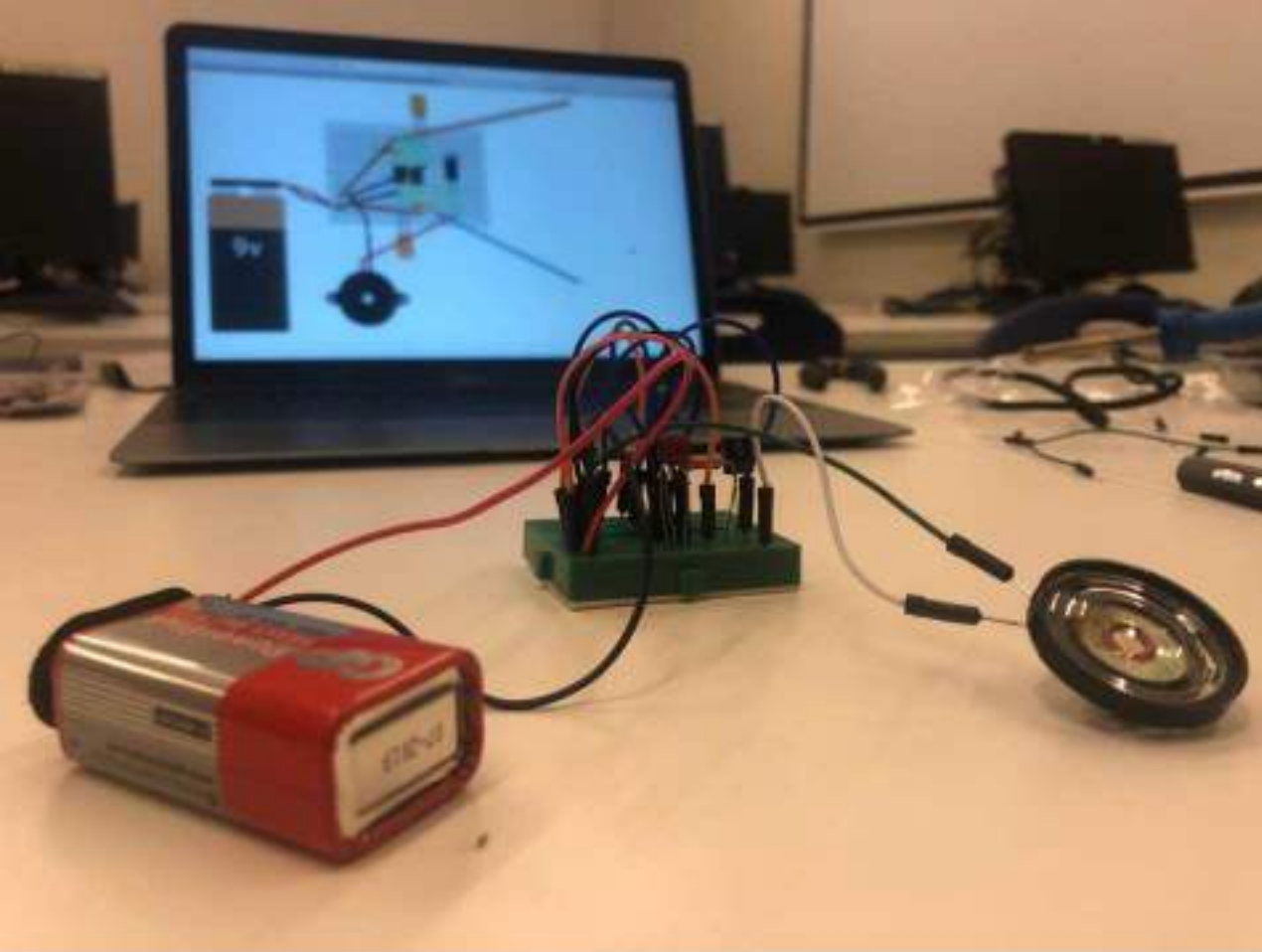
The turntable project was developed for Defoss, a company focused on designing modern, minimalist furniture and audio-related products. Defoss integrates digital fabrication methods such as 3D printing and CNC routing in their manufacturing process. The project aimed to create a new version of their turntable model called Logigram, reflecting the company's aesthetic and functional values.

The design process involved full participation in the development and prototyping stages, primarily using Rhinoceros software along with Fusion 360 for secondary modeling tasks. Key improvements focused on refining the mechanical components through advanced 3D printing techniques like SLAFDM resin printing, requiring over 80 hours to achieve a rigid and precise tonearm construction. The workflow also incorporated process automation and organization using Excel and Google Analytics.

Contribution to the project included enhancing several technical aspects of the turntable. This consisted of upgrading the tonearm for increased rigidity, implementing a high-precision machined axle bearing, improving the sub-platter to enhance grip isolation from the main platter, and optimizing the motor and control system to reduce operational noise. Furthermore, a critical calibration for the Vertical Tracking Angle was included for better audio performance.

The outcome resulted in a refined version of the Logigram turntable with significant functional and aesthetic upgrades. The improved tonearm and sub-platter combination increased stability and sound fidelity. Noise reduction in the motor system enhanced the overall listening experience. These combined improvements aligned with Defoss's modern design ethos while leveraging digital fabrication innovations.





Electronics

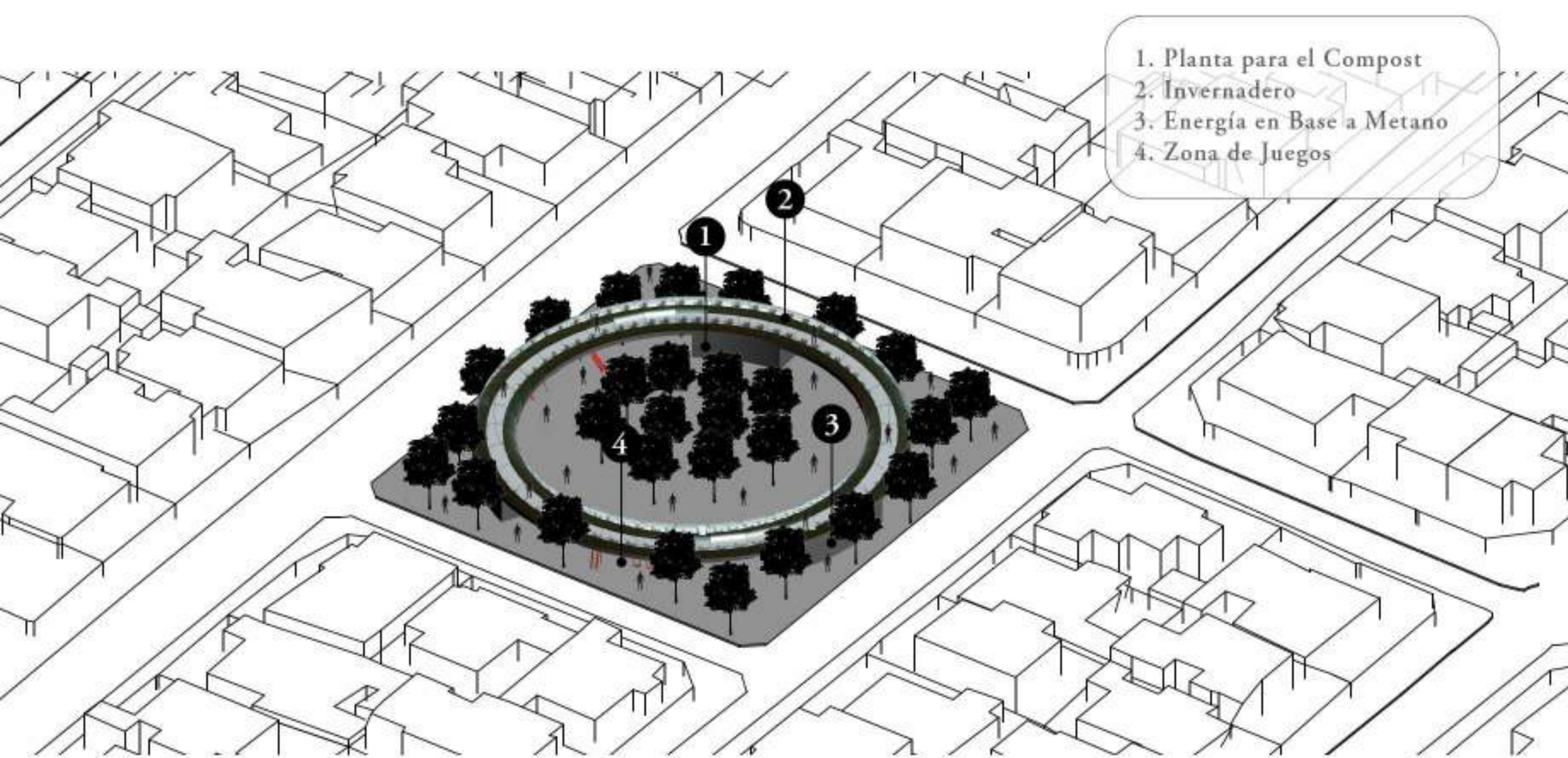
[YouTube Video](#)

This work focused on exploring the relationship between everyday human gestures and interactive sound through electronics. It began with a visit to Plaza de Armas in Santiago, Chile, where the theme of “belief” became the inspiration. Specifically, the cultural act of bringing hands together in prayer was chosen as the central idea to express through a tangible, electronic object. The project aimed to combine this concept with basic Arduino and circuitry skills to create an intuitive, sensory experience.

The design process started by building a Drawdio, a simple sound-generating circuit that produces audio through touch and conductivity. Using copper wires and conductive bands, the prototype was developed so that when the user pressed their palms together, the circuit would complete and create sound. Several iterations followed, shifting from a breadboard-based prototype to a more stable and compact version soldered onto a perfboard. Components were upgraded to ensure durability and improve the overall user experience.

My contribution involved assembling and programming the circuit as well as designing the interaction that allowed the prayer gesture to activate sound. I focused on making the electronic connections responsive and reliable while balancing the artistic concept. I enhanced the project by moving from fragile components to sturdier parts, soldering the circuit to improve stability, and completing foundational Arduino exercises to deepen my understanding of electronics. Additionally, I researched an accelerometer sensor and proposed a creative new use, expanding the project’s technical scope.

The final outcome is a tactile and auditory object that merges cultural symbolism with electronic interaction. Users experience the concept of belief physically through sound triggered by a familiar gesture. The compact, soldered circuit version is well-constructed and practical for repeated use. Supporting Arduino learning and sensor analysis helped broaden the project’s foundation, combining creativity with technical skills in a meaningful way.



- 1. Planta para el Compost
- 2. Invernadero
- 3. Energía en Base a Metano
- 4. Zona de Juegos

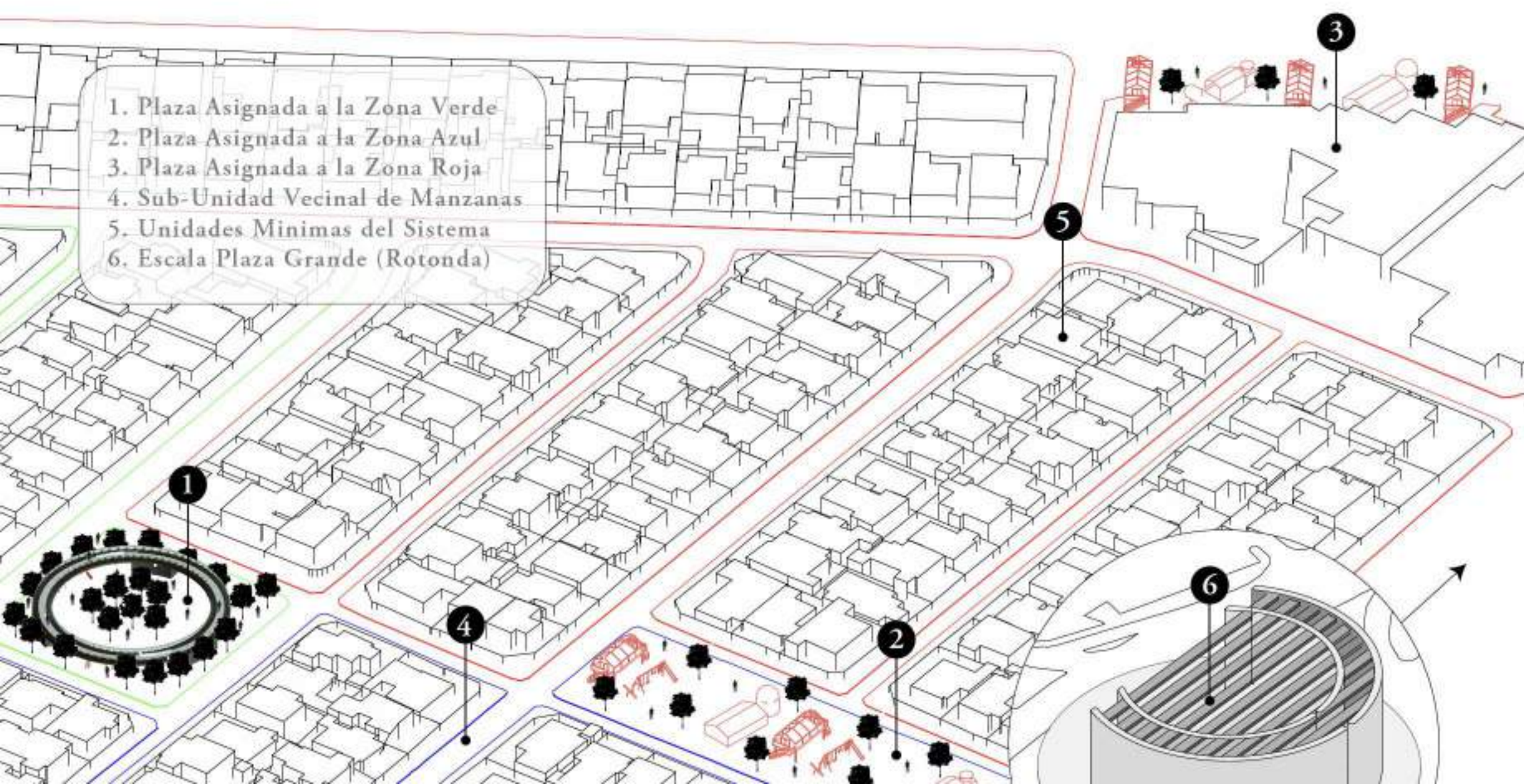
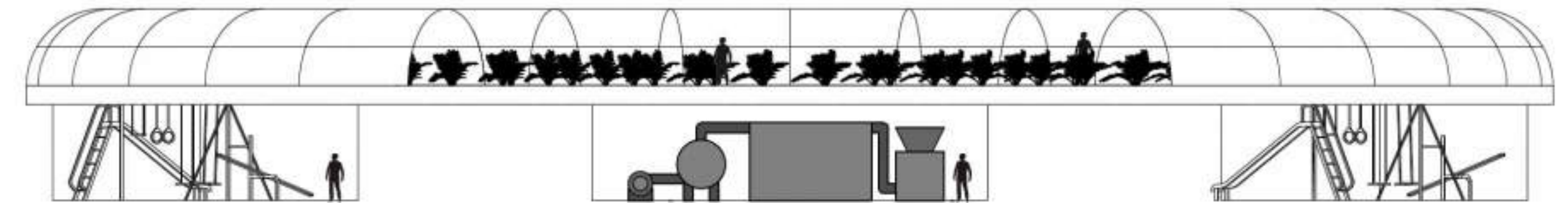
Green Hub

The project focuses on redefining neighborhood green areas by transforming them into self-sustainable community centers. These redesigned spaces aim to produce energy and food, emphasizing independence and the coexistence of urban life with productive resources. The initiative addresses the issues of resource management and community integration in modern cities, inspired by rural communal dynamics often lost in large urban areas.

The design followed a structured, iterative process divided into four stages: conceptual iteration, spatial iteration, proposal development, and finalization. Initial creative exploration defined core ideas such as urban-rural integration, resource independence, and community cohesion. These were applied at the neighborhood scale through mapping and spatial analysis to visualize existing conditions. The proposal phase introduced interventions in public plazas, integrating greenhouses, compost plants, and methane energy systems, refined through academic feedback and data analysis.

This project contributes by combining social and productive functions within public green spaces. It redefines plazas from recreational areas into active, sustainable hubs where communities engage in food production and energy generation using organic waste. The design fosters social cohesion by encouraging cooperation among diverse age groups through interactive paths, elevated greenhouses, and inclusive play zones, creating a model for neighborhood autonomy and sustainability.

The outcome is a holistic transformation of plazas into interconnected productive systems that are socially and environmentally sustainable. The intervention includes vertical greenhouses fed by compost, methane plants powered by organic waste, noise-absorbing walls, and multi-level walkways that promote interaction across all community members. These spaces retain their recreational qualities while functioning as community-driven centers for agriculture and energy, enhancing quality of life and urban resilience.



- 1. Plaza Asignada a la Zona Verde
- 2. Plaza Asignada a la Zona Azul
- 3. Plaza Asignada a la Zona Roja
- 4. Sub-Unidad Vecinal de Manzanas
- 5. Unidades Mínimas del Sistema
- 6. Escala Plaza Grande (Rotonda)



[YouTube Video](#)

Interfaces

This series consisted of several mini projects, each exploring different platforms and interaction methods to build foundational skills in digital design and coding. The projects ranged from game creation in Scratch and Unity, to musical interface programming in MAX, to live data visualization in Processing and TouchDesigner. Each served as a self-contained experiment with goals like creating games inspired by current events, connecting interactive devices, or integrating APIs for dynamic visuals. This diversity provided a rich environment for learning varied tools and approaches in interactive media design.

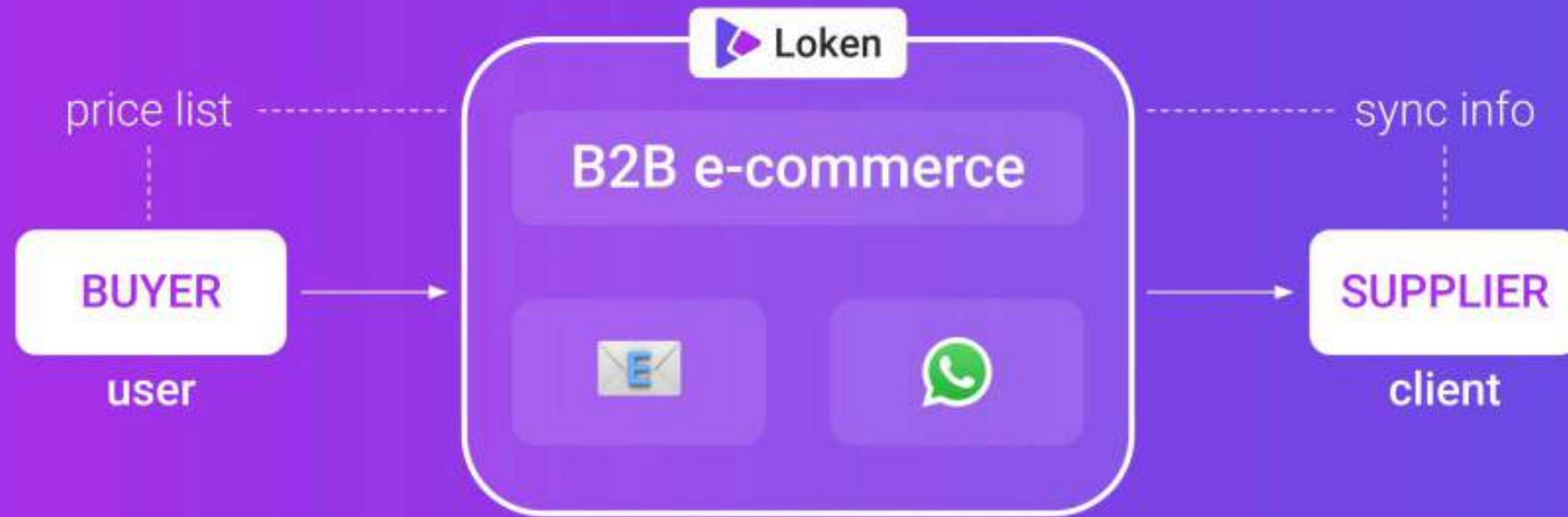
The design process focused on applying each platform's core features to build functional prototypes. Early projects involved coding games in Scratch and Pure Data where user input shaped gameplay, while later tasks connected MAX with OSC controllers and TouchDesigner visuals for synchronized audiovisual results. Data-driven visualizations imported JSON and XML files into Processing and TouchDesigner to turn raw data into meaningful graphics. Unity and Blender assignments advanced into recreating known games and producing 3D animations, expanding both technical and artistic skills.

My role was to translate concepts into interactive experiences through technical coding and design sensibility. I integrated platforms to enhance interactivity—linking virtual instruments with visual effects for compelling multimedia presentations. Experimenting with APIs and data sources, I created original visualizations that conveyed complex information clearly. Progressing to 3D game development and animation enabled exploration of narrative and thematic ideas, aligning intentional design with technical execution.

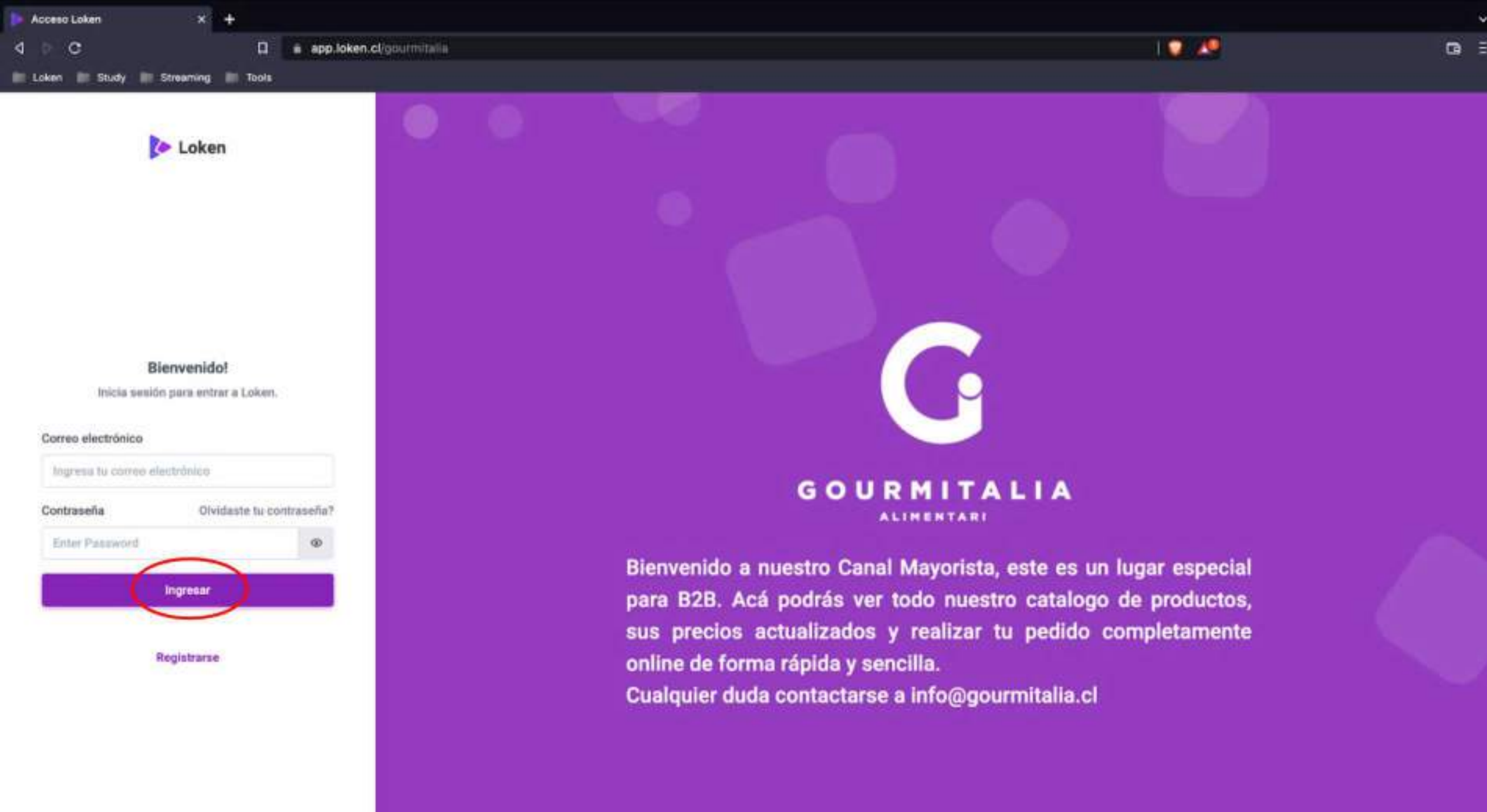
The final projects formed a diverse portfolio showcasing work across multiple tools and creative domains. Each mini project exemplified effective user interaction—through playful mechanics, expressive data displays, or multimedia integration. Together, they demonstrate the versatility and adaptability essential for interactive design, evolving from simple prototypes into orchestrated digital experiences engaging users on multiple sensory levels.



All-in-one platform that **automates, arrange** and **centralize** the B2B buying and selling process between companies 🛠️



Our solution → app.loken.cl → an example



Loken

[YouTube Video](#)

This project involved creating a B2B software platform designed to automate the buying and selling processes between businesses. It functioned as a closed ecommerce system tailored specifically for B2B transactions. The platform aimed to streamline operations by integrating key business functions such as order management, pricing, invoicing, and inventory control, providing a centralized digital space for companies to transact efficiently.

The design process focused on developing a seamless user experience that could synchronize with existing ERP systems used by businesses. Core features included multiple price list management, automated invoice generation, and real-time inventory tracking. Particular attention was given to ensuring the platform could handle complex business rules and workflows typical of B2B commerce, allowing smooth and error-free transactions across company boundaries.

The contribution of this work lies in delivering a comprehensive SaaS tool that reduced manual efforts and errors in B2B purchasing cycles. By automating repetitive and time-consuming tasks, it enhanced operational efficiency and accuracy for both suppliers and buyers. The solution also supported scalability by accommodating various business models, multiple users, and integration with external accounting and resource planning systems.

As a result, the platform successfully enabled businesses to centralize their sales and purchasing activities, saving time and reducing human errors. Its adoption was supported by a robust feature set tailored to regional business needs, which helped facilitate more reliable and faster transactions within a secure digital environment, transforming traditional B2B commerce into a more automated and user-friendly process.



Mechanism

[YouTube Video](#)

The project involved designing and building a mechanical system that performs a sequence of movements where one part's motion triggers another's opening. It was inspired by a practical need—to store remote controls compactly and neatly—drawing on concepts similar to a Swiss Army knife, where multiple compartments unfold from a single compact volume. The project context focused on understanding physical interactions and space constraints, maximizing functionality within a 50 x 50 x 50 cm volume.

The design process began with low-resolution prototypes illustrating the core movement concept, built from simple materials for fast iteration. The mechanism was modeled and analyzed in Autodesk Inventor for motion simulation, ensuring the linked sequence was smooth and operable with one hand. Iterative adjustments, guided by both simulations and physical tests, addressed real issues like friction and interference not predicted by software. This blend of technical analysis and intuitive problem-solving refined component geometry to enhance reliability and ease of use.

The project's main contribution is a novel linkage system that expands and compresses compartments smoothly using a single actuator. Unlike conventional storage designs, this mechanism features chained movements unfolding sequentially within a compact form. Design decisions tackled both engineering and ergonomic challenges, enabling one-handed operation while minimizing friction and mechanical bind. It also revealed the limits of digital simulation in capturing real mechanical behavior, emphasizing physical prototyping's role.

The final product is a functional four-compartment mechanism capable of expanding and retracting fluidly. Construction-stage refinements—like adjusting path curvatures and reinforcing parts—ensured structural stability and operational fluency. Despite material and fabrication challenges, the system effectively demonstrated the intended motion, validating the balance between digital modeling and hands-on iteration in mechanical design.



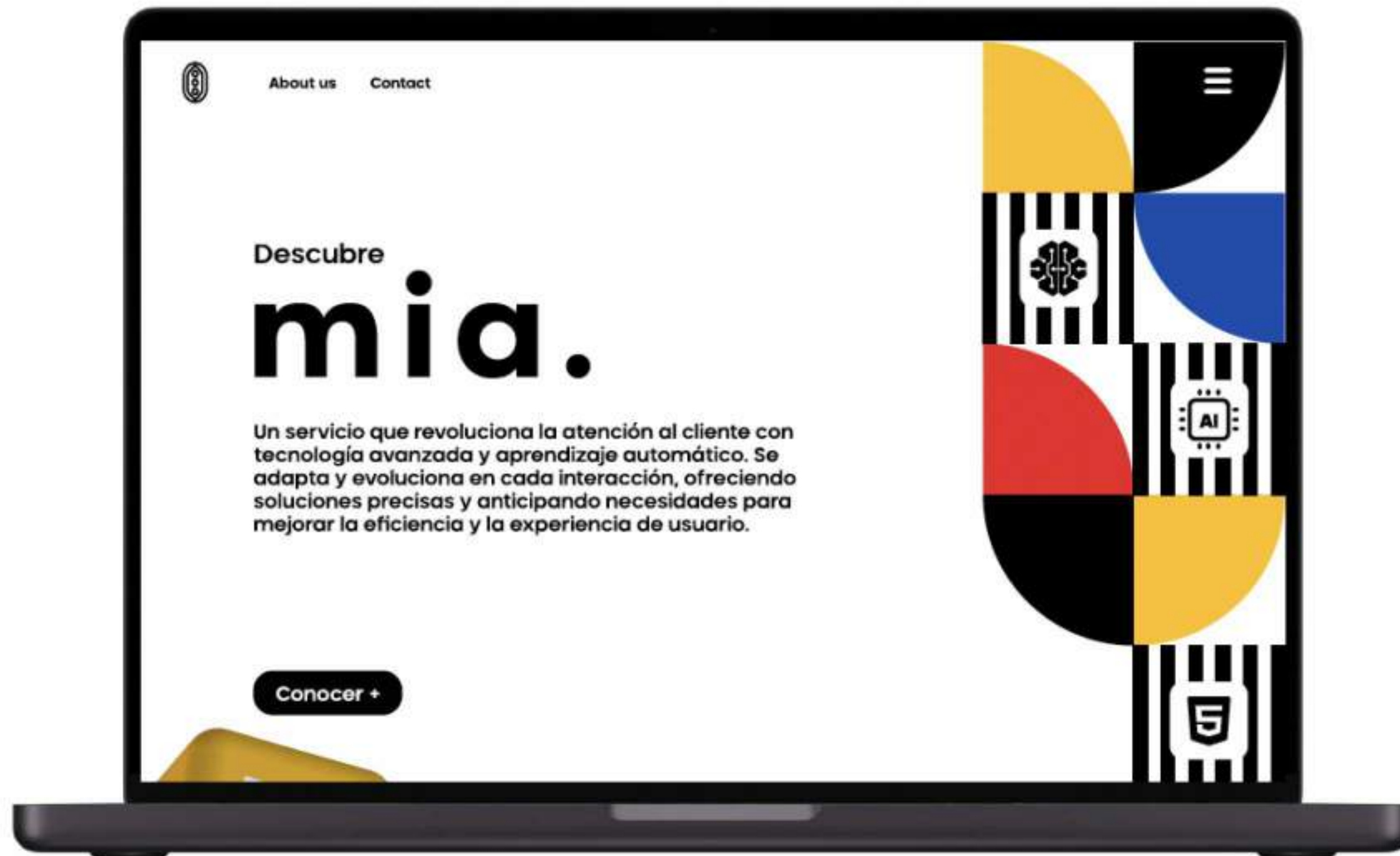
MIA

The project emerged as a master's final thesis that I supervised at the university, focusing on innovation within large-scale retail environments. The client, Parque Arauco—one of the most prominent shopping mall operators in Latin America—faced growing challenges in managing customer service across multiple centers. Support teams struggled with repetitive inquiries and high operational demands, revealing an opportunity to implement intelligent technology that could automate and improve communication with customers.

The design process centered on understanding the customer journey within mall interactions and identifying critical pain points in service workflows. Using qualitative research and data clustering, the team mapped recurring customer needs and translated them into functional design requirements. From these insights, we developed an AI-driven platform incorporating a chatbot and a learning algorithm built with Natural Language Processing to refine responses over time and adapt to evolving behaviors.

As the supervising professor, I guided the project's design vision and methodology, ensuring practical feasibility and coherence between user-centered design and AI capability. I oversaw the team's alignment with the client's goals, provided mentorship in prototyping and evaluation stages, and facilitated collaboration across technical and design disciplines to achieve a balanced and rigorous result.

The final prototype demonstrated promising impact: a projected 36% reduction in customer inquiries and average monthly savings of approximately 1,000 USD per mall. When scaled to Parque Arauco's 17 locations, the system estimated potential savings of 17,000 USD per month, validating the effectiveness of integrating AI and behavioral learning in real-world service environments.



CREW

App Concept

A heavy collaboration app focused on connecting emerging professionals in entrepreneurship through out the world. This platform seeks to be a tool to build up networks and meet new partners with different capabilities.

Screens

Usability

Logo

Typography

Ab Space Grotesk

Color Selection

UserFlow

RunMatch

Encuentra las zapatillas perfectas para correr

PROBLEMÁTICA: Encontrar las zapatillas perfectas para correr es una tarea complicada debido a la gran variedad de opciones disponibles en el mercado. Además, la falta de información sobre las características y beneficios de cada modelo hace que el proceso sea aún más difícil.

SOLUCIÓN: Desarrollar una aplicación que permita a los usuarios encontrar las zapatillas perfectas para correr basándose en sus preferencias y necesidades. La app ofrecerá recomendaciones personalizadas y permitirá a los usuarios comparar diferentes modelos y marcas.

SCREENS: MATCH, TUS ZAPATILLAS, PÁGINA DE PRODUCTO, RESEÑAS, DESCRIPCIONES, SECCIONES VARIADAS Poppins

USERFLOW:

Design.Lab App

La problemática abordada e identificada es la falta de integración de soluciones digitales amigables para el FabLab y la comunidad de makers. Nos centramos con la app, crear una comunidad para los estudiantes de la Escuela de Diseño en la Universidad, fomentar la colaboración entre pares, abrir espacio a un lugar donde visualizar proyectos pasados, conectarnos con sus creadores y optimizar los procesos que nos involucran con el FabLab, brindando una interfaz amigable que facilite labores y ahorre aún más su uso.

SCREENS: Home, Search, Profile, Project, Community

USERFLOW:

MID UAI

In the Master's program in Innovation and Design at Universidad Adolfo Ibáñez, I serve as the lead professor responsible for guiding key courses focused on Digital Product Design and the theoretical foundations of User Experience (UX) and User Interface (UI) design. These courses are part of a broader academic effort to address the explosive growth of technology, startups, and digital transformation across industries by preparing students to design impactful digital products that meet the needs of users and businesses.

The design process in these courses emphasizes user-centered design principles and agile methodologies. Under my direction, students conduct thorough user research, develop personas, benchmark competitors, prototype solutions, and carry out usability testing. Practical workshops allow them to create high-fidelity prototypes using industry-standard tools and incorporate responsive, accessible design principles to ensure inclusive user experiences.

Through these courses, I help students build competencies in synthesizing user insights and business goals into compelling digital interfaces. They engage in iterative, collaborative processes to balance aesthetics, functionality, and usability while staying abreast of emerging technologies such as AI and no-code platforms. This preparation equips them with the skills needed to contribute effectively in interdisciplinary and fast-evolving digital environments.

The results of these student projects are polished digital products and interface designs that demonstrate validated enhancements in user experience, reflecting both practical functionality and innovative design thinking. Graduates from these courses leave well-prepared to drive innovation and digital transformation by delivering user-centric solutions aligned with current industry standards and market demands.

FINDU

PROBLEMÁTICA: Muchos emprendedores en Chile enfrentan dificultades para encontrar talento y habilidades necesarias para el crecimiento de sus negocios. Esto se debe a la falta de canales efectivos para conectar con profesionales y talento especializado.

SOLUCIÓN: Desarrollar una plataforma que permita a las empresas encontrar talento de manera eficiente y a los profesionales encontrar oportunidades laborales que se ajusten a sus habilidades y experiencia.

SCREENS: Home, Search, Profile, Job Listings

USERFLOW:

ModelCollective

En el rubro del modelaje, encontrar talento es una tarea complicada para quienes buscan modelos para sus proyectos. Esto se debe a la falta de canales efectivos para conectar con modelos profesionales y talento especializado.

SOLUCIÓN: Desarrollar una plataforma que permita a las empresas encontrar modelos de manera eficiente y a los modelos encontrar oportunidades laborales que se ajusten a sus habilidades y experiencia.

SCREENS: Home, Search, Profile, Job Listings

USERFLOW:

EXTREME PAPARAZZI

COMPRA Y VENDE FOTOGRAFOS Y DEPORTISTAS

ENCUENTRA MOMENTOS EXTREMOS GESTIONA TU PERFIL

SCREENS: Home, Search, Profile, Job Listings

USERFLOW:

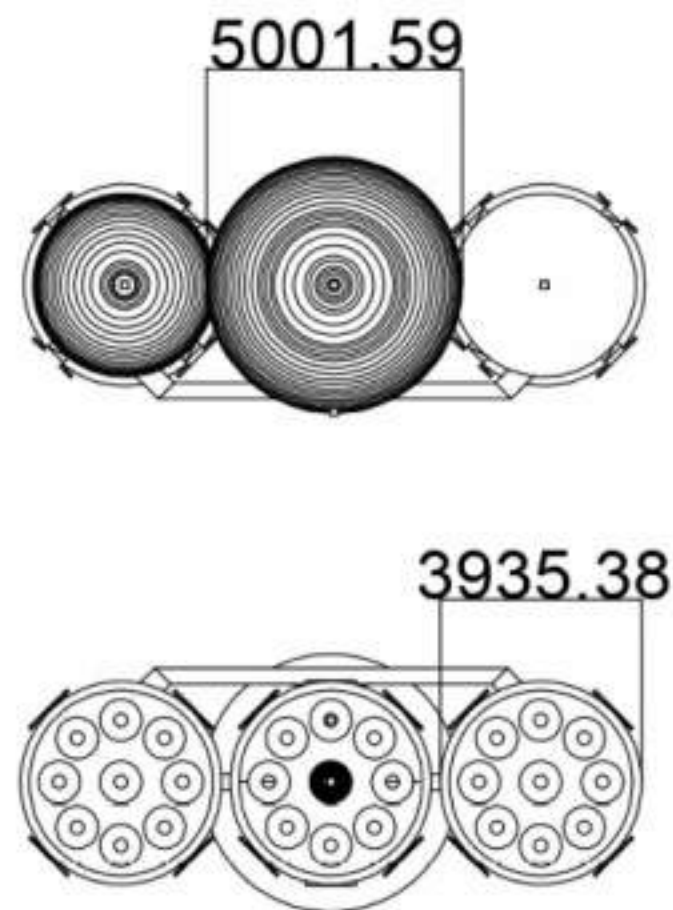
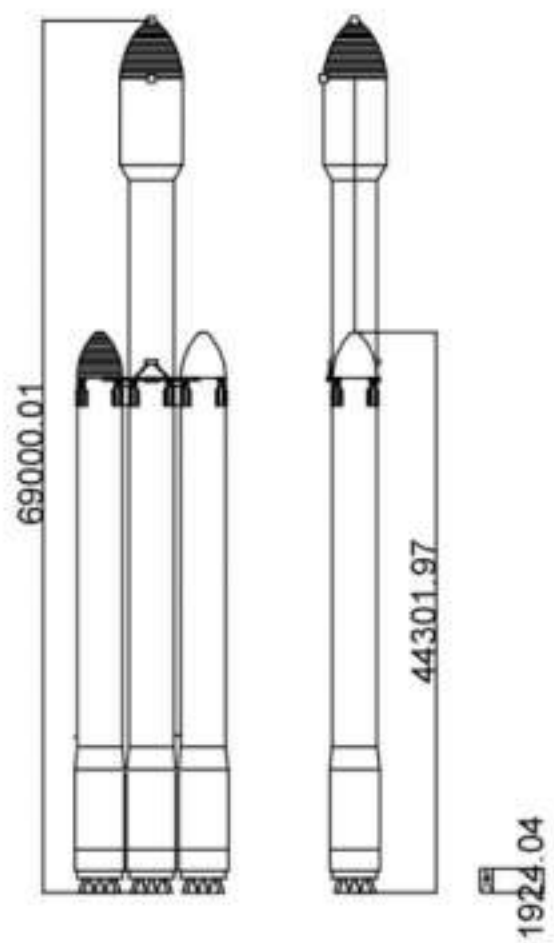
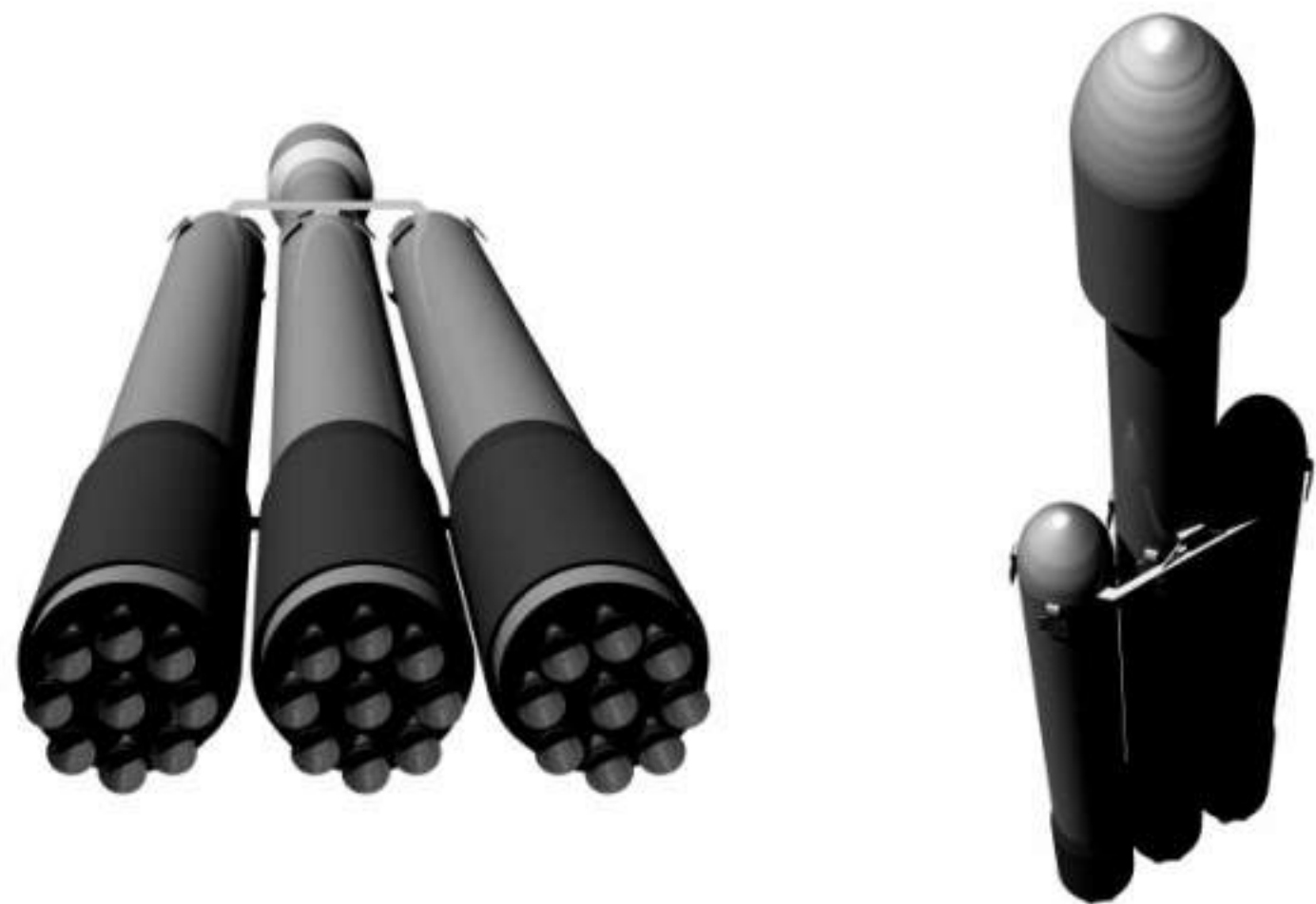
Piano Shelf

The Piano Shelf was conceived as a compact shelving solution that maximizes space efficiency both during packaging and use. Its design intention was to create a product that could be shipped in an ultra-thin flat box and occupy minimal wall space once installed. Inspired by the visual and functional characteristics of a piano's keys, each shelf element can be retracted and folded flat against the wall, optimizing usability in tight spaces. The project merges functional furniture design with spatial and material economy, tailored for modern living environments.

The design process involved detailed 3D modeling to carefully plan how each shelf component retracts and fits neatly against the wall. The main material chosen was metal, selected for its strength and durability, and was processed using digital fabrication techniques. Specifically, a waterjet cutter was used to precision-cut the metal sheets, ensuring accuracy and a clean finish. This digital workflow allowed for the intricate design of moveable keys and efficient material use, aligning with the project's goal of minimizing volume and complexity for assembly.

The contribution of this project lies in its innovative approach to transforming traditional shelving into a retractable system that adapts to various user needs, blending practicality with aesthetic appeal. The Piano Shelf challenges conventional furniture by integrating mechanical movement with static storage, enabling users to customize how much space the shelf occupies. This modular and retractable mechanism offers new possibilities for urban dwellers or small-space environments, where flexibility and smart design solutions are critical.

The final outcome is a durable, visually engaging shelving unit that folds compactly into the wall, leaving an almost flush surface when not in use. Its efficient packaging reduces shipping volume and cost, while the waterjet fabrication ensures high precision and quality in production. The result is a seamless combination of thoughtful design, advanced manufacturing, and user-centered functionality, providing a unique solution for space-conscious interiors. This project demonstrates how design and technology can collaborate to create useful, elegant, and sustainable everyday objects.



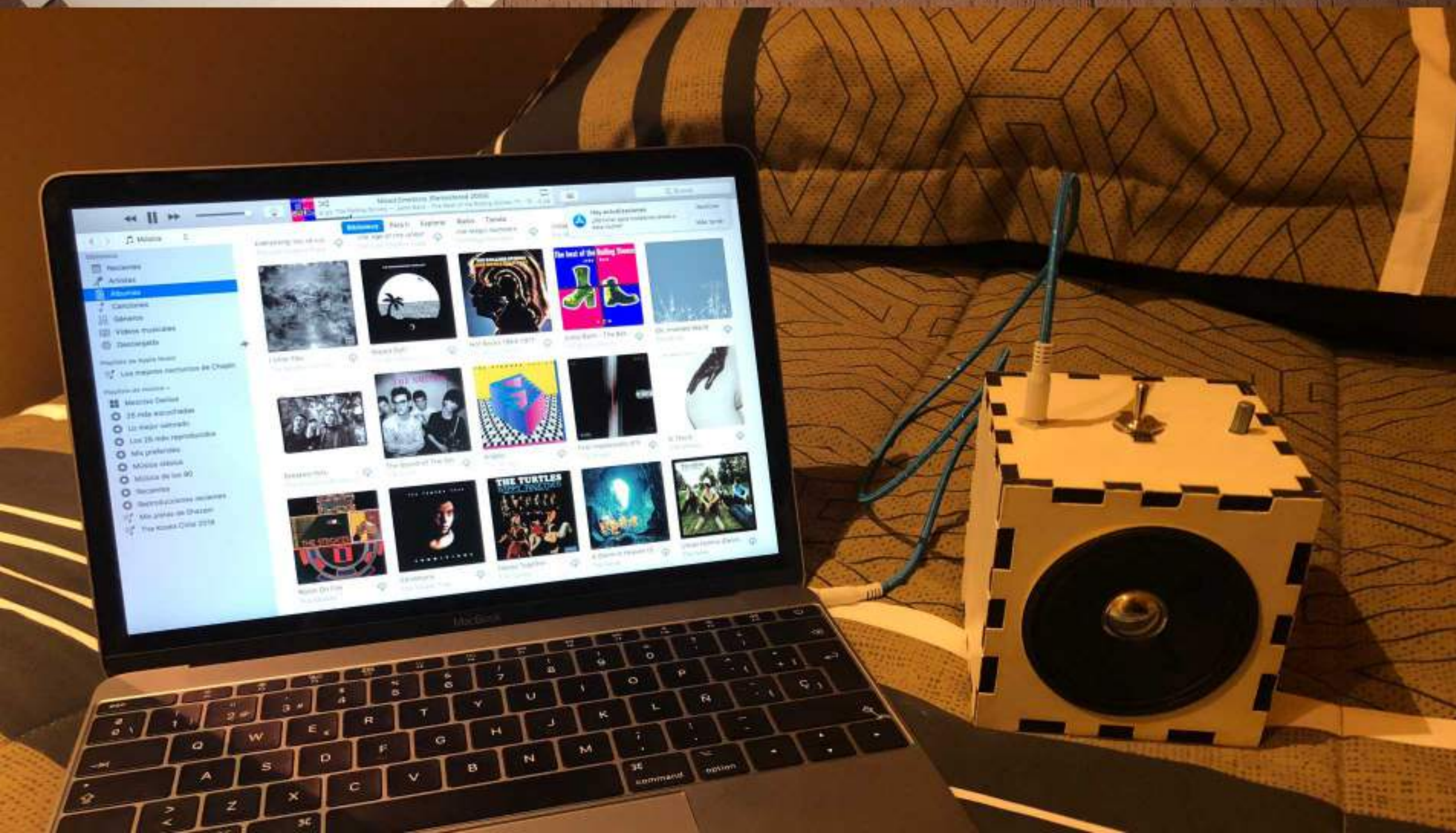
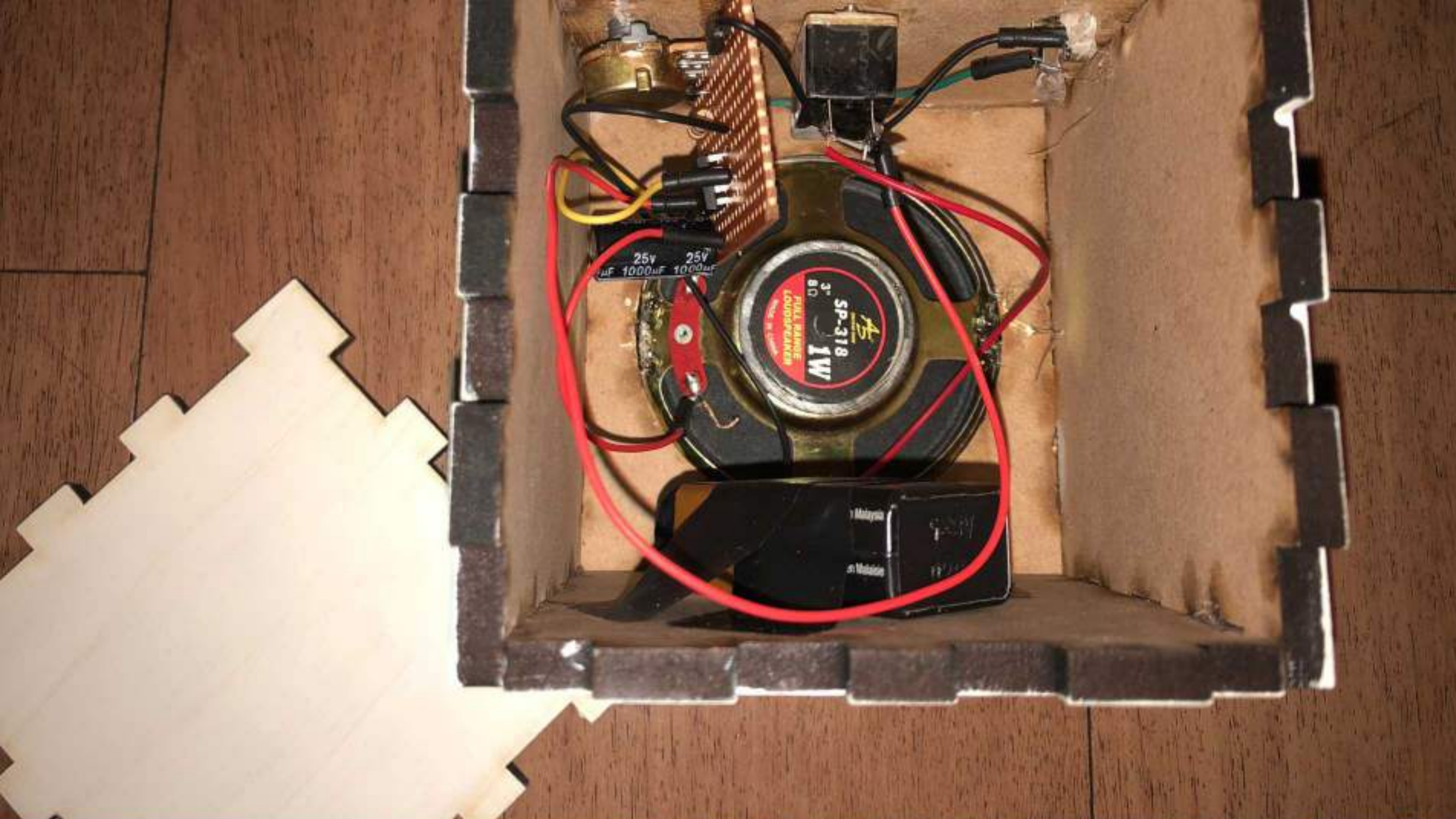
SpaceX Rocket

The project explored the relationship between digital modeling techniques and industrial design accuracy through the recreation of an existing aerospace structure. The focus was placed on SpaceX's Falcon Heavy rocket, chosen for its complex geometry and engineering precision. The objective was to understand how detailed 3D representation can convey both technical and aesthetic qualities of advanced technological products.

The design process began with extensive visual research, collecting reference images, blueprints, and engineering diagrams to establish precise proportions. Rhinoceros 3D was used as the primary modeling tool due to its capacity for high-accuracy surface manipulation. The workflow involved constructing the main body using NURBS geometry, detailing structural components such as boosters, landing legs, and the payload fairing. Several iterations were made to achieve visual coherence and reflect the rocket's technological essence.

The main contribution lay in translating a complex real-world object into a coherent digital model while maintaining both geometric integrity and design readability. Attention to details like aerodynamic curvature, surface transitions, and material references elevated the model from a simple reproduction to an expressive design piece. The iterative modeling process encouraged critical decisions regarding scale, proportion, and topology optimization.

The result was a fully detailed digital model that accurately represented the Falcon Heavy's structure and design logic. The final visualization emphasized clarity, precision, and surface quality, showcasing how 3D modeling can bridge the gap between technical fidelity and visual storytelling. The project demonstrated how digital tools can effectively capture the complexity of advanced engineering objects through a design-driven approach.



Speaker

[YouTube Video](#)

The project explored the design and assembly of a compact speaker system built using analog electronic components. The main objective was to create a functional audio amplifier centered around the LM386 integrated circuit, a key component widely used for small audio applications. This effort was an evolution from previous experiments with simpler sound-based circuits like the Drawdio, aiming to deepen understanding of audio amplification principles and their practical implementation.

The design process began with assembling the circuit on a protoboard to prototype and test its functionality. Through iterative testing, the circuit was optimized for stable sound output and minimal interference, ensuring that each component—from resistors to capacitors—performed efficiently within the layout. Once the configuration was validated, the next stage involved soldering the components onto a perfboard, ensuring durability and a more portable structure while maintaining the same design logic developed during the prototyping stage.

My main contribution involved managing both the electronic assembly and the transition from prototype to permanent build. This included careful component placement to guarantee a clear signal path, precise soldering to prevent shorts, and organizing the final layout to balance practicality and aesthetics. Additionally, I designed a wooden enclosure to protect the circuit, combining digital fabrication through laser cutting with manual finishing to enhance the overall presentation and usability of the speaker.

The final result was a fully functional and neatly enclosed speaker system housed in a custom-made wooden case. The enclosure, crafted from 5.5 mm laser-cut wood panels, was painted white to provide a clean and minimalist appearance consistent with the project's design intent. Once the electronic circuit was securely integrated inside, the device offered both a tactile and auditory experience that demonstrated a thoughtful connection between hardware design, craft precision, and audio performance.



Support Arm

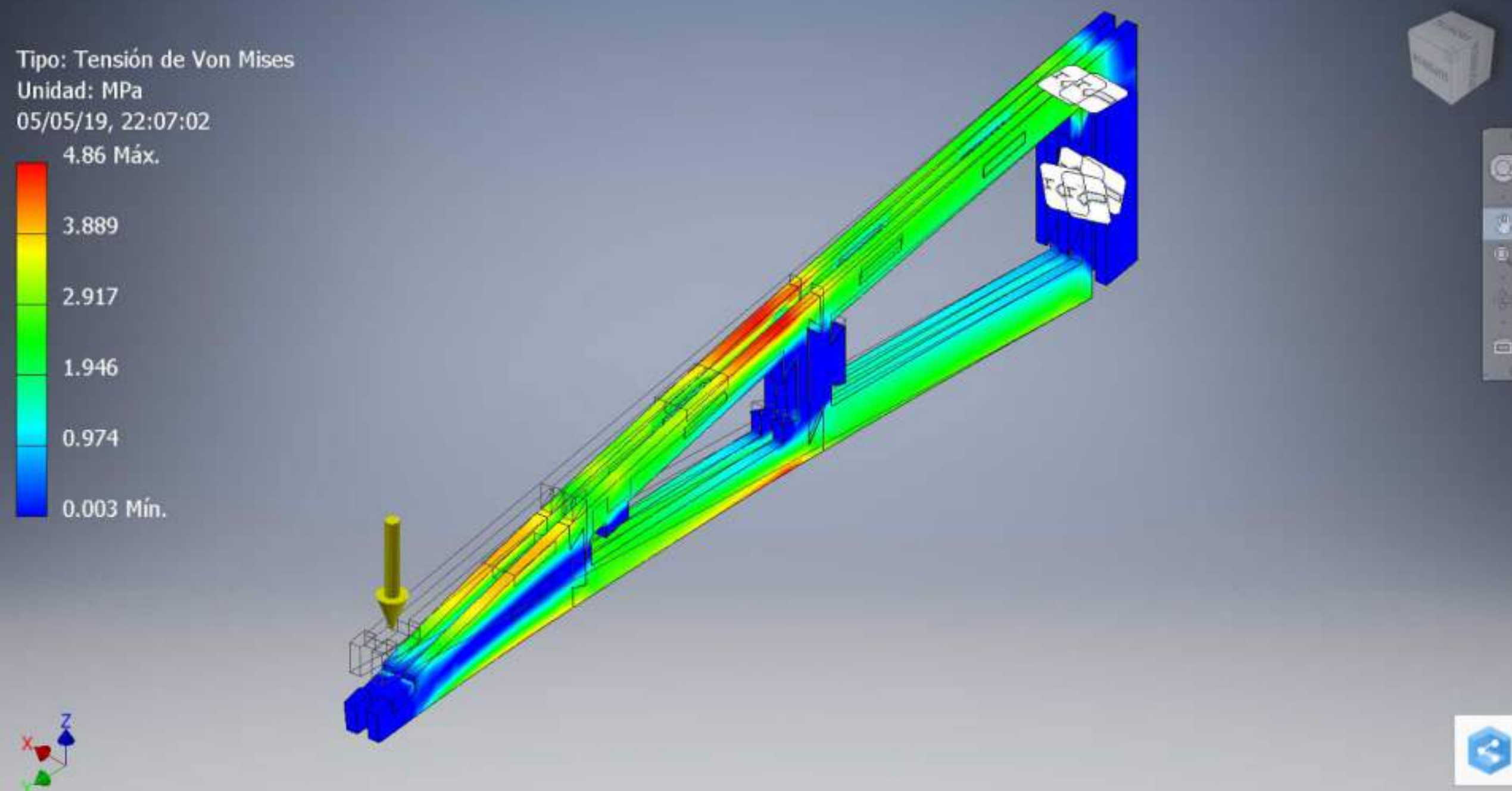
[YouTube Video](#)

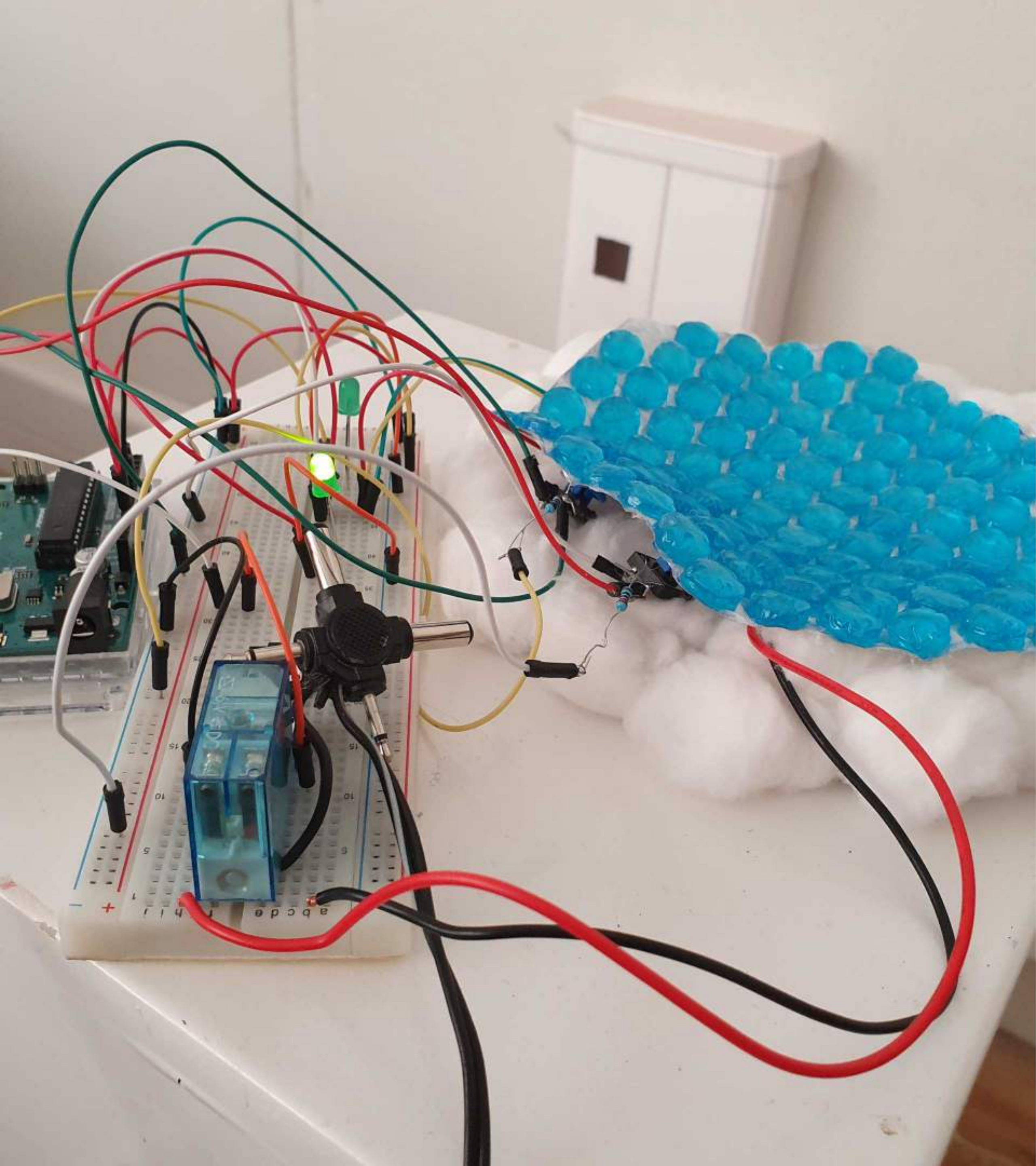
The project involved designing and building an MDF support arm capable of withstanding a significant load at one end. Conducted in an academic design and mechanisms course, the main challenge was achieving maximum load resistance within a limited 25x25 cm base and 50 cm length. The goal was to create a robust arm that outperformed peers, validated through real load testing as part of a competitive exercise.

The process began with an intuitive concept, refined through several Autodesk Inventor iterations. Early designs used a single MDF face with multiple parts but showed weakness in stability and joints. Later versions introduced dual MDF faces for greater rigidity, better joineries, and optimized connections to reduce instability while maximizing material use. The iterative approach combined finite element analysis and practical intuition to enhance strength and stability toward a final optimized design.

The project's main contribution was integrating digital modeling, structural analysis, and hands-on experimentation. The stepwise refinement revealed deep understanding of load distribution, material behavior, and structural balance beyond software predictions. Practical improvements—like larger and more numerous joints and evenly spaced MDF faces—proved essential for outperforming other designs. The experience emphasized complementing software-driven analysis with intuitive insights for real-world performance.

The final arm endured the highest load among all course projects, excelling in both virtual and physical tests. It ultimately failed at one joint, revealing potential refinement areas in connection design. Overall, the project demonstrated the effectiveness of iterative design and the synergy between digital analysis and practical implementation for strong, high-performing structures.





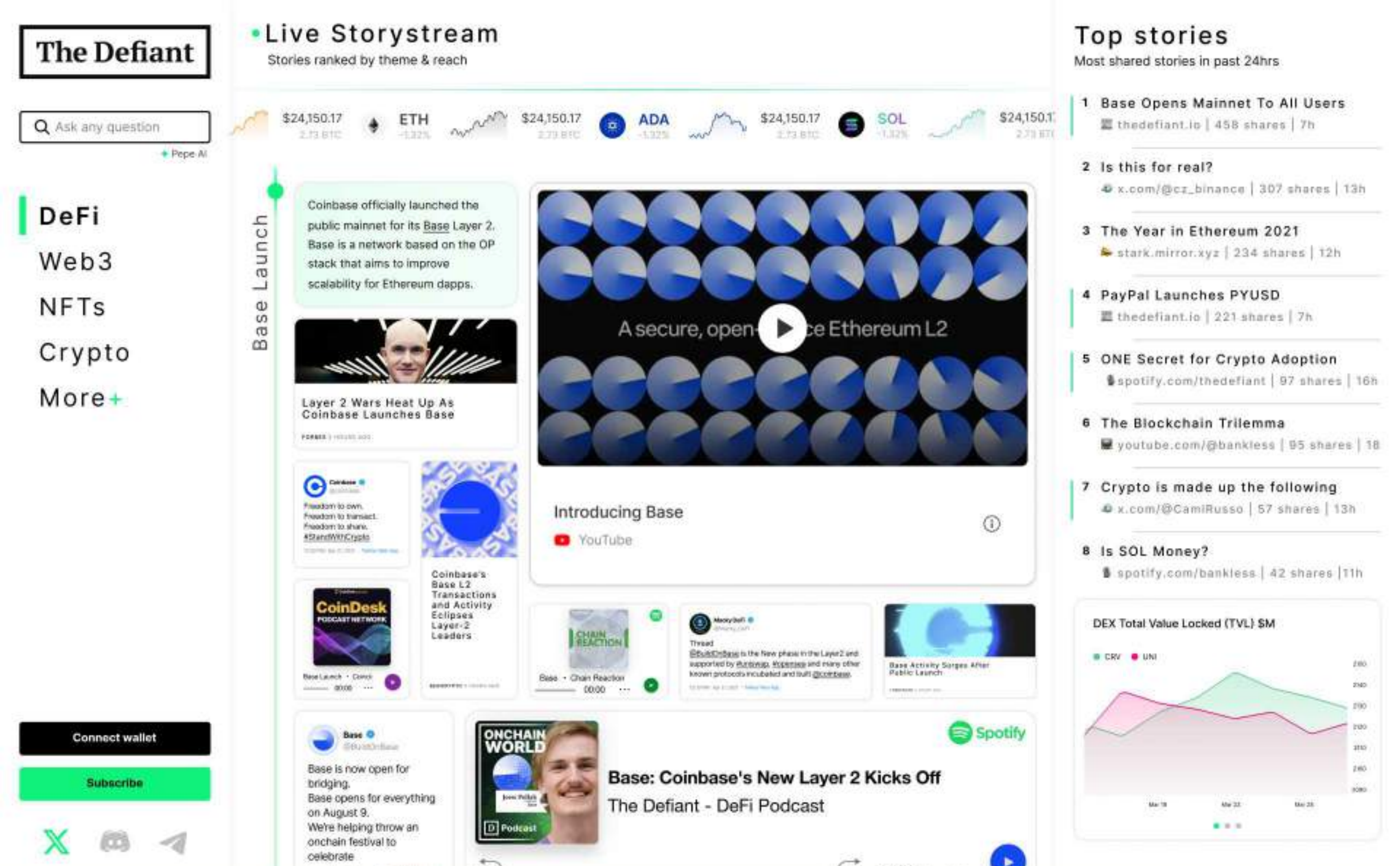
Tempillow

This project addresses the widespread problem of poor sleep quality and insomnia, particularly in elderly populations who often experience temperature-related discomfort during rest. The goal was to create a pillow capable of both cooling and heating, with a focus on cooling, to improve sleep comfort and potentially reduce health issues linked to poor sleep such as cardiovascular problems and anxiety.

The design process integrated an Arduino microcontroller, temperature sensors, and a Peltier plate to actively regulate the pillow's temperature. Since the Peltier plate cools on one side and heats on the other, careful thermal management was crucial; this was achieved by using heat sinks and gel-injected packaging bubbles to dissipate heat efficiently and maintain a stable, comfortable surface temperature. The system includes a user-friendly interface with buttons to switch modes and temperature feedback for precise control.

This prototype's main contribution lies in combining accessible thermoelectric technology with a user-centered and socially-conscious design approach, aimed at helping vulnerable groups such as low-income elderly individuals maintain body temperature comfortably year-round. The project balances innovative hardware, practical material choices, and affordability to maximize its social impact and usability.

The final prototype successfully demonstrates the capacity to regulate temperature within the pillow, allowing users to select and maintain their preferred cooling or heating setting during sleep. This successful outcome opens pathways for further refinement and development into a market-ready product that could benefit many suffering from insomnia and temperature discomfort.



The Defiant

The project aimed to redefine the digital presence of The Defiant, a leading publication in the DeFi and crypto space. It emerged from the need to build a more engaging, intelligent platform reflecting the speed and complexity of decentralized finance. The vision was to transform a traditional editorial site into a dynamic information environment, integrating AI tools to help users navigate and interpret the constant flow of blockchain and crypto news.

The design process began with an in-depth study of user behaviors across news and trading contexts. By mapping typical information journeys, the team identified friction points in how users consumed, compared, and validated crypto data. Iterative sketches and mid-fidelity prototypes tested an adaptive feed interface merging content from multiple sources beyond The Defiant. In parallel, concepts explored an AI-driven query system that let users access contextual answers and insights without leaving the page.

My main contribution involved shaping the interaction patterns and visual system. I designed the logic behind the aggregated feed, built the modular grid, and defined the conversational interface supporting AI-driven queries. I worked closely with developers to enable real-time content retrieval and with editors to refine how external media integrated with The Defiant's voice.

The final proposal presented a cohesive ecosystem combining real-time intelligence with editorial depth. The redesigned interface streamlined reading and positioned The Defiant as a multi-source knowledge hub. A conceptual extension introduced a professional-grade terminal inspired by Bloomberg, offering customizable dashboards and analytic tools for advanced users. Together, these solutions shifted news consumption toward data-driven insight and decision-making within the DeFi community.

Venn Shelter

The Venn shelter is conceived as a retreat in the natural landscape of southern Chile, specifically the scenic area of Pucón. Inspired by the Venn diagram, it merges essential aspects of daily life—rest, nourishment, and work—within a harmonious architectural form. Elevated above the ground, the shelter offers panoramic views of forests and volcanic landscapes, fostering an immersive experience that balances solitude with appreciation for nature.

The design centers on a geometric base symbolizing union and intersection, resulting in an elevated triangular structure. A central terrace acts as a communal node, surrounded by distinct yet interconnected spaces: kitchen, bedroom, and study. Each area was carefully arranged to maximize functionality and comfort while strengthening the connection between inhabitants and their environment. Light, orientation, and the seamless flow between indoor and outdoor areas were key considerations.

A defining aspect of the project is its modularity and adaptability. Designed for an individual or couple, the flexible interiors support diverse routines while preserving core functions. The layout fosters productivity and relaxation, encouraging users to disconnect from urban life and reconnect with nature. By reinterpreting recognizable architectural references in a local context, the project explores how small-scale dwellings can nurture well-being, intimacy, and environmental sensitivity.

The result is a distinctive living space that invites users to “float” within nature while feeling sheltered and elevated. With its clear geometric identity and integrated program, the Venn shelter enables a lifestyle that values both reflection and shared moments. Its openness offers sweeping views, while its design instills safety, comfort, and connection, serving as both a functional refuge and a symbol of unity in design.

