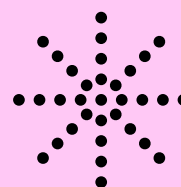


# GREEN THREAD



## EIC 2024

Mariam Shibly  
Gunashree Rajendra Kumar  
Vina Magdalena



# THE PROBLEM

**The multifaceted problem** our startup aims to address impacts both the global environment and the fashion industry significantly. The fashion sector, now a staggering \$2.5 trillion industry, is a major contributor to environmental degradation, producing millions of tons of textile waste annually. This waste not only exacerbates ecological vulnerability in regions like the Atacama Desert but also signals a broader issue of unsustainable practices pervasive in the industry. The alarming rate at which clothing is produced, consumed, and disposed of highlights a systemic problem rooted in the linear economy model, characterized by a take-make-waste approach. This model, while historically contributing to economic growth and development, has led to severe environmental consequences, including soil degradation, ocean pollution, and the loss of biodiversity (Ellen MacArthur Foundation, n.d.).

**The environmental impact** of the fashion industry is vast, responsible for about 10% of global carbon emissions and nearly 20% of wastewater. A shocking estimate suggests that 1.4 million trillion plastic fibers have contaminated the ocean due to the industry's reliance on synthetic fabrics like polyester, acrylic, and nylon. These materials, integral to "fast fashion," shed microfibers with each wash, contributing to the growing crisis of microplastic pollution in marine ecosystems (UNEP, 2019). This situation underscores a pressing need for a shift towards sustainable and ethical fashion practices, a sentiment echoed by the UN Alliance on Sustainable Fashion, which seeks to align the industry with the Sustainable Development Goals (SDGs) through collaboration and innovation (UNECE, 2018).

**Addressing these challenges** requires overcoming complex obstacles, including sustainable global supply chains, consumer behavior rooted in fast fashion consumption, and technical hurdles associated with sustainable innovations. Efforts to mitigate the issue, such as recycling and upcycling initiatives, face limitations in scalability and material quality retention. However, the push towards a circular economy, as discussed by the Ellen MacArthur Foundation and the US White House Office of Science and Technology Policy (OSTP), offers a promising avenue for substantial change. By embracing circular economy innovations, there's potential not only to alleviate the environmental impact of the fashion industry but also to stimulate economic growth and resilience (Ellen MacArthur Foundation, 2023).

## ORIGINALITY OF SOLUTION

**Our solution's originality lies in its innovative integration of computer vision technology with sustainable fashion practices**, creating a unique ecosystem that marries customer preferences with environmental consciousness. By leveraging computer vision to match customer-uploaded design preferences against a database of existing textile waste, we offer a customized manufacturing process that significantly reduces waste. This approach is complemented by a web portal that enhances customer engagement in the design process, marking a departure from traditional fashion production methods. Additionally, the involvement of fashion design students in the consultation process introduces fresh ideas into the design workflow, while our commitment to offering up to 10 free alteration services, including fabric rejuvenation, emphasizes our dedication to sustainability and garment longevity. Altogether, the marriage of these strategies presents a novel application of technology and sustainable practices, setting our solution apart in the quest for a more sustainable fashion industry.



# WHY DOES OUR SOLUTION SOLVE THE PROBLEM?

**Minimizing Textile Waste:** The solution proposes a Made-To-Order approach, which helps minimize textile waste by producing garments based on customer demand rather than mass-producing items that may go unsold and end up as waste.

**Recycling Existing Wastes:** By recycling existing textile wastes, including discarded clothing from regions like the Atacama Desert, the solution addresses the issue of textile waste accumulation and contributes to a more sustainable use of resources.

**Web Portal and Computer Vision Technology:** The creation of a web portal where customers can upload photos of their design preferences, coupled with the use of computer vision technology, streamlines the design process and reduces the need for physical samples, thereby minimizing waste and resource consumption.

**Confident Score and Production Threshold:** The implementation of a "Confident Score" based on computer vision analysis ensures that only designs with a high likelihood of customer satisfaction proceed to production, reducing the risk of producing unwanted or unsold garments that contribute to waste.

**Stringent Data Privacy and Compliance Standards:** Adherence to stringent data privacy and compliance standards, along with regular security audits, ensures the protection of user data and builds trust with customers, encouraging their engagement with the platform and promoting sustainability in fashion consumption.

**Additional Sustainability Services:** Offering free alteration services that go beyond stitching to include fabric rejuvenation promotes reuse and extends the lifespan of garments, contributing to a more circular and sustainable fashion economy.

**Collaboration with Fashion Design Students:** Involving fashion design students in the design process not only infuses fresh perspectives but also fosters collaboration and innovation, contributing to the development of more sustainable and creative fashion solutions.

**Overall, the solution addresses the multifaceted problem of environmental degradation caused by the fashion industry by implementing innovative strategies that promote sustainability, minimize waste, and engage customers in the design process.**

## MEET THE TEAM

### Mariam

7 years in the fashion industry through producing fashion shows and as a fashion creator. Launching a sustainable fashion line upon completing Masters of Science in Data Analytics from the Master of Science Business Fosters School program.

### Gunashree

Graduate Student of Information Management at UW iSchool, focus in Product Management. Entrepreneurial experience in Fashion, co-founder of an online tailoring service for Female Millennials back in India. Also an ex-Software Engineer at Oracle, Wells Fargo.

### Vina

A graduate student in the Information Management program at the UW's iSchool with a Business Intelligence specialization. Previously worked in marketing, currently running a curated vintage store with a partner to promote circular and sustainable fashion.

### ADVISOR

**Data scientist advisor:** Adithyaa V (UW Masters in Data Science Student)

# DEMO AND IMPLEMENTATION

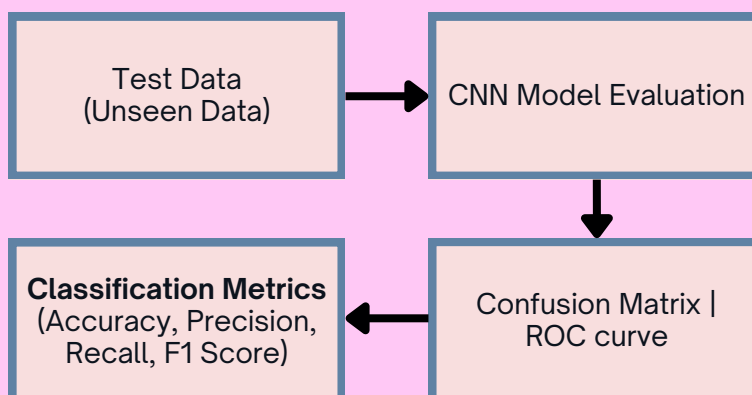
**1 Step 1: Digital Prototype Introduction:** We build a web portal and host it on a server. This portal is the heart of our solution, where customers can upload photos of their design preferences. We walk the audience through the user-friendly interface, highlighting how easily customers can navigate and submit their designs or inspirations, sourced from personal collections or platforms like Pinterest.

**2 Step 2: Computer Vision Technology Demonstration:** This segment demonstrates how the technology analyzes uploaded customer photos to generate a "Confident or Similarity Score." This score assesses the match between the customer's design preferences and our existing design database, including our inventory of upcycled textiles. We will be implementing a CNN (**Convolutional Neural Networks**) **Algorithm** to achieve the same and the details are discussed here.

Database Data	Input Data
Internal Designs Image that includes Atacama Textile Wastes	Customer Input Images

## Test Results and Validation:

When evaluating a Convolutional Neural Network (CNN), unseen data from a separate test dataset is used to gauge its performance. This involves analyzing classification metrics like accuracy, precision, recall, and F1 score, which reveal the model's ability to classify instances and balance different types of errors. A confusion matrix offers insight into error types and visualizes the model's predictions. The ROC curve depicts the true positive rate against the false positive rate across various thresholds. These metrics help comprehensively assess CNN performance and pinpoint areas for enhancement.



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**Step 3: Visual Explanation:** We enhance our explanations with visuals, diagrams, and posters, illustrating key features like the Made-To-Order approach, computer vision technology, and alteration services. These visuals clarify the end-to-end process, addressing textile waste in the fashion industry.

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**Step 4: Alteration Prototypes:** We showcase prototypes of alteration services, including fabric rejuvenation techniques, emphasizing our commitment to extending garment life. Before-and-after visuals demonstrate the effectiveness of our techniques, highlighting a range of alterations that rejuvenate and repurpose garments.

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**Step 5: Environmental Benefits:** We emphasize the environmental benefits of our approach, presenting data and visuals showcasing potential reductions in textile waste and sustainable fashion practices. This section aims to connect with our audience ethically, emphasizing the importance of sustainable fashion.

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**Step 6: Testimonials and Case Studies:** We conclude with testimonials and case studies from early users and pilot tests, showcasing the positive impact of our solution in reducing waste, meeting design expectations, and rejuvenating garments. By sharing success stories, we aim to build trust and excitement around our innovative solution.



## MARKET OVERVIEW AND TRENDS

**There is a huge market potential** to be realized by tapping into this growing market. With rising concerns on the industry's impact on climate change, demands for sustainability by consumers are also increasing. The value of ethical fashion is estimated at \$8.6 billion, which is minute compared to that of fast fashion at \$123 billion (Statista, 2023). However, the trend for this sector is steadily rising and is predicted to reach over 6% of market share by 2026 (Statista, 2023). Increasing government pressures are also huge contributors, with new regulations on ensuring sustainable practices in fashion and apparel set to be implemented in 2024 across the EU and the US according to a McKinsey report (Balchandani, Barrelet, Berg, Rölken, & Starzynska, 2023).

### Who are our customers?

Millennials (28-43) and Gen Z (18-27) are our biggest target audiences. These groups accounted for 68% share of sustainable apparel revenues in 2022 (Statista, 2023). Both demographics are also most concerned with environmental impacts and buying from brands that align with their values. McKinsey (Segel & Hatami, 2023) reported that 40% of Gen Z and millennials consider environmental impact as a very important factor when deciding what to buy.

Moreover, the significance of quality becomes apparent when considering clothing preferences within these demographics. Our solution is designed not only with a circular mindset, but also to ensure a long lasting quality that is often not met by fast fashion brands. By offering alterations on our product, we want to emphasize our commitment to creating a quality wardrobe that will be valued.

### Customer's dilemma

Consumers have shown willingness to choose the better option if presented to them. While trends are increasing, there is data supporting opposing behavior. According to a Bain and Company report (D'Arpizio, et al., 2022), customers expressed challenges in distinguishing sustainable products from the market and limited product selection as top reasons for not buying sustainable clothes and accessories.

Greenwashing has decreased customer confidence for many years. We want to explore opportunities in this market gap by boosting customer confidence by detailing our process from acquisition of materials to production and alterations. In addition, using made-to-order methods, encouraging customer submission, and leveraging young designers we also address the issue of limited selection by producing designs customers demand and offering unique designs by aspiring designers.

### Our competitor

We have identified one competitor that is providing a similar solution. Finesse is a clothing brand that claims to be sustainable by using AI to predict trends and hyper-optimize production with a mission to reduce overproduction that is rampant in the fashion industry. Customers vote on their desired design, a 3D rendering created by their team, on Finesse's website and Instagram weekly. The design with the most votes will then go into production (Finesse, n.d.).

Our solution is similar in that we will only move towards production when the confidence score is high, but differ significantly in that we are also actively trying to eliminate existing waste by recycling it into new clothing as well as finding new ways to eliminate the need for raw materials entirely.

# CLIMATE IMPACT

**Our startup's solution**, deeply rooted in the principles of the circular economy, is meticulously designed to mitigate the environmental impact of the fashion industry, with a strong emphasis on reducing carbon emissions. By adopting practices that encourage the upcycling of discarded textiles and the utilization of a made-to-order model, the project aligns with strategies that significantly lower the demand for new raw materials and reduce waste, thereby having the potential to considerably lessen carbon emissions within the fashion sector. The Ellen MacArthur Foundation outlines how the circular economy can create value and reduce emissions by designing out waste and pollution, keeping products and materials in use, and regenerating natural systems (Ellen MacArthur Foundation, n.d.-a).





In designing this solution, our team has been inspired by various schools of thought that underpin the circular economy, focusing specifically on reducing emissions and, where possible, sequestering carbon. This approach not only addresses the immediate carbon footprint associated with the production and disposal of clothing but also considers the lifecycle emissions of garments. By leveraging technologies and methodologies that aim for carbon neutrality, we strive to ensure that our solution contributes to the broader goal of emission reduction in line with the insights provided by the Ellen MacArthur Foundation (Ellen MacArthur Foundation, n.d.-b).

Regarding the Green House Gas (GHG) emissions scope, our team has conducted an initial assessment to identify which areas of our solution hold the most significant potential for emissions. Recognizing that Scope 3 emissions, which include indirect emissions from activities such as the procurement of raw materials and the disposal of products, are particularly relevant in the fashion industry, we are focusing our efforts on minimizing these through our sustainable practices. Furthermore, we are in the process of calculating the projected carbon footprint of our solution to ensure transparency and to identify further opportunities for emission reduction. This meticulous approach underlines our commitment to not only addressing the pressing issue of textile waste but also contributing positively to the fight against climate change.

## OVERALL POTENTIAL IMPACT

**Absolutely, our startup's solution could have a substantial impact in the market, the world, and on people's lives. The fashion industry,** a significant contributor to environmental degradation, is now at a critical juncture. With plastic fibers polluting oceans, the production of wastewater, the use of toxic dyes, and the exploitation of underpaid workers highlighting the dark side of fast fashion, the need for change is undeniable. Reports from the United Nations Environment Programme (UNEP) and the Ellen MacArthur Foundation emphasize the environmental costs of fast fashion and advocate for a circular economy for textiles as a sustainable alternative.

Our startup's focus on reducing waste and preventing the use of new, plastic-based materials directly addresses the issue of microfiber pollution, as highlighted by UNEP. By transforming the industry's approach from a linear to a circular model, we not only aim to reduce the environmental footprint but also to reshape consumer habits and industry standards. This transition to a circular economy, where textiles are reused, recycled, and upcycled, presents an opportunity to significantly mitigate the adverse effects associated with fast fashion.

The impact of our solution extends beyond environmental benefits; it has the potential to revolutionize the market by introducing sustainable practices that can be adopted globally. By prioritizing the reduction of waste and the upcycling of materials, we are setting a precedent for how businesses can operate in harmony with the planet. This approach not only alleviates the pressure on natural resources but also addresses social issues by advocating for fair labor practices and reducing the industry's reliance on exploitative labor.

On a personal level, our solution empowers individuals to make conscious choices about their clothing, fostering a deeper connection between consumers and their garments. By allowing customers to submit their design preferences and ensuring that these are met sustainably, we enhance the value and longevity of each piece of clothing. This not only reduces waste but also promotes a more mindful approach to fashion, where quality and sustainability are valued over quantity and disposability.

**In summary, the impact of our startup's solution is multifaceted, offering environmental, economic, and social benefits.** By pioneering a shift towards a circular economy in the textiles sector, we are paving the way for a more sustainable, equitable, and conscious fashion industry. This transformation has the potential to influence global markets, contribute to the well-being of our planet, and enrich people's lives by promoting sustainability, innovation, and ethical practices.

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