Conclusion

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Introduction

Introduction

How can people build closer relationships with sustainability-focused companies? A research project for designing a sustainable shopping, saving, and investing companion.

Research Relevance

If used wisely, money can help build communities of sustainable impact. This research is timely in 2023 because of the convergence of five trends:

Table 1: Current trends backing the relevance of this research project.

Major Trending Themes (Supernarratives)
Increasing environmental degradation
Young people demand sustainability
Intergenerational money transfer; relatively young people have money
Appearance of sustainability metrics and instruments such as ESG, B Corp, Green Bonds, etc
Technology adoption and generative AI-based user interface availability

Research Background

I grew up reading science fiction books and their influence on my outlook towards future possibilities continues until present day. Star Trek has a portable device called a ***tricorder*** (fig. 1), which enables imaginary future humans fix all kinds of problems from scanning for minerals inside a cave to scanning human bodies for medical information. I would love to have such a device for consumer choices and financial decisions - to know what to buy and which businesses to do business with. Robots are already integral part of our lives; this thesis

proposal was partially written using Google's and Apple's Voice recognition software, allowing me to transcribe notes with the help of an AI assistant.

Figure 1: Captain Sulu using a Tricorder (Star Trek) - Photo copyright by Paramount Pictures

Research Motivation

As a foreigner living in Taiwan, I've relied extensively on AI assistants for many aspects of my life: to communicate, move around efficiently, find food and services. Even when we don't realize it, AI assistants helping us with many of our mundane tasks. When writing in Chinese, Apple's text prediction algorithms translate pinyin to 漢字 and show the most likely character based on my previous writing, Google's maps find efficient and eco-friendly routes and recommend places to eat and ChatGPT provides statistically probable advice from the sum of human knowledge. While it takes incredibly complex computational algorithms to achieve all this in the background, it's become so commonplace, we don't even think about it. From this point of view, another AI assistant to help humans with choosing more eco-friendly businesses to show, save, and invest doesn't sound so much of a stretch.

Research Objective

Without reliable and easily accessible data, it seems impossible to know which company is more sustainable than the other. We don't really know what's green, unless we spend a lot of time looking at the numbers. Environmental issues are caused by production and manufacturing processes of the companies that make the products we consume on a daily basis. The study presents an AI companion design which seeks to help people build relationships with sustainability-focused companies. The major contribution of this study is an interactive artefact (a prototype) informed by design research.

Research Demographics

My research targets respondents according to the following criteria.

Criteria	
Location	Taiwan
Population	College Students
Count	700

Interviews with experts in finance and design, and a including a choice experiment between potential feature sets in consumption, savings, and investment.

Criteria	
Location	Global
Population	Experts
Count	5

Research Questions

My research aims to answer the following questions.

Table 4: Table of research questions.

№	Question	Methods
1	How does environmental sustainability intersect with AI, design, and finance?	Literature Review
2	How can AI assistants help college students participate in sustainable financial activism?	Literature Review and Expert Interviews
3	What questions do college students prefer to ask a sustainability AI assistant?	Student Survey

Abstract

Abstract

The Journey from Consumer to Investor: Designing a Financial AI Companion for Young Adults to Help With Sustainable Shopping, Saving, and Investing

College students are concerned with the environment, yet they are busy with school and hindered by unavailability of simple tools to affect systemic change. Stronger environmental policy from the European Union includes the concept of ***digital product passports***, which holds the promise to help distinguish ***eco-designed*** products made by ***circular economy*** companies trying to be zero-waste from companies that simply say they are. Tracking product data from the source materials until the consumer, combined with ***data-driven interaction design*** facilitates building transparency into opaque systems. Likewise, advances in the development of ***large-language models*** enables ***artificial intelligence assistants*** to become a translation layer between complex environmental data and human-comprehensible language.

The emerging field of ***Planetary Health*** recognizes profound interconnections between our economic behaviors, ecosystem services such as clean water, air, soil, the climate crisis, and human health. As of 2024, Earth's natural environment is being heavily degraded by the extractive business practices of companies that make many of the products and services we buy every day. The way we use our money to interact with companies - through shopping as consumers and saving / investing as investors - has an effect on the life-supporting biosphere we rely on to keep our planet inhabitable. In essence, from an ecological perspective, every financial action is either an investment decision to support more environmentally-friendly companies - or to support polluters.

My research addresses the need for tools to make sustainable financial action convenient for college students. I focus on leveraging ***design research*** to find design concepts for ***simple AI user interfaces*** also known as ***generative UI*** to help college students participate in ***sustainable financial activism***. A survey of 700 students across 10 universities in Taiwan was conducted, enhanced by 5 expert interviews providing industry insights. The major contribution of the study is an interactive AI-assistant prototype.

Keywords: Climate Anxiety, Human-AI Interaction, Digital Sustainability, Financial Activism, Transparency, Planetary Health

Abstract in Chinese *

從消費者到投資者的旅程：為年輕成人設計一個財務 AI 夥伴，幫助他們進行可持續購物、儲蓄和投資

大學生關注環境問題，但因學業繁忙及缺乏簡便工具來影響體制改變而受阻。歐盟更強化環保政策，引入了「數位產品護照」的概念，此舉有望幫助區分由循環經濟公司製造的、努力實現零廢棄的「生態設計」產品，與僅聲稱自己環保的公司。從原材料到消費者的產品數據追踪，結合「數據驅動的互動設計」，有助於為不透明系統建立透明度。同樣地，「大型語言模型」的發展使得「人工智能助理」能夠成為複雜環境數據與人類可理解語言之間的翻譯層。

新興的「地球健康」領域認識到我們的經濟行為、生態系統服務（如淨水、空氣、土壤）、氣候危機與人類健康之間存在深刻的相互聯繫。截至 2024 年，地球的自然環境正被開採性企業的商業行為嚴重破壞，這些企業生產我們每天購買的許多產品和服務。我們通過消費和儲蓄/投資與公司的互動方式，對我們賴以生存的、支持地球可居住生物圈產生影響。從生態學的角度看，每一個財務行動都是支持更環保公司的投資決策，或是支持污染者。

我的研究應對了為大學生提供便於實行可持續財務行動的工具需求。我專注於利用「設計研究」來尋找「簡易 AI 用戶介面」的設計概念，也稱為「生成 UI」，以幫助大學生參與「可持續財務行動主義」。在台灣 10 所大學進行了一項涵蓋 700 名學生的調查，並增加了 5 位專家訪談以提供行業見解。研究的主要貢獻是一個互動 AI 助理原型。

關鍵詞：氣候焦慮、人工智能互動、數位可持續性、財務行動主義、透明度、地球健康。

- The abstract was translated to Chinese on May 22, 2024, using the Claude 3 Opus model and the translation quality was checked with OpenAI GPT4, Google Gemini, Mistral Large, Meta LLama as well as human reviewers. In case of any discrepancies, please refer to the English text.

Prototypes

Prototypes of Product Features

I developed a number of early prototypes to visualize product feature ideas.

What's on the intersection of College Students, Sustainability, Investing, Data-Driven Design and Artificial Intelligence (AI)? AI-Driven Sustainable Investment Tools.

The app aims to address the market failure by providing consumers sufficient sustainability information on the goods, services and investments.

resource depletion

and adopt the doughnut economy as my overarching theoretical framework

Humans are successful because of our adaptability. The study suggests tools to adapt to our current reality.

United Nations Decade on Ecosystem Restoration

Hypothesis: extractive business practices reduce college students trust, regenerative business practices create trust among college students towards the company.

Provided there is awareness

How can sustainability-minded college students find companies that meet their expectations, standards and requirements?

- Make a public profile of my carbon consumption!!! Like on Commons.
- Shop
- Save
- Invest
- Build closer relationships with sustainability-focused companies
- Sales funnel for eco-focused products
- The eco-friendly market is fragmented
- Build trust, clarity, transparency, and honesty
- Make a 'Sustainability Flywheel' graphic, like that of Amazon's
- Sustainability is fragmented. How can billions of people build closer relationships with sustainability-focused companies based on honesty and transparency? A research project for designing a sustainable shopping, savings, and investing companion.
- Most sustainability plans rely on carbon credits to achieve their goals, making carbon credits a single point of failure. If the credits are not accurate, the whole system collapses.
- TODO: Make a table showing research results translated to design decisions
- Your Green Helper
- Make some initial prototype? make YoutTbe video… hi, you have reached? spread… through ESTBan and others?
- Currently CO_2 footprint calculators ask you a couple of questions and give a ballpark estimate. Does it make sense to track sustainability on a more nuanced level, like Apple Health, in order to encourage sustainable behavior?

Product Idea	Source		Prototype Link
Speak Truth to Power	Literature Review	Consolidate user feedback for companies	greenfilter.app/prototypes/truth-power
Shopping Divest	Literature Review	What if you could build communities based on what you buy?	greenfilter.app/prototypes/shopping-divest
True Cost	Literature Review	What if you could see the actual cost of each product including externalities?	greenfilter.app/prototypes/true-cost-
Sunday Market	Literature Review	First prototype for going to the organic Sunday Market with friends.	
XYZ	Expert Interview		
ABC	User Survey		

Affinity Diagrams

- Affinity diagrams help users organize ideas by brainstorming, sorting and labeling to cluster related information (Kara Pernice, 2018 ; Quignard, 2022)

Scan a product to see the company and start investing or divesting from them Current economics is lowering the quality of life on the planet

Actionable Insights: Translate data into everyday actions the app can suggest.

- What does investing look like at the scale of billions of people? like IG
- The most effective things are Commodities? Food, transport, fashion, plant trees.
- personalized AI, meta glasses understand your context. sense and reconstruct the world around you and to understand the context in which you're using your device.sense and reconstruct the world around you and to understand the context in which you're using your device. Make suggestions and take action proactively to help you get things done — ideally, so seamlessly that you may not even notice.neuroscience co-adaptation of the interface. your future devices will learn and adapt to you as you use them.
- Scalable Climate Solutions: What really works on a large scale?
- brand colors: pink, orange, green

Shopping-as-Investing

- Introduce this concept
- The Manor (2022)
- Sustainability is hard. Green Filter helps you find companies that are making a true effort and build closer relationships through shopping, savings, and investing. Green Filter helps you find companies that are making a true effort to become sustainable and build closer relationships through shopping, savings, and investing
- Gather requirements and build a prototype for the next-generation investment app for young adults. Improving the user experience for young adults getting started with (green) investing. What would a "Tinder for (Green) Investments" look like? How can we make the logistics of investing so easy to use and take into account my values?
- My thesis core message is : everyone should change from consumer to sustainability investor (define these terms in the thesis). how to do this? can help you become from consumer to investor i believe there's space for a product like that. your green investing friend find the companies tackling certain problems and invest in them using crypto business can be a force for good

'Shopping-as-Investing'

- Consumer purchases are an indicator of demand. If demand trends down, companies will stop producing this product.

'Investment-as-Product'

- Green Filter helps you discover how to save money and the planet with your daily shopping. By providing an easy way for people to learn about and shop with sustainable companies, we imagine a world where people invest in their future, find great deals on responsibly-made products, and get useful discounts from socially responsible brands.
- GreenFilter is a product that combines AI, design and marketing to help people manage their social impact throughout the stages of their lives, from young adult years to retirement. Its primary goal is to give people the tools they need to invest responsibly in sustainable companies, while also educating them on this topic. Our project offers a responsive website and mobile app that leverages AI and other advanced technologies. In addition, our prototype includes a reality-based virtual assistant with voice command capabilities which can provide customers with new insights into the world of green finance

- GreenFilter introduces a novel, interactive point-of-sale technology that helps people make greener shopping decisions. The platform uses artificial intelligence to suggest green alternatives for products on your shopping list, and will also help you to find other companies that can make sustainable versions of the product you are buying.
- As people become aware of the impact their shopping is having on the environment, they become interested in finding alternatives to big brands and large companies. GreenFilter provides designers an AI companion design which helps people build relationships with sustainability-focused companies by providing personalized recommendations, giving product reviews and helping them shop sustainably. This new tool will empower consumers to make greener choices throughout their lives.
- Better management of planet Earth
- How can wee Shop, Save, Invest in line ecologic principles and planetary boundaries? individual action doesn't move the needle. how to group together
- App to build community
- Life within planetary boundaries
- Currently it seems there's a secret around how things are produced we want to increase transparency
- Companies that have nothing new nothing to hide should welcome this opportunity to mark themselves to keep a conscious consumers and investors.
- We want to create competition around sustainable practices enter widespread adoption
- Cigarettes and pictures of lung cancer every product should be required to have photos of production conditions switch such as Rainforest and deforestation the products that include Palm oil.
- My thesis is that a lot of people want to do good, shop eco-friendly, invest green, etc. But they don't believe the solutions work. They don't have trust. This is a user interface issue. How to build trust.

Terminology

Terminology

- AI - Artificial intelligence, a field of computer science and an umbrella term focused on a wide range of approaches to automation
- UX - User experience, a field of study and operational approach focused on how humans experience using systems

- AX - Algorithmic experience, a proposed category of user experience, that is focused on interfaces between AI algorithms and humans
- UI - User interface, such as in a mobile app, however increasingly audio, video, etc
- XAI - AI user experience, interaction design applied to AI concerned with how does a person or a group of people interact with the AI
- Fintech - Financial technology, the application of technology (usually AI), to classic financial services, such as payments
- ESG - Environmental, Social, and Corporate Governance, a new set of metrics proposed by the European Union, and adopted worldwide, to assess business and financial assets
- AI Assistant - software system providing the user with personalized suggestions based on machine learning algorithms
- Financial Advisor - a human financial specialist providing customized financial advice, including investment advice and services to a client
- ML - Machine learning, a tool within the larger AI umbrella to enable computers to learn from large sets of data, which may be labeled (by humans) or un-labeled (auto-labeled)
- HCI - Human-computer interaction, a field of study to improve human experience with information technology
- OEM - Original equipment manufacturer, a company making products for another company that markets and sells such products under their own brand
- API - Application Programming Interface, a method for software agents to exchange information in various forms of data: the basis for contemporary online services
- EPR - Extended Producer Responsibility
- SDGs - Sustainable Development Goals, a set of targets agreed upon by the nations of the world
- LLM - Large Language Models
- Vector Databases - specialized data storage for mathematical language embeddings in multi-dimensional space helpful for clustering similar concepts
- CO2e - CO_2 equivalent greenhouse gases
- GHG - Greenhause gases
- PD - Participatory Design
- VCM - Voluntary Carbon Markets
- Hedge Fund - pooled investment fund
- DAO - Decentralized Autonomous Organization

- "Zero waste is the conservation of all resources by means of responsible production, consumption, reuse and recovery of products, packaging and materials without burning, and with no discharges to land, water or air that threaten the environment or human health. This is the definition of Zero Waste as adopted by the Zero Waste International Alliance." https://letsdoitfoundation.org/wp-content/uploads/2022/05/Zero-Waste-Training-Handbook.pdf

Conclusion

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My research combines insights from fields including sustainability, finance, AI, and design to propose an interactive AI-assistant to help young adults, specifically Taiwanese college students, towards environmentally-friendly financial choices.

A comprehensive literature review in the interconnectedness of economic behavior and ecological sustainability underscores the critical role that financial decisions play in impacting the planet's health.

identify key concepts

Survey results from 700 college students across universities in the Northern, Southern and Eastern parts of Taiwan highlights the concern among young adults regarding environmental degradation. However, my survey results acknowledges the barriers these individuals face, including a lack of tools and clear information, which hinders their ability to contribute effectively to environmental sustainability.

their preferences and attitudes

Expert interviews to gain industry insights

Prototype informed by design research aims to empower young adults to make informed decisions that align with their environmental values, whether through sustainable shopping, saving, or investing.

Testing with 30 students at NCKU provided additional changed in the app design.

Foster environmental stewardship through financial activism.

mixed-methods

Designing AI systems that are capable of translating complex environmental data into actionable insights.

"The study employed a mixed-methods approach, starting with a , followed by . A survey of 700 college students across 10 universities in Taiwan was then conducted to understand . The

major contribution is the interactive AI-assistant prototype, informed by the design research findings.

In conclusion, this research addresses the need for convenient tools to enable college students to take sustainable financial actions in their daily lives. By leveraging advancements in AI and data-driven interaction design, the proposed AI companion aims to act as a translation layer between complex environmental data and human-comprehensible language. The prototype demonstrates how thoughtful design can empower the next generation to align their consumption and investment behaviors with their concern for the environment, driving positive change through their financial choices."

- Drive companies to be more transparent with ESG data
- Increase ESG accessibility