Maynooth University
National University
of Ireland Maynooth

INVESTIGATION
IMAGINATION
INNOVATION

DEGREE SHOW 2023

BSc PRODUCT DESIGN
(MARKETING AND INNOVATION)

Department of Design Innovation

Contents

Key: Agriculture Sports/Health Medical Safety Retail Security Renewable Energy Industry

BSc Product Design

The BSc Product Design and Innovation at Maynooth University is anchored upon human-centred problem solving, within both private and public sector contexts. Students are taught how to design products and services that are responsive to society's main challenges. Unique to our programme is its interdisciplinarity, with students developing their understanding of innovation from the perspectives of engineering, design and the social sciences, as well as a six-month, full-time work experience placement in third year. Our emphasis on project-based learning, workshops, laboratory sessions and group work combined with our interdisciplinary teaching, ensures the design of solutions that balance organisational viability, human desirability and technical feasibility.

Welcome

This is truly an exciting time for young designers. Design has never been more vital, sought-after, or influential than it is today. The theme of the 2023 Product Design Showcase - **Investigation**, **Imagination**, **Innovation**, demonstrates why. In this complex, fast-changing and uncertain world, people, organisations and society are seeking new answers, novel insights, and more effective methods to address their needs and challenges. This group of designers are ready to deliver this by applying rigorous and creative approaches to understand challenges, by envisioning exciting possibilities, and by transforming meaningful ideas centered on genuine human needs into reality.

The common theme across the work presented here is the focus on enriching people's lives and improving the world we live in. A conversation with any of these designers about their project, where it came from, the insights they've gained, and the creative process they've employed to bring it to fruition, will provide reassurance that our future is in good hands. You will discover new ideas, energy, and perspectives that challenge, inspire, and most importantly, instill hope. As John Schaar once aptly said, *"The future is not some place we are going, but one we are creating."*

Across their journey, this group has been supported by a dedicated team of department staff, visiting lecturers, industry partners and the wider university community. I would like to thank them for their tremendous support. But for now, please join me in congratulating the 2023 graduating class on their wonderful achievements and wishing them every success in their future endeavors.

Trevor Vaugh
Academic Director
Department of Design Innovation

Welcome

It is with much excitement that I welcome you to our BSc Product Design and Innovation Degree show. This year, our students were tasked with developing products that responded to the needs of the Irish public, as documented in Science Foundation Ireland's *'Creating Our Futures'* report. It is our intention with this Degree Show to show the immense rigour involved in the creation of products that genuinely respond to an unmet human need. In addition to each of these products being aesthetically and functionally phenomenal, every student has developed a business plan and attained backing from external organisations. This is an integral part of our Product Design degree which provides each graduate with the foundations, skills and creative confidence they need to become empathetic designers. Every cohort of students is special to our department, but I would like to call out the Class of 2023 as the class who began their studies during the COVID-19 pandemic.

Dr. Threase Finnegan-Kessie
Head of Year 4
BSc Product Design and Innovation

The resilience and passion each of these students has shown over the past four years is astounding. Students, we are immensely proud of what you have achieved and wish you every success as you use your design skills to make a positive impact on the world. I would like to extend thanks to Kildare County Council's Local Enterprise Office for their continued support of our students and for sponsoring this event. Enjoy the show and please join me in congratulating the BSc Product Design and Innovation Class of 2023 on their fantastic achievements.

Supported by Kildare County Council's Economic & Enterprise Office

CLASS OF
2023

Stammer Halo

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User Problem

Stammerers often find themselves struggling to effectively communicate. This can lead to feelings of isolation and exclusion from meaningful interactions and relationships.

Key insights

1. Communication is a fundamental human need.
2. Empowering the person with a stammer is vital.
3. A unique and effective solution is needed to support to stammerers 'in the moment.'

Solution

The Stammer Halo has user-friendly design elements, while advanced features such as a metronome and app to offer a comprehensive solution for individuals with stammers.

Abstract

The Stammer Halo addresses the unmet needs of individuals with stammers by providing an innovative solution that enhances communication and boosts confidence. Through rigorous engineering and technical approaches, the project has developed a unique earpiece design in the shape of a circular halo, ensuring a secure and comfortable fit around the ear, with a strap band for added stability. The Stammer Halo integrates rhythmic speech techniques, metronome functionalities, and a companion mobile app to enable users to practice and improve speech fluency.

Participants

The research involved conducting user research and gathering feedback from individuals with stammers A diverse group of participants were selected to ensure a comprehensive understanding of user needs and preferences.

Framing & Ideation

Ideation involved research, consultations, and ideation methods such as 3D rendering and sketches. The final solution was driven by the need for real-time practice and the effectiveness of rhythmic speech techniques, as supported by academic references and user feedback.

Assumptions & Prototyping

It was important to test prototypes with people who experience stammers, to ensure that it was usable in real-world situations.

Future Impact on Society

The Stammer Halo has the potential to help people who live with a stammer gain the confidence they need to create meaningful interactions and express themselves.
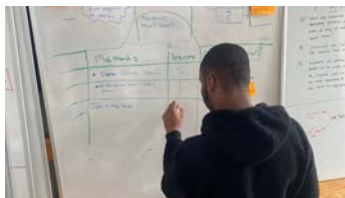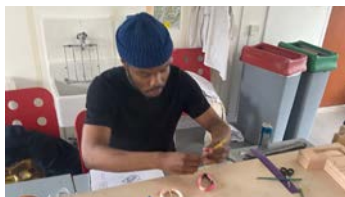
Fig. 1: A user testing the Stammer Halo in conversation

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The Solar Blind

User Problem

People in apartment dwellings have no current access to generate their own source of renewable energy.

Key insights

1. Apartment dwellers wanted a self-fitting product
2. Dwellers wanted a customizable product
3. Dwellers have no roof space to produce solar power

Solution

The solar blind is a window product that generates and stores solar power using a solar charge controller and batteries. The power can be accessed via USB hubs on the frame

Abstract

Producing solar energy without roof space has been, up until now, overlooked. It has never been an option before. To combat this problem I have come up with the innovative solution which I have called The Solar Blind. This is a product that you place in your apartment where it will receive direct sunlight throughout the day. The product utilizes a 104cm x 33cm solar panel backed with a timber support that is mounted onto a concrete base. Through the use of a solar charge controller and batteries you can use the generated energy through a USB hub situated on the side of the concrete base. This solution provides a renewable source of energy to any apartment.

Participants

I conducted 3 in person semi-structured interviews. Two were apartment dwellers and the other worked in a solar panel providers. I conducted a survey which had 20 participants. The participants consisted of apartment dwellers, college students, renters and other members of the public.

Framing & Ideation

The Solar Blind's framing and ideation began with "How might we let apartment dwellers produce renewable energy?". Sketches and CAD drawings followed. Prototypes were created for efficient renewable energy production. Final CAD models were made, and materials were gathered for the last prototype.

Assumptions & Prototyping

Multiple prototypes were made for two feasible ideas, but target users pointed out flaws. The designs were combined for a well-rounded product. Final CAD models and renders were made before the final prototype.

Future Impact on Society

Solar Blind has potential to generate solar energy in apartments worldwide, offering green energy and saving on bills. Funding could improve efficiency for worldwide use, and the potential for this product is endless.

Fig 1. Hero image of the SOLAR BLIND

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The Crash-Course Cart

User Problem

The newest generation of retail workers are struggling to grasp the fundamentals of the job, we need a new way to learn on the job

Key insights

1. The pandemic had a direct effect on young workers
2. Managers are silently suffering across the sector
3. Young workers learn better by doing than watching

Solution

The Crash-Course Cart is mobile learning station designed to teach new colleagues the fundamentals of the job, at their pace, using reinforcing tools and activity based courses

Abstract

Studies done on the effects of lockdowns on the youth of Ireland show they missed out on a traditional transition period between teen to adult. They are not prepared for the sudden responsibility expected of them and are struggling in a working environment. The Crash-Course Cart is designed to teach young workers the fundamentals of the job, at a pace they can manage with methods that act like stabilisers on a bike. Reinforcing the desired behaviour while inspiring confidence in the worker

Participants

I reached out to several contacts and colleagues I've networked with over my decade in the sector. I conducted semi structured interviews in person and remotely with Store managers, team leaders, sales assistants and most importantly new young workers. They worked in 5 separate Irish retailers.

Framing & Ideation

While testing it with new colleagues not only did they enjoy using it but I realised it was reinforcing what a good face off was. So that they could do the job again later without the tool. Like stabilisers on a bike. I incorporated this mentality into the rest of the cart.

Assumptions & Prototyping

Initial sketch ideas led towards developing a set of tools, inspired by a medical crash-cart. After experimenting with the scale and shape I made a full scale cardboard model of what would be the Crash-Course Cart. I made a scale 3D render version of the cart before committing to a full scale materials prototype.

Future Impact on Society

The lockdowns put unreasonable demands on the retail sector, many front line workers quit throughout the pandemic, the ones that stuck it out are more worn down than people realise. Anything that could help take the pressure off those who remain could make all the difference in the world.

Fig 1. Hero image of the Crash-Course Cart

Dashboard

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User Problem

A common issue experienced by snowboarders, beginners in particular, is the difficulty of getting around on flatter areas like lift queues, base areas & landing areas.

Key insights

1. Ski resorts are designed for skiers, not snowboarders
2. Unlike skiers, snowboarders cannot walk in their gear
3. Snowboarders & skiers don't know how fast they're going

Solution

A motorised snowboard accessory that allows the user to 'drive' their snowboard in situations where gravity won't do the trick. A screen on top can be configured to info like the user's speed & location.

Abstract

The restrictive nature of snowboards wherein both feet are secured to the same board can be difficult and unintuitive to learn in comparison to the independent leg control offered by skis. This can make learning for newcomers a particularly tiring & frustrating affair. The Dashboard is designed to provide users with mobility in instances where mobility is limited, using motorised tracks that the user controls via a smartphone companion app. The Dashboard companion app is highly customizable, allowing the user to view their speed and other metrics on the built-in screen.

Participants

I interviewed a number of amateur & experienced skiers and snowboarders between the ages of 20 and 35, including someone with 5 years of experience working as a ski lift operator.
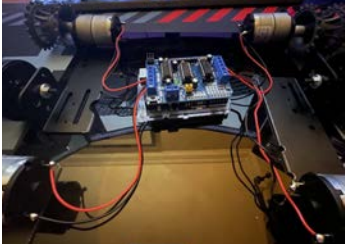
Framing & Ideation

I began the framing & ideation stage of this project by asking myself 'How Might We encourage more participants of winter sports to take up snowboarding?' I began by researching existing solutions & sketching novel solutions that may alleviate these problems.

Assumptions & Prototyping

I began with a cardboard model to get a clear picture of scale, before moving on to the final model. I experimented with multiple electronic prototypes as well as 3 different iterations of the final shell; each developing upon the next. The final prototype is a marriage of this last iteration and the electronic components from previous prototypes.

Future Impact on Society

The Dashboard can greatly alleviate some of the most common inconveniences experienced by snowboarders; wasted time, wasted energy and wasted money, by eliminating the need to repeatedly mount and dismount the board's bindings to walk through queues and landing areas.

Fig. 1: Dashboard - Snowboard Mobility Attachment.

Installed Dashboard

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CaliBeer

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User Problem

Currently, there is no quick and easy way for bar staff and stock takers to measure the remaining quantity of a tapped beer keg

Key insights

1. Current devices are different forms of large weighing scales which are inconvenient
2. Uneven floors in cold rooms cause scales to be inaccurate
3. These scales require the user to lift the keg

Solution

The Calibeer is a compact, handheld device that combines an ultrasonic liquid level sensor and an easy-to-use interface that can be used by anyone

Abstract

Estimating the amount of beer left in a tapped keg is a challenge for bar staff and stock takers, and the current method of lifting and shaking the keg is outdated and results in physical discomfort for 60% of them. I created the Calibeer as an innovative solution, which uses an ultrasonic liquid level sensor and an intuitive interface to provide an accurate measure of the quantity of beer remaining in the keg. The device is easy to use and eliminates the need for outdated and potentially hazardous estimation techniques. The Calibeer is suitable for use by anyone in a licensed premise, and it serves as an effective and efficient solution to the challenge of measuring the amount of beer left in a keg..

Participants

I conducted 3 in person semi - structured interviews, one participant being a stock taker and two being bar staff.
I also created a survey which was completed by 35 participants (20-65 yrs). These participants ranged from bar staff, stock takers, publicans, restaurant managers.

Framing & Ideation

" How might we prevent users from injury when measuring a tapped beer keg?". From there, I created multiple sketches which led me to physical prototyping using cardboard. I then created a CAD model. Finally I 3D printed the CAD model and began to manufacture the final prototype.

Assumptions & Prototyping

I began by sketching ideas during a brainstorming session. I took my favorite three sketches which i then made out of cardboard. I showed these prototypes to a target user who gave me feedback. I updated my sketches and prototypes with this feedback in mind. Once i was happy with the form, i began creating a CAD model which i then 3D printed and manufactured the final prototype.

Future Impact on Society

The Calibeer has the potential to be used in pubs, clubs and restaurants around the world. The Calibeer not only eliminates the possibility of injury while measuring a keg, but it will also improve the accuracy of stock takes, Improve cash flow and finally it will enhance the daily operations within the premises by staff being better prepared to keep the premises running smoothly.
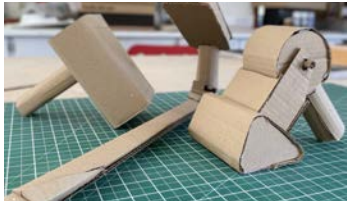
Fig 1. The Calibeer Scanning a Tapped Beer Keg

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SafeStep

User Problem

Farmers regularly work long hours in isolation. It can lead to tragic consequences in an emergency situation with no help nearby.

Key insights

1. "Farm fatalities account for ½ of all workplace deaths in Ireland. Farmers represent 6% of the workforce"
2. 52.2% of fatal incidents in Agriculture > 65 years old"
3. "Often one man operations with no help nearby"

Solution

SafeStep is a work boot attachment, providing a wearable solution for farmers. This device can alert the emergency services or a nearby family member in the event of an emergency situation.

Abstract

The largest number of fatal incidents in Ireland occur in Agriculture. Farmers over the age of 65 account for more than half of these work related deaths. Many older farmers are working in isolation with little to no help nearby in the event of an accident. SafeStep aims to act as an autonomous aid, calling for help in the event of a fall. It does this by utilising its inbuilt sensor array consisting of an accelerometer, gyroscope, magnetometer and GPS. SafeStep leverages its onboard ultra-low-power AI core to analyse this data and initiate a distress message over the LoRaWAN network if the user is unresponsive.

Participants

Three recurring interviews with farmers of varying ages (23, 57, and 78) which helped me gain valuable insights into the daily realities and potential risks faced on the farm. These firsthand accounts guided the development of features addressing farmers' safety needs.

Framing & Ideation

Insights gained recommended placement on their work boots. They suggested this placement as it aligns with their daily routine, something they always wear. Initial sketches incorporated the dimensions of internal components, providing a sense of scale for the device.

Assumptions & Prototyping

The primary design challenge involved creating a system that allows easy device removal for charging while ensuring secure usage. Development included 3D modeling, printing, and iterative testing, resulting in over 30 different iterations for optimal performance.

Future Impact on Society

SafeStep's potential to save lives in farming can be further amplified through ongoing development. By reducing its size and expanding into markets like manufacturing, warehousing, and construction, SafeStep can reach a wider range of workers and industries, creating a safer environment overall.
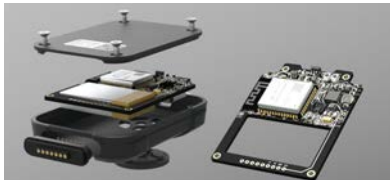
Fig 1. SafeStep installed on a farmers work boot

LOHI Surf Saver

User Problem

Surfers struggle with the dangerous problem of being disconnected from their surfboards from taking falls, leaving them stranded in the sea.

Key insights

1. Surfers will go out alone regardless of the risk.
2. The Solution Must fit seamlessly into their routine
3. Having no safety equipment makes the experience more stressful

Solution

LOHI tackles the problem surfers face of being disconnected from their boards by springing out the innovative anchor system, which allows the board to be slowed enough for the surfer to swim back to it.

Abstract

The LOHI system was designed to enhance the safety of surfers who may become disconnected from their board if the leash holding them to it snaps. Its main feature is an innovative anchor system that slows the board down to a manageable speed if a separation occurs. This allows the surfer to retrieve the board and re-attach themselves to LOHI, providing a secure way to surf or paddle back to shore.

Participants

Interviewing water sports enthusiasts, including surfers, kayakers, a sea swimmer, a paddleboarder, and RNLI members, provided valuable insights into safety concerns. Ongoing feedback from surfers helped refine the product's development.

Framing & Ideation

I prioritized the users' needs by designing around key insights and findings from research and reframe phases. Using sketches, CAD renderings, and prototypes, I developed LOHI from initially a personal floatation device concept to the final board-based solution.

Assumptions & Prototyping

I developed multiple prototypes of LOHI and used user feedback to improve the device's design. Feedback led to changes such as a quick-release mechanism and placing the device on top of the board to avoid impacting the surfer's mobility. LOHI prioritizes ease of use, security, and reliability to enhance water safety.

Future Impact on Society

LOHI enhances surfers' safety and experience on the water. It has promising scalability due to the growing market of water sports enthusiasts seeking innovative solutions. LOHI can reach a broad range of users through online sales and retail partnerships, including surfers and potentially paddleboarders.

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Fig 1. LOHI on the rear of a surfboard

Fig 2. Development Sketches and prototype findings

ReinForce

User Problem

Gaelic football on greasy grass makes ball handling a challenge. Current GAA gloves fall short, lacking durability, grip, and protection.

Key insights

1. Glove rips easily at seams.
2. Grip wears down after first use, rendering glove useless.
3. No finger protection, leading to common injuries.

Solution

A seamless design for extended glove life, finger protection inserts to prevent injuries, and replaceable grips for effortless renewal. Revolutionising the Gaelic football glove with durability, safety, and convenience.

Abstract

This study introduces a comprehensive solution to enhance performance and safety in Gaelic football gloves. Current GAA gloves lack durability, grip, and protection. My proposed solution features a seamless design, finger protection inserts, and replaceable grips, revolutionising the Gaelic football glove. With improved durability, safety, and convenience, this innovative approach addresses player needs and fills a significant market gap, elevating performance and safety on the field.

Participants

As an active participant in this study, I surveyed multiple Gaelic football teams and conducted in-depth interviews with three senior footballers to gain valuable insights for the solution development. This direct engagement with participants provided a comprehensive understanding of the problem and informed the proposed solution.

Framing & Ideation

Iterative ideation led to diverse prototypes of Gaelic football gloves, incorporating various materials and design elements. Experimental trials optimized hand-ball contact, testing different grips and inserts. Concepts were refined with valuable player feedback. The final design significantly enhances performance and safety.

Assumptions & Prototyping

Assumptions were tested through multiple prototypes of Gaelic football gloves. Seamless construction proved to be more durable than seamed gloves, while user feedback informed the use of flexible materials for finger insert pockets. Lightweight plastic inserts outperformed foam, and the velcro grip pads exceeded expectations. Field testing confirmed the gloves' performance and functionality.

Future Impact on Society

Our innovative Gaelic football gloves offer significant benefits to players, improving performance, safety, and durability. Fine-tuning, including a lower-profile Velcro for enhanced ball control, is necessary to position them as the next big thing in GAA glove design. Partnering with a high-quality manufacturer is crucial to ensure longevity. Strategic entrepreneurship planning will help us bring these gloves to a wider user base, making a lasting impact in the Gaelic football community.

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Fig 1. In game scenario testing

Mindful Metrics

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User Problem

Many individuals struggle to recover physically and mentally after exercise, injury, or stress as traditional methods can be costly and time-consuming.

Key insights

1. Recovery is seen as an additional workout
2. Recovery products or services are costly and time consuming.
3. Current products do not provide tracking or insights into progress

Solution

A portable meditation device, accompanied by a companion app, offers a convenient and effective solution to the accessibility issue related to traditional recovery methods. With an ECG to measure relaxation levels and vibration feedback to coach breath patterns, the device promotes physical and mental recovery for users. The app features a live ECG analysis to monitor relaxation levels during a session.

Abstract

Many people struggle to find time and resources for recovery practices, and the current solutions can be costly and require significant time commitments. Mindful Metrics offers an innovative solution, using ECG sensor and haptic feedback to provide real-time insights into relaxation levels during meditation. The device is portable and can be used on-to-go, making it easy for users to prioritize their mental and emotional wellbeing no matter where life takes them. The accompanying app offers a variety of meditation programs to suit different needs and schedules, and the device's haptic vibrations provide physical feedback to help users achieve a more focused relaxation.

Participants

I spoke with multiple physiotherapist and sports scientist to gain a better understanding of the science of recovery and how and imbalance between workload and recovery can lead to overtraining and injury. I also gained the perspective of physically active people through surveys

Framing & Ideation

The framing question was "How might we make recovery more accessible?" and ideation led me to develop a portable meditation device that can be taken with you anywhere and used in areas like the office or on the bus.

Assumptions & Prototyping

My main goal was to test the need for a physical product during meditation. Meditation can be done using no equipment, although I wanted to see how a physical aid could benefit. Using a vibration

Future Impact on Society

By providing an accessible and convenient solution to recovery, this product could help improve overall quality of life and wellbeing for individuals, potentially reducing healthcare costs associated with stress-related illnesses and injuries. Additionally, by promoting the use of natural and non-invasive recovery methods, this product could help reduce reliance on medications or other interventions with potential side effects.
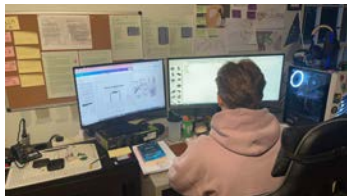
Fig 1. Mindful Metrics with live ECG

ReviveDrive

User Problem

Drivers experience extended periods of driving, often during dark hours, leading to increased fatigue and drowsiness, which can jeopardize their safety and the safety of others on the road.

Key insights

1. Fatigue impairs driving abilities
2. Risk increases with long hours of driving
3. Need for effective non wearable fatigue management solutions.

Solution

A driver revitalizer designed to keep Driver awake containing stimulating scents that promote alertness and mental clarity.

Abstract

A revolutionary car air freshener designed for professional and non-professional drivers alike, that contains a unique blend of stimulating scents such as ammonia inhalants, lavender, lemon, and eucalyptus. This innovative air freshener is engineered to release a carefully measured burst of the desired scent, providing drivers with a refreshing boost to their senses to help them stay alert and focused while on the road. By incorporating proven scents that promote alertness and mental clarity, the air freshener can help reduce driver fatigue and increase overall safety. Whether commuting to work, traveling long distances, or simply running errands around town, this car air freshener is an essential companion for anyone looking to stay alert and focused until they reach their destination safely.

Participants

I conducted a survey consisting of 10 questions, with a total of 19 participants: individuals holding a driver's license, covering a wide age range from 17 to 65 years old. Additionally, I interviewed an ambulance driver to gain valuable insights from their experience. Perspectives and insights from other stakeholders such as guards, truck drivers, and commuters were sought and observational research was conducted.

Framing & Ideation

The framing question for this project was: "How can we ensure drivers stay alert while driving, thereby reducing the frequency of accidents and fatalities on our roads?" Through the ideation process, a non-wearable device was developed as a solution. This device is designed to be installed in any vehicle, providing a safe method to keep drivers alert and attentive while they are on the road.

Assumptions & Prototyping

Assumptions about user needs and preferences were informed by research and consultations with potential users. Rapid modeling techniques were utilized to test and refine the size and shape of the revitalizer, ensuring optimal usability and fit in various vehicles. Several prototypes were then developed and evaluated to gauge their effectiveness. Additionally, different fragrances were tested to assess their impact on driver alertness.

Future Impact on Society

Our car air freshener, designed to keep drivers alert, will positively impact the lives of users by enhancing road safety, reducing accidents, and preventing potential injuries or fatalities caused by drowsy driving. With a scalable design and user-centric approach, I hope to bring this product to a wider user base, ensuring its accessibility and impact on a larger scale.
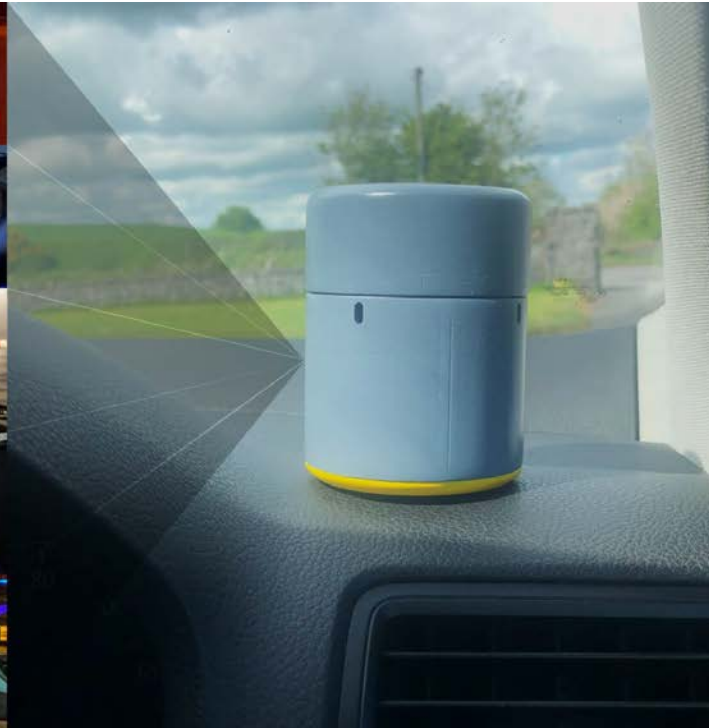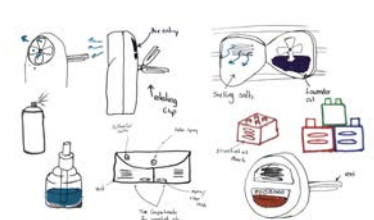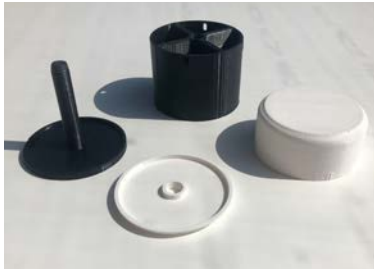
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Fig.1: ReviveDrive on car dash

LifeLink

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User Problem

SAR Operators have to go through harmful environments while locating victims, whom possibly are unresponsive, delaying the whole operation.

Key insights

1. Structural collapses create harmful environments.
2. Victims can be unresponsive and not be picked up by current location devices.

Solution

Portable device which can be placed to actively clear hazardous environment and is complete with 24/7 surveillance with seismic sensors.

Abstract

LifeLink is a portable device which makes deep rubble excavations easier for SAR operators while also providing additional functionality when not in use. Derived from the problems i've gained from researching structural collapse, LifeLink tackles the problem of dust in an area by providing lighting and dust control functionalities. LifeLink also connects to the ground with seismic sensors, creating a mapping of beacons for victim surveillance 24/7. This makes search and rescue more efficient by making operators work in different areas. The goal would be to improve the speed and effectiveness of search and rescue operations, potentially saving more lives in emergency situations.

Participants

My participants for my research phase consisted of 2 people specialising in geography. Research such as surveys and interview were completed by SAR workers in international SAR forums. Other research were done by accounts of reports and autobiographies of survivors and SAR operators related to my research topic.

Framing & Ideation

" How might we aid SAR in increased victim survivability". From this, I created multiple sketches which led me to physical prototyping using rapid 3d prints for scale and design. Finally I 3D printed the CAD model and began to manufacture the final prototype.

Assumptions & Prototyping

I began by sketching ideas during a brainstorming session. I took my favorite concepts and made small prototypes. Looking for possible concerns. I updated my concepts with these concerns in mind. Once i was happy with the form, i began creating a CAD model which i then 3D printed and manufactured the final prototype.

Future Impact on Society

Technology/products which focuses on health and safety is a very important industry. What LifeLink offers is a different approach to current search and rescue equipment in the market. LifeLinks goal is to challenge difficulties faced by victims and SAR, I believe the product is unique which can lead to more efficient rubble excavations for SAR and victims under rubble.

LifeLink under Rubble

LiFE LiNK

Land-Log

User Problem

Agricultural runoff is negatively impacting Ireland's water quality, which affects both those who drink it and use it for recreation.

Key insights

1. The reasons for runoff can differ depending on location.
2. Spreading too close to waterways and in poor conditions still occurs
3. "It is not that farmers don't care, it's that they aren't aware"

Solution

Land-Log is a farm management system that uses color-coded rings to show buffer zones in the field. It allows farmers to record and view land history along with a host of other features.

Abstract

Land-log is an innovative solution for land management and runoff awareness, using a colour-coded system to monitor buffer zones in the field. It features a sign with a QR code that provides access to field information, flora and fauna, and farm alerts. The system enables farmers to log and record work done on the land and communicate with advisors. Land-log's development involved a combination of data sources, including farmer surveys, to address the environmental impact of agricultural runoff. Overall, Land-log promotes responsible land management and supports a more sustainable agricultural industry.

Participants

I conducted a survey with 25 local farmers and agricultural contractors from Mayo/Galway area and interviewed a farmer and two Teagasc employees.

Framing & Ideation

The ideation process involved researching, brainstorming, and obtaining feedback from farmers and potential users, followed by sketching, prototyping, and 3D modeling.

Assumptions & Prototyping

I created roughly 15 prototypes for Land-Log, using card, foam, and 3D printing, to determine the gate's appropriate size, shape, and fit for ease of use and installation. Farmers' feedback was incorporated into each prototype. The iterative prototyping process played a vital role in the final product's development.

Future Impact on Society

Land-Log addresses agricultural runoff and promotes sustainable land management practices, with the potential to reduce negative impacts on the environment, human and animal health. The product is scalable, adaptable, and improves communication between farmers and advisors.
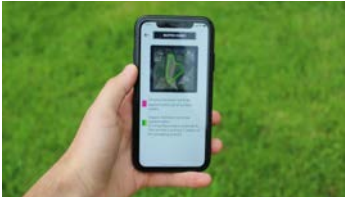
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Fig. 1: Land-Log

Leva App & Buddy

User Problem

Women with ADHD continuously struggle with high stress and anxiety levels which can lead to major anxiety attacks on a regular basis.

Key insights

Sticking to routines is the key challenge and the activities they do to relax are highly individual.

Solution

Leva addresses the specific barriers that women with ADHD encounter when trying to build a habit of decompressing regularly.

Abstract

The Leva app and buddy were developed in consultation with two-dozen neurodivergent women to address the specific challenges experienced by women with ADHD when it comes to regular stress and anxiety relief. The app and its companion serve as tools to remind, motivate and support users in their pursuit of permanently lower stress and anxiety levels. Based on both scientific and empirical principles, this solution is the first of its kind to be designed with neurodivergent needs in mind.

Participants

I consulted 26 neurodivergent women between the ages of 18-25. The vast majority of participants completed two online surveys and 5 participants took part in semi-structured interviews, focus sessions, user consultations and user testing.

Framing & Ideation

After drawing up some simple concepts and consulting users, it became clear that an app would be the most suitable type of product. However, it was also clear that an app alone would not be able to keep their attention long term, and a tangible component was needed.

Assumptions & Prototyping

I developed the controller through rapid prototyping in order to find the most suitable shape. I developed the mini-games using an Arduino and Processing. The app came to life through wireframing and paper prototyping, before I developed a clickable prototype in Figma.

Future Impact on Society

Being stressed and struggling to form good habits is not just unique to women with ADHD. I expect them to form the group of early adopters, but in the long run this product can benefit anyone who is looking for an innovative and personalised solution when it comes to stress relief.

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Fig 1. The Leva app and buddy together

Rapid iteration through different dashboard wireframes.

Walkease

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User Problem

Drop foot is a condition where the front part of the foot cannot be lifted, causing the toes to drag when walking. It can be caused by nerve damage or muscle weakness.

Key insights

1. People with Drop Foot are unable to exercise regularly.
2. People with Drop Foot are limited to what style of footwear they can wear.
3. People with Drop Foot have a lowered self esteem due to their gait.

Solution

WalkEase Retro a traditional splint brace which can attach onto any style of shoe, And we also have.
WalkEase SmartStep which uses FES technology to internally activate the peroneal nerve to raise the foot.

Abstract

Nothing brings me greater joy than seeing the smile on someone's face when I've made a positive impact in their life. It is this passion that has led me to this current project developing a new generational splint brace to help those with drop foot and other walking disabilities. My inspiration for this project came from a family friend (Ellen) who suffers from multiple sclerosis (MS). Unfortunately this has caused her to develop drop foot. I have gained a new perspective after witnessing her struggle with all kinds of tasks, even the simplest. I have seen her try different walking braces, but none of them provided the functionality and support she needed.

Participants

I completed four in person semi-structured interviews. An online survey which got a total of 46 respondents (25-65 age group). I additionally carried out a four hour observation exercise with Ellen (41 years old). Ellen volunteered to take part in product testing and was a vital component in shaping these products.

Framing & Ideation

My approach encompasses diverse sources of inspiration, such as quotes and existing products in the market. With my proficiency in various skills, I began the process of generating ideas through techniques such as sketching, computer-aided design (CAD), creating mood boards, and rapid prototyping.

Assumptions & Prototyping

WalkEase retro went through seven different prototypes. This was done through rapid prototyping using 3D printed parts. WalkEase SmartStep was developed and tested in only one format which I have had extensively designed through sketches. I tested my designs by first wearing them myself and once I was happy with their ability, I gave it to Ellen for further testing.

Future Impact on Society

WalkEase has potential to have a significant positive impact on lives of individuals with Drop Foot. WalkEase will have a positive impact by giving the ability to become independent again. The design is sleek and minimal so that the user won't feel judged. The quick and easy set-up and adjustability makes WalkEase the perfect solution.
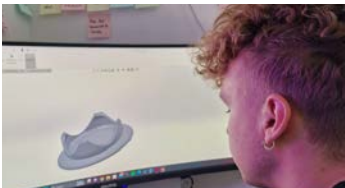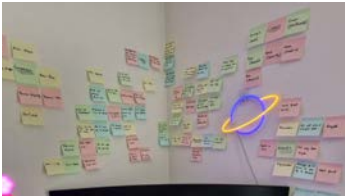
Fig 1. Both WalkEase Retro and SmartStep being worn at the same time for most optimal support.

LOCKIT

User Problem

Many cyclists find it overly cumbersome to carry a traditional bike lock while riding, as it can be heavy bulky and a discomfort in general.

Key insights

1. 'Bicycles should provide inbuilt security features like cars do''
2. 'Cyclists feel anxious leaving their bicycles unattended'
3. 'Users outlined that there was no way they could ensure proper bicycle security in a convenient and effective manner'

Solution

LOCKIT is designed to offer cyclists a bicycle lock is easily accessible whenever needed. With its novel rotating steel chain, LOCKIT not only offers cyclists convenience but also the confidence that they will not become a victim of bike theft like so many others.

Abstract

LOCKIT is integrated directly into your bike's seat post, so you'll never have to worry about carrying a lock again. Simply remove your seat and use the included key to lock and secure your bike. LOCKIT is made from high-quality materials to ensure durability and security, the locking mechanism is a designed security chain with a flexible internal core made of hardened steel links and balls.. The internal steel cable is protected by these steel links and balls which rotate, it's spinning capabilities makes it challenging to cut with a grinder or hacksaw. The sleek, minimalist design won't interfere with your bike's aesthetic, so you can ride in style while keeping your bike secure. LOCKIT is perfect for cyclists who need a reliable and convenient locking solution that won't weigh them down.

Participants

During the research phase, 8 user interviews were completed on two categories of bicycle accessory users. These categories included commuter cyclists and casual cyclists. A survey was also conducted within the age category of 20-40, focusing on participants working in urban areas and students.

Framing & Ideation

LOCKIT was framed and ideated based on insights gathered through user research and analysis of the current bike lock market. Techniques such as sketching, CAD modelling and rapid prototyping, aided in developing the overall aesthetic of the product and the locking mechanism found on LOCKIT.

Assumptions & Prototyping

The main area I focused on with prototyping was the chain mechanism itself. This part of the project was integral as I didn't want the product to simply be more convenient for the users, but also be more secure than the current bicycle security accessories currently on the market.

Future Impact on Society

LOCKIT has the potential to make biking more, convenient, and secure for its users . I would hope my design could be sold as standard with new bikes the same way a car steering lock is a standard with all cars. By considering biking and bike security as one, we could decrease bike theft and encourage more people to choose biking over other forms of transportation, resulting in a more sustainable and healthier society.

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Fig 1. Lockit being used to secure bicycle

Eco-Stream Turbine

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User Problem

The energy crisis has hit Ireland, causing people to make lifestyle changes to manage increasing electricity expenses.

Key insights

1. Rising energy prices causes financial strain, stress, requiring support.
2. 80% of participants unaware of governments carbon goals
3. 53% of participants attribute War in Ukraine to the Energy Crisis

Solution

The Eco-Stream Turbine generates energy by harnessing the kinetic energy of flowing water.

Abstract

The Eco-Stream Turbine is a renewable energy product designed to generate electricity from flowing water with minimal environmental impact. It offers a sustainable solution to the energy crisis by reducing dependence on non-renewable sources. The turbine is small, low-maintenance, and eco-friendly, making it suitable for communities seeking renewable energy without harming the environment. It can be combined with other renewable sources through a Localised Renewable Energy System (LRES) for maximum energy generation. This solution empowers communities to generate their own eco-friendly energy and reduce reliance on non-renewable sources.

Participants

I completed 5 interviews from ages 20 to 55 and these participants ranged from students, housewives, to full time workers. I also completed a survey of 68 people and the participants were from ages 18 to 26+ and the participants ranged from students, retirees, government workers, etc...

Framing & Ideation

During the ideation process for the Eco-Stream Turbine, techniques such as brainstorming, 3D rendering, and modeling were used. At the start sketching and creating rough small-scale models were used to visualize and test different concepts.

Assumptions & Prototyping

During the research and development of the Eco-Stream Turbine several card prototypes were made to get the general layout of what the turbine should look like. The Eco-Stream Turbine has changed alot since making these card prototypes and has evolved into a sleek and organic looking product

Future Impact on Society

The Eco-Stream Turbine has the potential to positively impact the lives of millions of people in both rural and urban areas by providing a reliable and sustainable source of energy.In terms of scalability, the modular design and compact size of the Eco-Stream Turbine make it easy to transport and install in a variety of settings.

Fig 1. The Eco-Stream Turbine

Flexi Desk

User Problem

People who work remotely struggle to find a comfortable and efficient place to work outside of the home or office. This can result in lower productivity and lack of focus

Key insights

Current solutions have limitations that do not fully address the problem. Remote work and study is increasingly common and rapidly changing as technology is advancing

Solution

A compact desk design with integrated charging ports, and an NFC-enabled smart lock for secure storage of personal belongings. The desk can be easily booked and paid for through a mobile app, making it convenient for users to find and use in various locations.

Abstract

The Flexi desk project is a product and service design concept that aims to provide a convenient workspace solution for remote workers, students, and anyone in need of a compact and functional desk. The product is a wall-mounted desk which folds out to provide a comfortable workspace, featuring a smart lock, charging stations, and WiFi connectivity. The service aspect of the project allows users to find the closest Flexi Desk and book via an app which is also used to unlock the workstation. The project seeks to address the growing need for flexible and adaptable workspace solutions, particularly in a post-pandemic world where remote work has become increasingly common.

Participants

I interviewed 6 remote workers aged 20-30 and conducted an online survey with 40 respondents of the same demographic, providing a diverse range of perspectives on the challenges faced by remote workers.

Framing & Ideation

I employed a user-centered design approach and utilized brainstorming, sketching, computer-aided design, and prototyping in my ideation phase.

Assumptions & Prototyping

Assumptions were based on research and user consultations. Rapid modelling helped to test the product's size and shape. Prototypes, including a mobile app, were developed and tested with remote workers. iterative changes were made to refine the final user-centered solution.

Future Impact on Society

The Flexi Desk provides convenient solutions for remote workers, improving work-life balance and productivity. It is ideal for college campuses and airports where resources are scarce, and time is ample. The next steps include partnering with a manufacturer, developing the app, and conducting trials at a local campus.

Brian Toomey

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Rapid modeling

Fig 1. Final product in situ on Maynooth University campus

Award Winning Students

Enterprise Ireland 'Student Entrepreneur of the Year' Top 50 Shortlist

Dara Sweeney

Health Service Executive 'Design on the Frontline' Scholarship Winner

Denis Michen

The Department

Academic Staff

Dr Frank Devitt

Dr Iain Macdonald

Dr Linzi Ryan

Dr Threase Finnegan-Kessie

Trevor Vaugh

Senior Technical Officer

Anthony Cleary

Administration

Emer Fitzpatrick

Associated Staff

Aidan McDermott

Alan Harrison

Barry Coughlan

Barry Ryan

Ben Millett

Daire O'Broin

Dr Shane Keaveney

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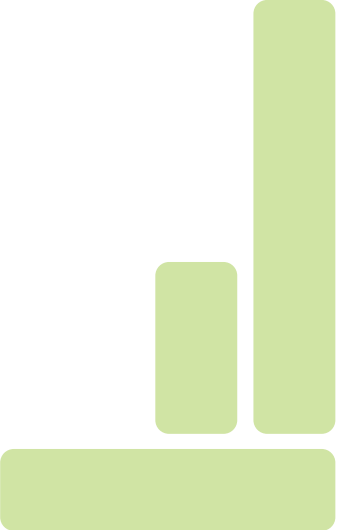
Programme Overview

YEAR 1

Semester 1
- PD155 — Physics & Mathematics — 7.5 credits
- EE151 — Electronic systems prototyping — 7.5 credits
- PD151 — Design sketching — 7.5 credits
- PD157 — Creative thinking theory & methods — 7.5 credits

Semester 2
- PD156 — Material science — 7.5 credits
- PD154 — Electronic systems project — 7.5 credits
- PD152 — Design Modeling: material and virtual — 7.5 credits
- PD158 — Visual Thinking and project — 7.5 credits — Sponsored

YEAR 2

Semester 1
- AC210 — Finance, Economics, Accounting — 7.5 credits
- PD207 — Manufacturing Processes 1 — 5 credits
- PD262 — Societal Challenges & service Innovation 1 — 5 credits
- PD209A — Universal Design Project — 5 credits
- PD216 — Visual communication and portfolio — 10 credits

Semester 2
- PD201 — Design History and Culture — 5 credits
- PD215 — Usability, Ergonomics & Aesthetics — 10 credits
- PD206 — Computer Aided Design & Visualisation — 5 credits
- MN203 — Marketing Management — 5 Credits
- PD263 — Societal Challenges & service innovation 2 — 5 credits

YEAR 3

Semester 1
- PD301 — Ethnography and Anthropology for Design — 5 credits
- PD311 — Competitive Landscapes & Intellectual Property — 5 credits
- PD309 — Human-computer Interaction — 5 credits
- PD304A — Design for Environment & Sustainability — 5 credits
- PD307 — Design Process and Projects — 10 credits — Sponsored

Semester 2
- PD399x — Industrial Work Experience — 30 credits — Sponsored

YEAR 4

Semester 1
- PD303 — Advanced Materials and Design for Manufacture — 5 credits
- PD401 — Group Design Project — 15 credits — Sponsored
- PD402C — Final Year Individual Project Proposal — 10 credits

Semester 2
- PD401 — Final Year Individual Project — 20 credits — Sponsored
- PD401 — Innovation Management — 5 credits
- PD401 — Systematic Design Methods for innovation — 5 credits

Sponsored — Modules that have been sponsored by external Organisations or are available for sponsorship

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Department of Design Innovation

Design Innovation at Maynooth University is a department of interdisciplinary expertise that combines industrial, entrepreneurial and academic excellence in design. We are focussed on developing research and user-centred, applied practitioners that create impact through design innovation in industries across Ireland and Europe. We distinguish ourselves from other design courses by placing an emphasis on research methods, user-experience, marketing, business models and the commercial justification of new product and service proposals, as well as core social science and engineering subjects. The Department is recognised as a unique centre of excellence in Ireland and has been an active member of Institute of Designers in Ireland. Our industry network covers many sectors: health and medicine, sport, agri-tech, consumer products, financial services and food. Both our undergraduate and postgraduate programmes have collaborating projects and placements with many leading companies such as: Accenture, ESB Innovation Lab, Genesys, SAP, Cook Medical, Glanbia, Salesforce, Pramerica, Hewlett Packard and St James's Hospital.

MSc Design Innovation

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The MSc Design Innovation is available in both a full & part-time basis, with a limited number of places still available for our 2023 program. We welcome participants from various disciplinary backgrounds, including graduates of Social Sciences, Anthropology, Design, Business, Computer Science or Engineering. Graduates of other disciplines are also invited to apply. It is also possible for candidates with significant industry/ relevant sector experience but without a primary degree to be considered. If you are interested in applying, you can find more information through the Maynooth University website, or you can contact Dr Iain Macdonald through her information below.

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