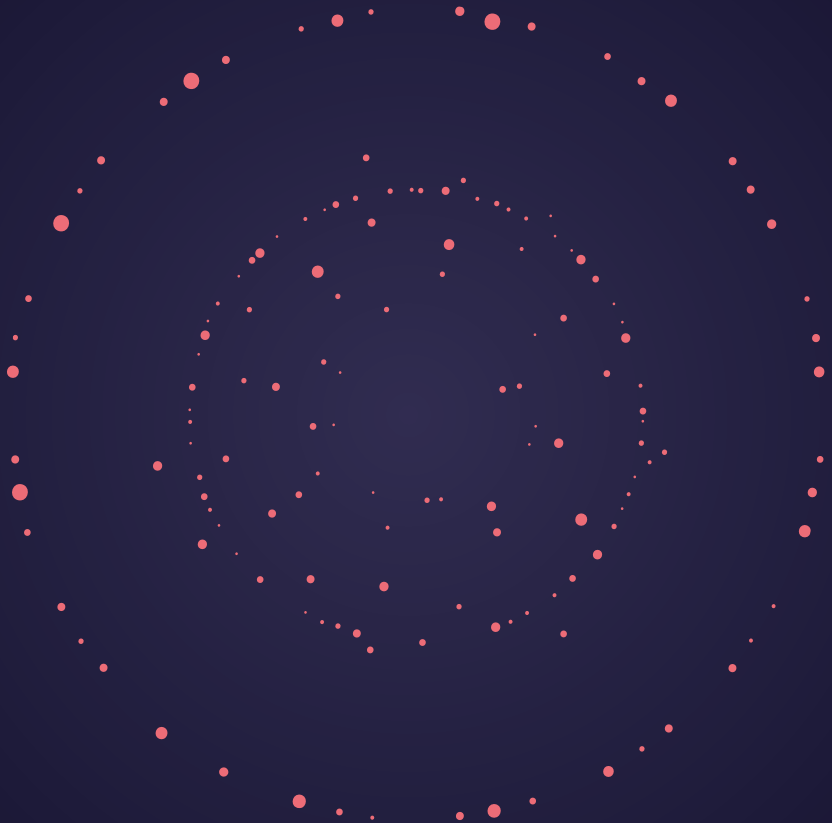
WESTERN SYDNEY
UNIVERSITY

2017
SCHOOL OF COMPUTING
ENGINEERING AND
MATHEMATICS TECHNOLOGY
INNOVATION EXHIBITION



WELCOME

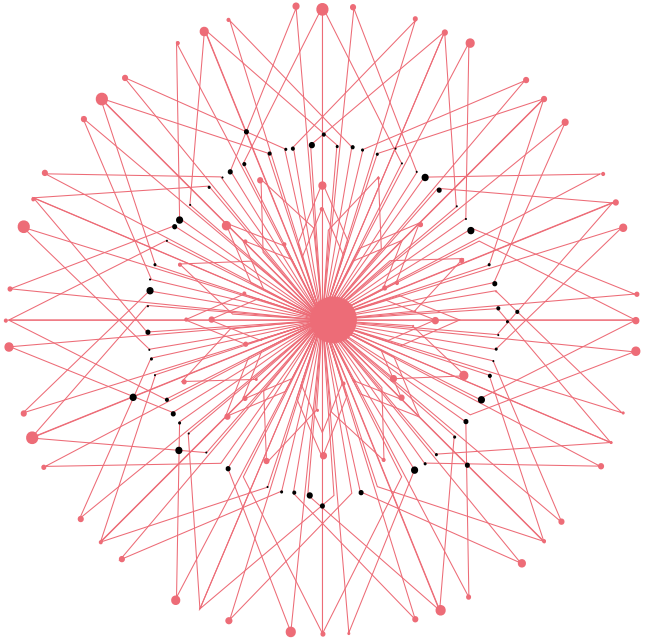
The rapidly changing reality as a result of the improved automation, increased embeddedness of machine learning and artificial intelligence technologies, and continued technological improvements and digitalisation in manufacturing, sets new opportunities for future graduates. Creativity, inventiveness, research leading to problem identification and solving, entrepreneurial acumen and leadership are essential for succeeding in this world. The ability to engineer smart functionality intertwined with aesthetics, environmental sustainability and energy efficiency are essential for succeeding of a new invention.

The School of Computing, Engineering and Mathematics (SCEM) develops the above capabilities in its students through transdisciplinary fusion of knowledge and skills from Industrial and Engineering Design, Artificial Intelligence, Data Science and technology-driven entrepreneurship. SCEM has extensively supported and stimulated the development of trans-disciplinary projects, which accelerate intensive interaction and fusion between Industrial Design, Engineering and the Information and Communications Technology (ICT) disciplines in product design and manufacturing, and smart building design and construction.

Western Sydney University Solar Car project is a fine example. In 2017 the 22-member team UNLIMITED 2.0, comprising of students from the fields of Engineering, Industrial Design and Visual Communications, finished 6th in the Challenger class in the World Solar Challenge competition, achieving the best result among the Australian teams. During the preparation phase, the team operates in a "start-up mode" in terms of creating new car design, engineering and ICT solutions, soliciting sponsors and manufacturers, and engaging with the broad community. The Werrington Observatory Enterprise, Formula-SAE, The Sustainable House, The Solar Electric Scooter, The Solar Go Karts, The Robo Cup challenge, various hackathons and challenges are some of the projects, which require expertise from all the areas and commitment from students, academics and professionals.

Over the last five years the University has introduced new design studios, has extended the networked maker spaces, has developed the Arts and Engineering Precinct on the Parramatta South Campus and is further extending the design and engineering facilities in the Kingswood Advanced Manufacturing Precinct, to provide unlimited support for the development of student creativity and leading-edge capabilities. Such expertise and capabilities provide students with the opportunity to convert their creative ideas into cutting-edge solutions and take those into the real world. The Widevision exhibition this year reflects the creative and entrepreneurial spirit and capacity of the students at Western Sydney University.

Professor Simeon Simoff
Dean, School of Computing Engineering and Mathematics



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CITIZEN
WESTERN SYDNEY SOLAR TEAM

WESTERN SYDNEY SOLAR TEAM

A team of 22 volunteer students from Western Sydney University who design, build and race their own solar car through one of the harshest environments on Earth.

PLACED 6TH IN THE WORLD

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WestSydSolarTeam

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A MULTI-DISCIPLINARY PROJECT


FORMULA SAE

WESTERN SYDNEY RACING

is Western Sydney University's student led Formula SAE team. The team combines cutting-edge design with innovation to build high performance open wheel race cars that compete in the International SAE competition.

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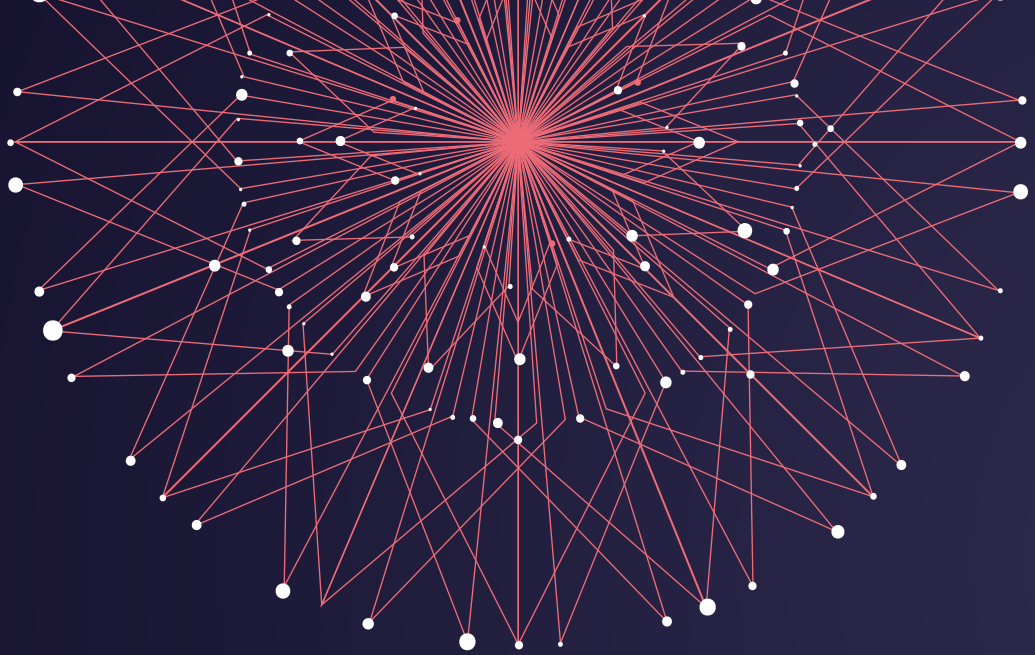
WESTERN SYDNEY RACING

The Western Sydney Racing Formula SAE team offers students the opportunity to gain first-hand experience tackling complex and systematic design problems, with an emphasis on developing project management, team work, leadership and communication skills. The team is multi-disciplinary, offering not only engineering students, but also business, law, design, computing and marketing students with the opportunity to gain invaluable degree relevant skills within a highly supportive framework.

BENEFITS

- Industry recognised experience.
- Networking opportunities with companies such as Tesla, Boeing, Ford and Holden.
- Opportunities to gain industry recognised certifications and training.
- Incredibly flexible work that recognises the challenges of being at University.
- Opportunity to work in a cutting edge work setting, with a supportive and professional team.
- Opportunity for your work to be publicly displayed and publicly recognised.



BACHELOR OF INDUSTRIAL DESIGN

FINAL YEAR STUDENTS

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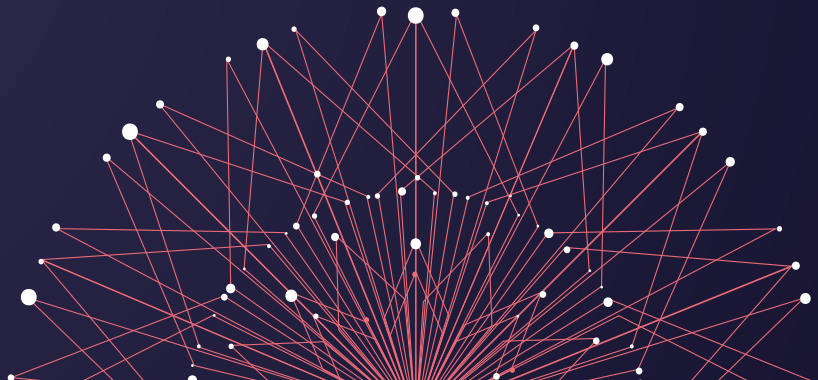

INDUSTRIAL DESIGN
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KNIGHT RIDER DESIGNS F1GTS

JAKE BLACKHALL

E-sport is a growing gaming industry around the world that pits professional gamers up against one another in competitive games and environments. Within this field is the professional e-sport of SIM racing which encompasses the feel of being in a real car. Simulators are used in numerous motorsport categories such as F1 for driver training and feedback on the development of parts that will go on the real car at the next Grand Prix race.

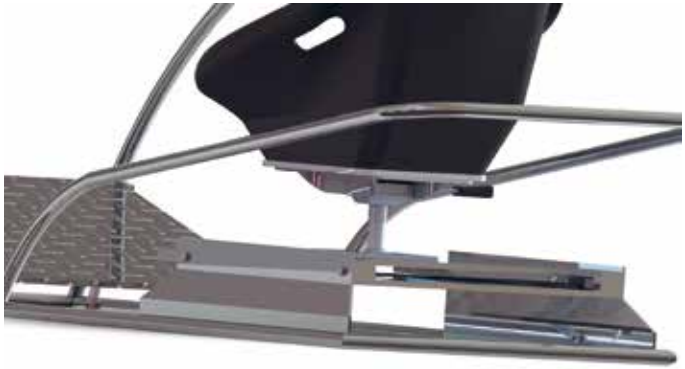
High-end simulators are mainly used for motorsport application and some have made it into the everyday user's home and have created a competitive field in the e-sport industry but not everyone has the money to be able to purchase such a high-end simulator that would be upwards of $20,000. Everyday home users have become the driving force in SIM racing, presenting design challenges toward style and budget especially when some people don't have the space for expensive rigs. When someone first gets into SIM racing they usually have one of two choices, whether they choice a Formula 1 style SIM with a seating position matching an open wheel car or a GT style seat.

My personal narrative informed the project as I have been SIM racing for the past 8 years and have won numerous championships online competing against some of the best sim racers Australia and the world has to offer. I'm now a part of a team called Evolution Racing Team that provide me the support that I need including sponsors like Logitech G that help me strive to be the best that I can.

I have also worked and driven alongside drivers like Super 2 driver Anton De Pasquale, World Endurance and Aston Martin factory driver Benny Simonsen, Current British Touring Car Champion Ashley Sutton and Nissan GT Academy Winner Matt Simmons. No other SIMs can change the seating position and pedals automatically and that is what I have set out to achieve with the KRD F1GTS.

Photoshop Rendering of initial concept for the F1GTS

Final CAD rendering of the F1GTS



Detailed CAD rendering of office chair pivot mechanism

KRD
KNIGHT RIDER DESIGNS

Photoshop renderings showing the different seating positions

INDUSTRIAL DESIGN
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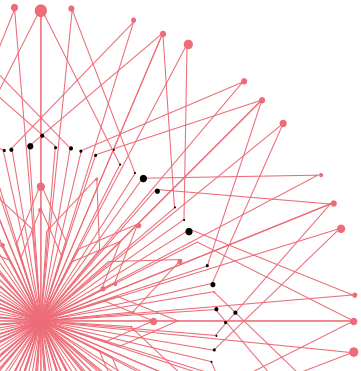
BLOOM STAND

CHRIS BOWMAN

IV stands are a common and essential piece of hospital equipment, supporting liquid medication bags, a variety of infusion pumps and other hospital apparatus. Despite their prevalence in the medical setting, there are several crucial issues with the current design, which have made them the bane of hospital staff. Research conducted, concluded that there are serious issues surrounding the stability, manoeuvrability and general practicality of these stands, which place both patients and staff at risk of injury.

The Bloom Stand is designed around the needs of patients and hospital staff to help create a safe and practical environment. The protruding base legs of the current IV stand are replaced by a modernised supporting base, designed around the user's natural foot position while pushing the stand, to greatly reduce the chance of tripping on the base. Prototype testing concluded that a four-wheel design, which implements larger wheels at the front, enabled the easiest control of the stand over uneven areas of floor while keeping the base free from the user's feet. User research involving past hospital patients and nurses, concluded that an offset pole with a weight supporting area for heavy infusion pumps, reduces the strain on nurses as they mount the apparatus to the pole, while improving the overall stability of the stand due to this weight being centralised. Any electronically powered items mounted to the stand are connected to a base mounted power board which utilises a spring retracting power cord.

The Bloom Stand assimilates effortlessly into the current busy hospital environment to provide a safe and reliable piece of vital equipment.



Bloom Stand top view.

Bloom Stand underside view showing structural frame and wheels.

Bloom Stand supporting fluid bags and infusion pump.

Bloom Stand side view.

INDUSTRIAL DESIGN
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PERSONAL PAL

BROCK PAUL CAMILLERI

A child's learning can be tedious and challenging in today's fast changing and information loaded society. Therefore, there is a need for an array of new tools and methods that can assist providing them with fun and engaging educational experiences.

The Personal Pal project introduces learning through play to children based on S.T.E.A.M (Science, Technology, Engineering, Arts and Mathematics) educational methods. It works through enjoyable interactive practice, incentives and guides to help develop fine and gross motor skills, associative and cognitive ability, critical and creative thinking, intelligence, memory and problem solving skills. The Personal Pal is a robotic companion which the child nurtures, trains and raises, whilst doing so the companion also helps a child develop socialisation and interpersonal skills through conversations and emotional feedback.

The Personal Pal syncs with mobile devices, which give parents and teachers access to monitor all relevant data and interactions at any given time. Collected data allows parents to check on progress, struggles and estimate the child's natural talent, abilities and preferences in learning.

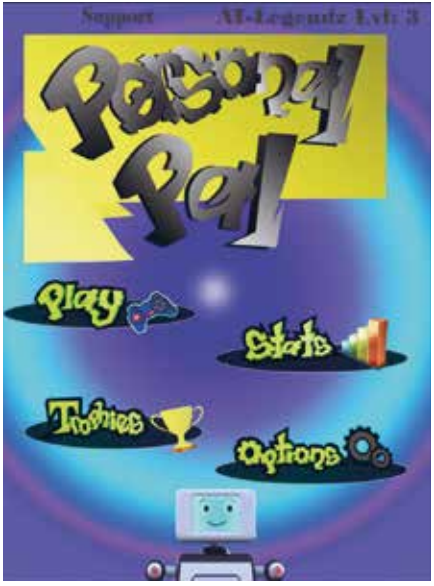
Time and other units of measure can also be set for daily reminders and activities such as bath time, bed time and brushing teeth, making these daily processes less strenuous for the parent. The Personal Pal is completely customisable from both a mobile application and by physically upgrading parts, sensors and accessories.

The Personal Pal grows with the child and his/her cognitive development through an innovative system based experience connecting all stakeholders including; the child, parent, teacher and technology.

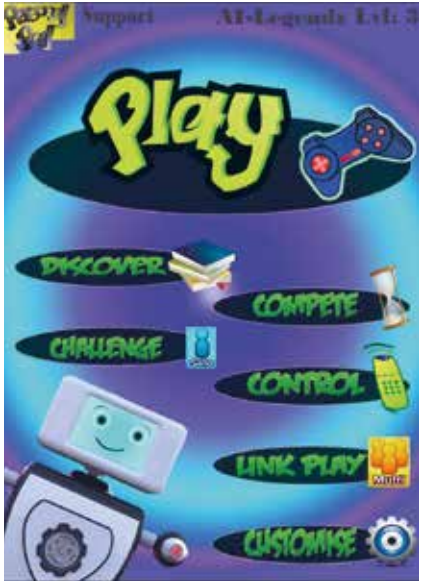
Personal Pal Robotic Companion

Personal Pal Happy Emotional Level

Personal Pal Unhappy Emotional Level



Mobile Interface - Play Menu



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THE PLEURA
WYATT HEDGECOCK

There are a multitude of design ventures that can be pursued within various problem areas that surround the Medical field. Out of these areas there are those that take precedence with the need for an innovative solution. Breathing & Chronic Respiratory Illnesses form a large family of diseases, which are increasingly expanding health epidemics, and these illnesses share common ground in terms of their diagnosis, management, and the various dynamic forms of treatments. However, prevention methods and the promotion of these methods to combat and/or halt these conditions before they develop, aren't always thoroughly practiced.

Chronic Obstructive Pulmonary Disease (COPD) is the most predominant of these illnesses as it is a debilitating disease which is characterised by a limitation of airflow within a persons' lungs. It is progressive, worsening after every increment of inflicted damage, and the largest percentage of users & patients who suffer from this disease are smokers. People often find it difficult to harness incentive for the cessation of smoking which is something that could potentially aid in the improvement and/or avoidance of their disease.

For today's users & patients, a Spirometric Assessment is currently the main form of returnable diagnostic information that details the severity of their disease, however this practice isn't always confidently trusted due to how difficult the procedure is for some users to perform and the accuracy of its' returned results. Impulse Oscillometry (IOS) is an alternate method of Lung Function Testing and has been found to be a far more sensitive instrument in evaluating the severity of Airwave Obstructions within a person/s Respiratory System. Innovatively progressing this technology provides the possibility for the early detection of COPD, helping to prevent the severity of the disease and in turn, potentially prolonging life.

My Project '*The Pleura*' is a portable product solution which incorporates modern interactive technologies as it embodies the practice of Impulse Oscillometry (IOS), specifically Airwave Oscillometry (AOS). Airwave Impulses are passed into the users' lungs as they participate in Tidal Breathing exercises and the 'Impedance' and 'Reactance' readings of Air pressure & flow is measured and converted into digital data, which is sent to analysis software to simplify the output data. This data can be easily viewed and understood within The Pleura App that can be installed on any smart device. The test results and in-app functions help to promote the cessation of smoking for COPD sufferers and provide an effective method of prevention for their disease.

The Pleura

The Pleura Exploded View of Internal Components

The Pleura

The Pleura Topside - Overall ergonomic shape for increased usability

INDUSTRIAL DESIGN
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ALPHA LIGHTNING
ZAC KIRWAN

The Alpha Lightning is an electric motorcycle like no other on the market. This project was initiated to design an electric motorcycle using high performance lightweight materials accompanied with cutting edge EV (Electric Vehicle) Technology and interfaces, to create the best E-Bike the world has ever seen.

There are numerous design issues to overcome with electric motorcycles, for example power, performance, battery life and many more. However, the largest problem is the short running range of only 200kms compared to a standard internal combustion engine with a range of 400kms, and the excessively long charge times of 8 hours when fitted with standard charging systems. These two main issues alone drive most potential users away from E-bikes to standard motorcycles.

As most E-bike manufacturers use 40-60AH (Amp Hour) batteries, the issues of battery life, power and running range were solved by using Aircraft Grade 100AH batteries set in series to produce 96 Volts with a 10KW (Kilowatt) engine, giving the Alpha Lightning a ridable range of up to 450kms accompanied with a calculated 0 – 100km/h in just over 3.5 seconds. Carbon Fibre was used for all of the fairings and mounts to keep weight to a minimum. To reduce charging times a J1772 fast charger was incorporated to reduce a complete charge down to 2 hours whilst being compatible with all standard EV charging station located in various parking facilities. Finally the most innovative design on the Alpha Lightning is the solar charging system, which deploys the solar fairings when entered into its solar charging mode, this can regenerate 100kms of ridable range when charging for eight hours, further adding to the overall ridable range of the motorcycle.


EV4C
Centralizing Electric Vehicle Data
Battery Amperage
Energy Capacity (SOC)
Motor Amperage
Controller RPM
Charge Amperage
Power Input
Battery Management System (BMS)
Motor Controllers

INDUSTRIAL DESIGN
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LEVEL BICYCLE
TYRAN LECHNER

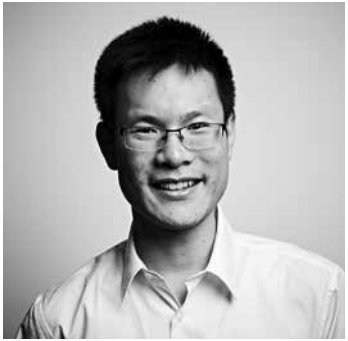
In the world of mountain biking, designers have struggled to develop a bicycle that reaches a medium between pedalling efficiency for ascending and stable handling characteristics required to retain control across high speed and rough terrain. Traditionally, mountain bikes were designed within the bounds of compromise between user needs depending on riding style and discipline. This project aims to develop an all-round mountain bike, by finding a balance between rider input efficiency and stability, while answering the question; How can the integration of electronics into mountain bike frame design provide a reliable active geometry adjustment system?

During the commencement of this project the need for an active on-the-fly geometry adjustment system was identified and proven using MatLab to analyse data collected by riding current competitors' products. This data, paired with the results from focus group surveys and personal knowledge gained from working in the cycling industry, set a number of parameters from which an electromechanical actuator could be specifically developed and integrated into a mountain bike frame.

The actuator is housed inside a monocoque carbon fibre frame and comprises of a worm gear set, DC motor and Arduino. The system reads current terrain conditions and adjusts the bicycles geometry to the best calculated position. The frame has been designed using state-of-the-art technology and materials to provide a no compromise product. The Level bike offers efficiency and stability for all styles of riding, focusing on both uphill and downhill performance.

Level mountain bike project overview

Composite project overview



INDUSTRIAL DESIGN
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MedTicketr

BENNY LEUNG

MedTicketr is a queueing machine with ticket printing feature that is designed to be installed in local clinics and small hospitals. Its goal is to provide options for elderlies to choose their preferred doctor/GP, and minimise waiting time, similar to the ticketing machine at the bank, or at the meat butcher in the market. Research reviews indicated that medical assistive technologies is a developing field and can improve the aging population. The life expectancy of Australians will increase by an average of 3.3, and the number of Australians aged 65 and over is projected to more than double, there are projected to be around 40,000 people aged over 100 by 2054-55 (Hockey 2015).

This research project set out to understand elderly behaviours and consider existing aging population solutions, ergonomics for elderly people, product semantics and lastly briefing design opportunities. The current solutions in accessibility to medical and health services are limited. To meet the increasing aging population, several areas are learned from this research project: ergonomics, ease of access, location and adaptability. Where ergonomics emphasises the user experience of the product, ease of access focuses on product use and features, location as to improve accessibility or providing transport services, and adaptability as to provide education or offering user friendly design. Industrial Design is an ever-changing process. As the process is closely tied to other branches such as technology, design style trend, market demand, the change of medical solutions. We shall continue researching and designing to deliver solutions to the aging population.

Silhouette scale reference

Exploded view

Side view

Product render

INDUSTRIAL DESIGN
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THERAPY TRIKE FOR CHILDREN WITH CEREBRAL PALSY

LAUREN MACKERTICH

The project focused on the development of a tricycle for children living with Cerebral Palsy. More specifically the final product aimed to suit the needs of children under the age of five living with cerebral palsy diplegia affecting the lower body with a Manual Ability Classification System (MACS) of 2 and below and a Gross Motor Function Classification System (GMFCS) of 3 and below. Initially, the project intended on catering to the needs of several different disability types, however, it was decided that the focus of the project should be narrowed down to a specific group due to time restrictions for the project.

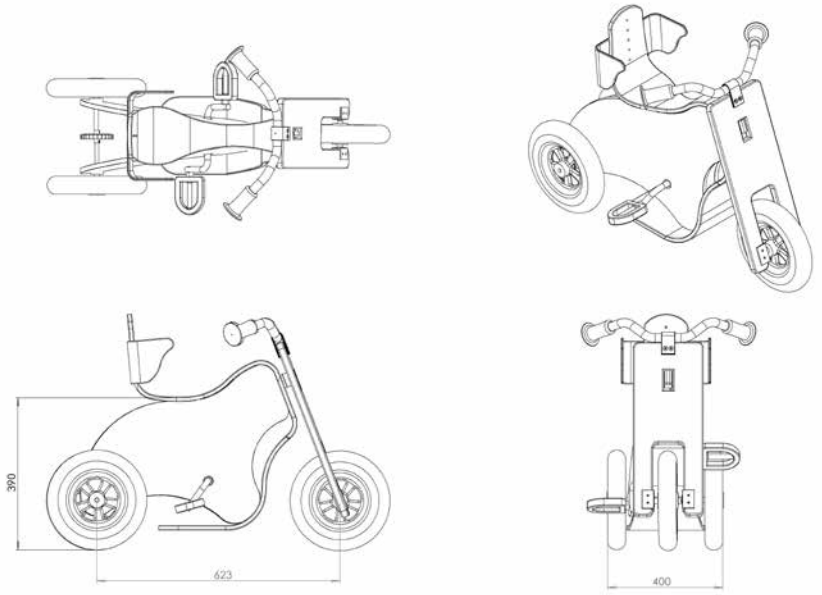
Through my research it was discovered that cycling is often used as a form of therapy for children with Cerebral Palsy. Although, there are existing products on the market that are suitable they are modified bicycles. These designs are un-inclusive in design and not the most appropriate solution to the problem.

Although in the initial stages of the project it was thought that a bicycle would be suitable for the final product it was made clear through research that a tricycle would be most appropriate for the target audience. It was found that these children would most likely need stabilisers on a bicycle and therefore absorbing the stabilisers into the design to form a tricycle was the most appropriate design direction.

Initial Rendering of Intended Design

First full scale model

Timber Trike frame detail



Projected Trike and Dimensions

INDUSTRIAL DESIGN
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WALKING FRAME
SAMANTHA MARTINIC

This project aims to provide a walking aid option for users who have progressive walking disorders. As older adults continue to age, underlying medical factors that contribute to walking difficulties can become more severe. This can cause current walking aid options to become less effective in controlling the patient's symptoms.

While conducting a study on elderly people living within the homecare system, it became apparent that there were problems that affected both the patients and the workers such as fall related injuries and difficulties with obtaining health information about the patient. This project addresses these issues by using two methods:

1. The design of the frame and arm supports help to control factors that increase the risk of falls. This is achieved by stabilising movements of the upper body, reorienting the torso's centre of mass and supporting postures that lessen the likelihood of falls. The frame design also enables natural leg and walking movements to support walking rehabilitative activities.

2. Implementing a computer into the walking frame allows for the installation of additional electronic devices that can monitor and protect patient health. It also provides an electronic method for storing, updating, and communicating important medical information on a centralised system, enabling home care workers to easily access, update, and report on patients.

INDUSTRIAL DESIGN
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ACEI

DYLAN JAMES OLRICK

The ACEI epinephrine autoinjector aims to create a controlled and comfortable injection process for anaphylactic patients. Existing products are spring powered, requiring users to jab or strike the mid to upper thigh in order to release the mechanism. The immediate release of energy is violent and uncontrolled, which may result in inflammation or bruising post injection, whilst the need to strike the body from a distance also portrays issues regarding accuracy and the angle of penetration.

ACEI utilises a button activated Co2 powered injection mechanism. The user simply places ACEI on the mid to upper thigh and presses the button at the top of the device with their thumb to begin administration, thus creating a more accurate and controlled injection process. As Co2 is released, the force drives the plunger and syringe assembly downwards, with the power generated being controlled by an internal compression spring and ventilation slits. A suction cup at the base of the device creates a pinching effect on the skin prior to injection which aims to reduce pain, provide stability and ensure effective syringe penetration. When administration is complete, the internal compression spring expands and recesses the syringe back into the device, ensuring it is stored safely to eliminate potential injuries.

To improve administration times, ACEI is not housed in a plastic sheath, with a safety cap the only means of protection against accidental activation. This design minimises steps needed to achieve administration, thus allowing the user to inject as quickly as possible during the onset of anaphylaxis.

INDUSTRIAL DESIGN
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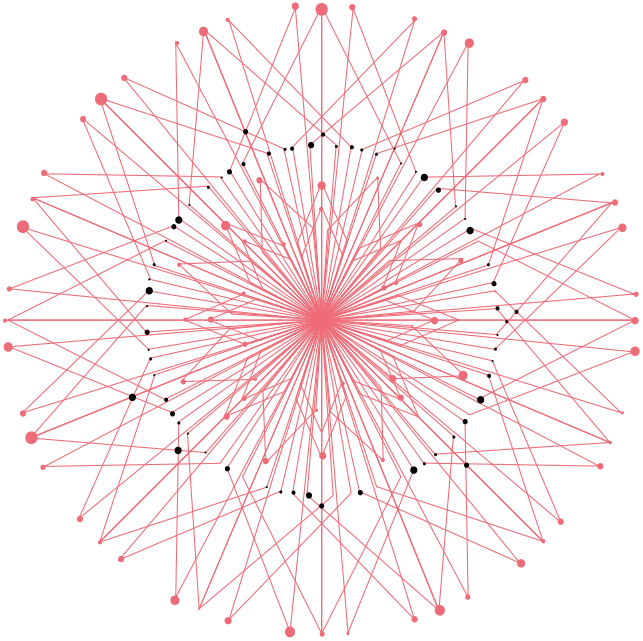
OVER PASS
LIAM PLANT

This project's goal was to create an effective system to help improve the quality of living in residential homes for the elderly. Environmental hazards, such as trip hazards or extreme climate conditions, are serious concerns that affect the general population but can be more extreme for an older population. By incorporating cloud computing into demotics, a non-invasive home system can be created to monitor the perceived well-being of residents. This can be identified through a wall mounted sensor to a central computer similar to a Google Home. The user of the system is able to access this information either through vocal activation systems or an interactive application that can be installed on a tablet.

The climate monitoring portion of the system monitors patterns of temperature and humidity throughout the day and cross references this data with the time of day, time of year and geographical location to create personalised text based feedback for the user to react upon if the climate becomes too extreme for a reasonable person to maintain their current activities. By incorporating The Internet of Things and Big Data, it can be made more accurate with less human involvement.

The fall detection portion of the system uses doppler radar technology to "listen out" for an action that may be perceived as a fall. A human sized body quickly going from vertical to horizontal is this pattern but there are difficulties in a non-human system correctly identifying this pattern, through technological leaps by teams such as Deepmind Kinetics, this is becoming more accurate.

A tablet interface was designed using Unity for the user to view the climate data of each device and see any messages given to them. Although the same messages can additional be sent through speakers, it was realised that having hidden menus and no way for a user to process data at their own pass would hinder usability.



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VFlow

SHANNON WILLIAM PRIOR

VFlow is designed to prevent and treat vascular diseases for female and male athletes involving portable compression treatment in hospitals, travelling or at home that will improve quality of life and performance. Professional athletes in physically demanding roles can be at a greater risk of suffering from Deep Vein Thrombosis (DVT) and Chronic Venous Disease (CVD) due to many factors such as immobility after exercise due to travel, rest and injury. The motivation behind treating and preventing these serious vascular diseases is to help enhance potential performance of athletes and maintain their quality of life.

Modern therapy involves Intermittent Pneumatic Compression with typically large compressors that remain the normal type of application used in Intermittent Compression where the use is more restricted, specialised and long term. Due to this large problem faced by all users of intermittent compression, a shape memory alloy known as Nitinol implemented to contract via an electric current, can help innovate the method Intermittent compression is used. Using ultrasound technology to detect blood flow velocity, VFlow can provide an effective and portable alternative to modern compression therapy and a leap towards smart material compression. Additionally, using an innovative buckle system will assist in non-compliance and incorrect fittings, which can often speed up manifestations of vascular diseases.

Smart Memory Alloy Sequential Calf Compression

Detects Blood Flow Velocity For Correct Venous Return

Multiple Size Adjustments

Portable and Battery Powered

INDUSTRIAL DESIGN
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ENCHANTRESS PC CASE

LUKE RANIERI

Gamers spend hundreds to show off their PC hardware in style and has become just as important as the performance of the gaming PC itself. Therefore, a need was created for a case to house these components, keep them cool under load, while showing off the motherboard, graphics cards and hardware themselves.

The Enchantress PC case incorporates high airflow and modularity into a lightweight, aluminium shell. Enchantress is made from 2mm aero-grade aluminium sheet metal; laser cut, bent and riveted together to create a mono-chassis that is strong and unique. This frame allows for two separate halves of the case to be temperature controlled using 120mm fans located at the base and the top.

One compartment houses the graphics cards in an aesthetic vertical position, with support for storage, while the other side contains the motherboard and power supply unit. They are both interchangeable with one another, therefore, each bay can be removed and swapped into the other for a different look. Two one-piece bent acrylic Perspex doors allow easy access to the case for maintenance and hardware installation. Enchantress is dust free thanks to removable air filters and a positive air flow design.

Enchantress in single PC configuration is capable of housing twelve 120mm fans, eight 360mm or less radiators, 4 hard drives, and 8 SSD's. It is also capable of supporting two PC systems in the one chassis. Enchantress is an innovation of computer style and performance in a unique form factor unlike anything else.

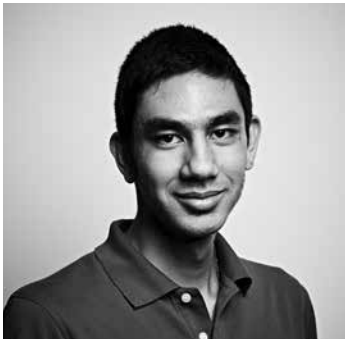
Enchantress PC case by Luke Ranieri

Enchantress Side and Front Views

Final Case Design: Enchantress PC Case

Fourth Case Design: Talon

First Case Design: Division



INDUSTRIAL DESIGN
HONOURS

SUPERVISORS: JEAN PAYETTE,
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ENCOMPHIT
MITCHEL SAAD

Encomphit presents a dog monitor and app aimed at 65+ year olds to entice mental and physical wellbeing, through improving exercise and sociability. It is motivated by human's companionship with the dog.

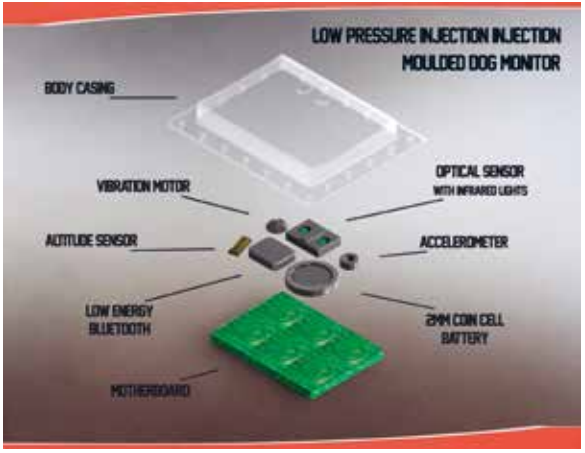
The theme of this project was '*Mental and physical wellbeing of the ageing Australian population*'. From this a research question was derived, reading '*Barriers to mental and physical wellbeing in an ageing Australian population: Design intervention in a smart city*'.

From the 65-year-old age bracket, maintaining a social life begins to prove difficult. Leading causes include poor infrastructure and technology within cities, namely transport and communication through technology. As the world evolves, this increasing population is being left behind and cannot easily adapt. A social life increases physical exercise in various forms, including walking with friends, community activities and walking to destinations. This leads to greater mobility through muscle strength. Social life also improves mental stimulation, including decreasing loneliness which directly relates to depression. Cognitive functioning and motivation is also impacted.

Encomphit offers a solution. It collects the dog's fitness data and feeds this information into leaderboards. This is represented in an app where like-minded, similarly aged and geographically situated users are matched to form social group 'clans'. 'Clan' members meet up, with their dogs, encouraging exercise and social bonding through walks and activities such as fetch. User motivation arises from maintaining the dog's health; the user's wellbeing is merely an after-effect yet an ever-present factor. Motivation is enhanced by working as a group aiming for the top spot on each leaderboard, which is represented in the app.

Welcome to Encomphit, the dog monitor to assist elderly mental and physical wellbeing

Encomphit dog harness & monitor



The monitor: a breakdown

Encomphit app's leaderboards

INDUSTRIAL DESIGN
HONOURS

SUPERVISORS: JEAN PAYETTE,
BERNIE FEHON

SunBattery

MEHMET SOYUSATICI

When you are camping or backpacking, or after a natural disaster, you will still need access to power, but in these situations, you have no power. If there has been a natural disaster, such as a flood or hurricane, it might be a while until the electricity supply is restored. Until then, what do you do? You could always purchase a portable battery, but how will you recharge it? Some products have been released onto the market to try and answer this question, but all of them have one flaw or another. Either they are bulky and don't store enough power, or they are simply unaffordable.

The solution is a portable battery system with an inbuilt solar panel to ensure you are always connected. Unlike anything else on the market, the portable system also includes three removable batteries, so you'll never be far away from a source of power. The individual battery can be used while in your pocket and can be plugged into the main system to recharge. Also, the design includes an innovative solar tracking feature, which allows the solar panel to follow the sun throughout the day making the system much more efficient.

Keeping the design compact is important

Solar tracking greatly improves efficiency

SunBattery

power on.

On the go. Times three.

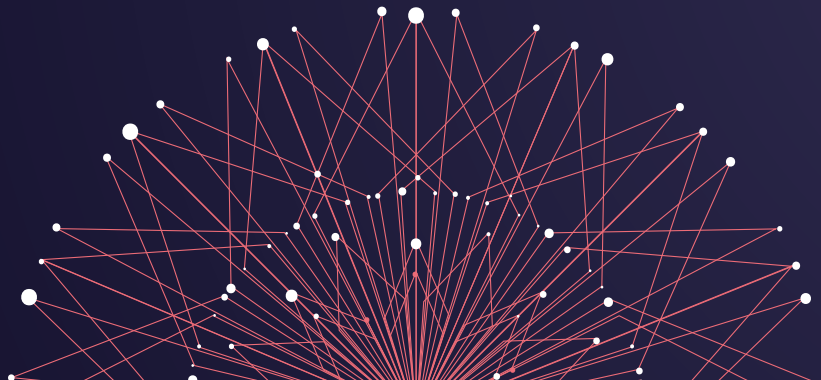
Three removable batteries means you can use one, bring it back and swap it for another, immediately.

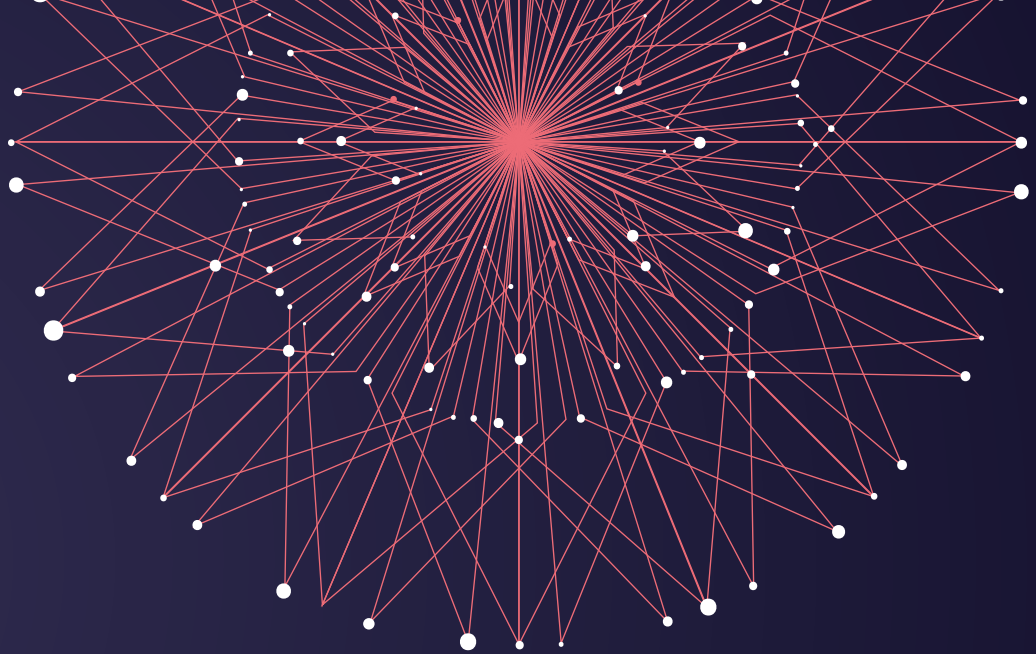
More sun = More power

Single axis solar tracking makes the solar panel up to 30% more efficient over stationary panels.

BACHELOR OF INDUSTRIAL DESIGN

FINAL YEAR STUDENTS





COURSEWORK PROJECTS

INDUSTRIAL DESIGN

SUPERVISORS: JEAN PAYETTE,
JAMES BERRY, KAREN YÉVENES

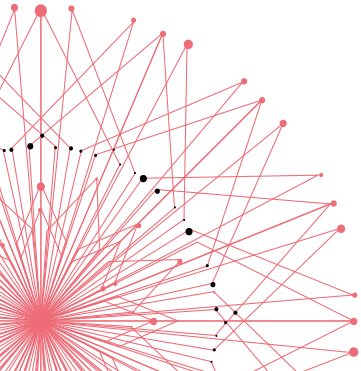
ASSISTED HELP DESIGN HANDHELD DEVICE

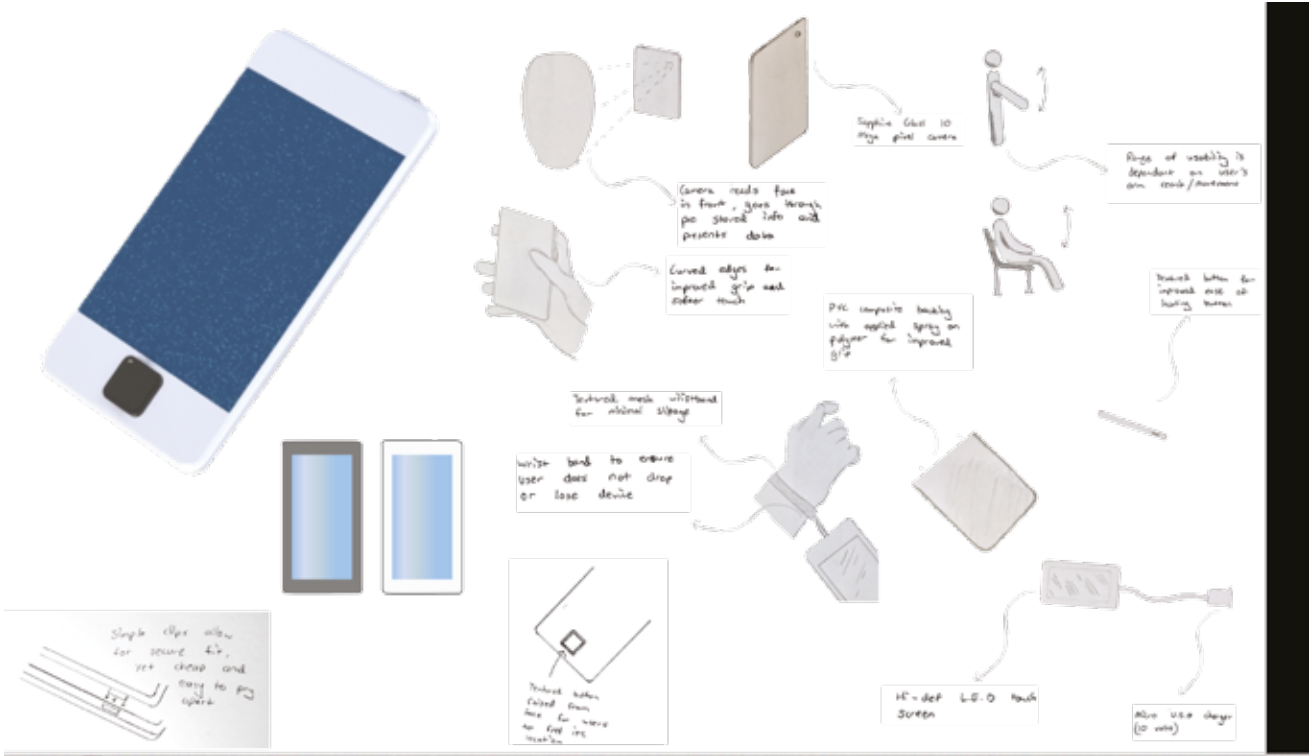
ANDREA ANTHONY CARIGLIANO

Technology has become such a significant part of everyday life that moving forward it would be unwise to not incorporate technology to growing populations. Australia in particular has an aging population that is continually growing, resulting in a number of people affected by various diseases and illnesses. Largely, mental health is the main issue affecting the aging population, particularly in the form of dementia and Alzheimer's disease. However, what is apparent is the aging population still want to be able to partake in everyday life, fit in within society and have the confidence to be a part of the world around them. At times for some it can be frightening, as memory loss plays a significant role in the deterioration of the elderly where the memory of their loved ones, places and everyday occurrences are quickly forgotten. Having experienced firsthand the effects of dementia on three grandparents, what struck me most was how nervous and frantic they became when no one was beside them to explain every detail of their surroundings. It was concerning as they needed round the clock care and monitoring, therefore I put forward the idea of having a technological handheld device. This device is an information bank for the user to call upon key information about a specific person or event. With technology being as advanced as it is today with facial recognition available in most devices, this design would use currently available parts that can run such a system and help the user scan a new or pre-existing and cross reference that in a database of information within the handheld (i.e. name, age, affiliation, other key information). With this product the user can be assured that there is some form of assistance with them constantly allowing them to confidently be involved in regular day to day activities.

Render

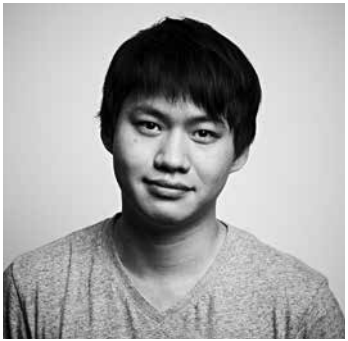
Render exploded





AH

Design Memory Assister



INDUSTRIAL DESIGN

SUPERVISORS: JEAN PAYETTE,
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HAND EXERCISE TECHNOLOGY
ALLAN CHEN

My project, 'hand exercise tech' is a finger exercise product. The idea for this project is to help prevent the deterioration of Dementia patients. As research has shown, exercise can prevent Alzheimer's disease and Dementia. One simple activity is exercising the muscles in fingers and it is one of the simplest and most basic exercise.

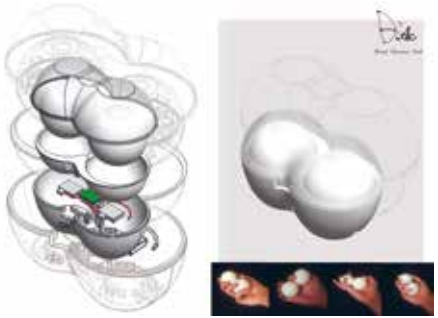
The design inspiration was taken from a Chinese culture "Hand play" or "Fitness ball". This product uses the same ergonomic shape and method however, now transformed into a technological design.

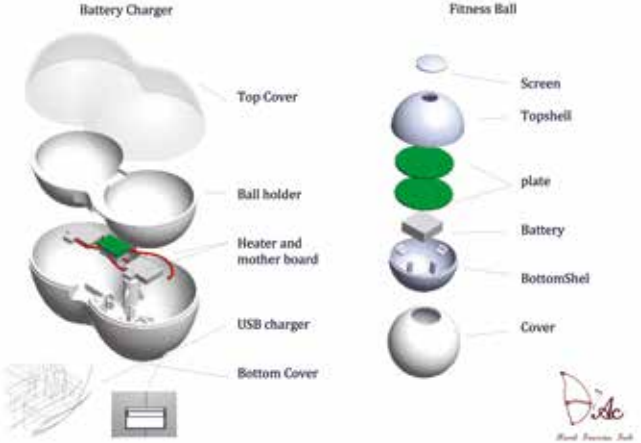
There are three ideologies incorporated into this design.

This project design is to solve the problems around finger exercises and is based on 3 main ideas:

- → **HEATING** the fingers allows each finger to warm up quickly and promotes better finger blood circulation therefore relieving finger rigidity
- → **NUMBERS** or **SCORE BOARD** creates an interactive experience for the user and helps them to better use the product. The design calculates the frequency of use and scores them with numbers.
- → **ERGONOMICS** is taken into consideration so each user can travel with ease and can be used in any situation. The appearance can be changed according to each individual user's taste and size allowing for more convenient use.

One extra component added is the warm up charger. This charger allows the user more convenience to transport the device as its size is limited. Enabling the user more convenience for all occasions.




Battery Charger
Top Cover
Ball holder
Heater and
mother board
USB charger
Bottom Cover
Fitness Ball
Screen
Topshell
plate
Battery
BottomShel
Cover


Hand Exercise Tech
Hand Exercise Tech

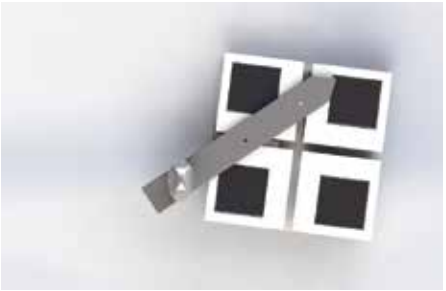
INDUSTRIAL DESIGN

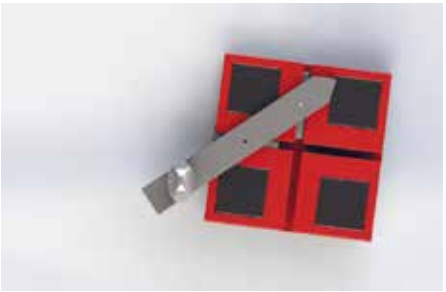
SUPERVISORS: JEAN PAYETTE,
JAMES BERRY, KAREN YÉVENES

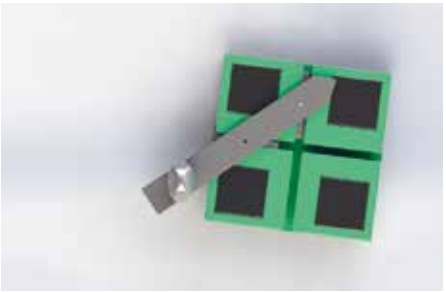
THE ARTHRIGHT

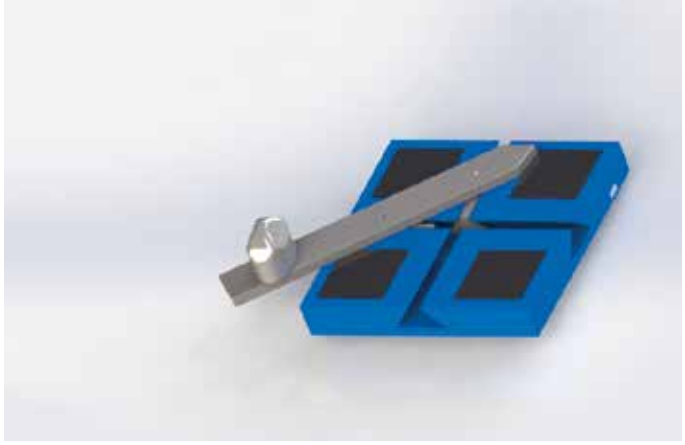
DANIEL DA SILVA

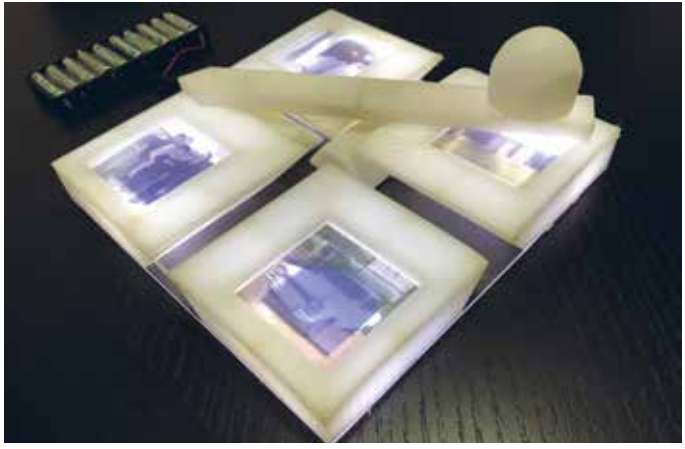
The Arthright is a basic muscle and joint exercise which focuses on exercising the shoulder and elbow joint. The main focus of my product is to help aid in prevention of Arthritis in these joints and maintain their strength, as well as assisting in preventing the occurrence of Dementia. The exercise performs a reciprocating motion, with the handle being attached to two blocks weaving in and out of set grooves. As the handle is rotated around either clockwise or anti-clockwise, the user will perform a shoulder crossover, elbow extension and a circle of the wrist through the exercise. The Arthright also has four digital LED screens, which can be programmed to load up images which the user has to identify. The images will be everyday items or memories that the user should easily remember. This assists in memory activation and helps keep their mind active in order to help prevent or delay the process of Dementia. The handle is shaped like an arrow, and as the exercise is underway the user will be asked to identify and point the arrow to a certain memory in the photo.











INDUSTRIAL DESIGN

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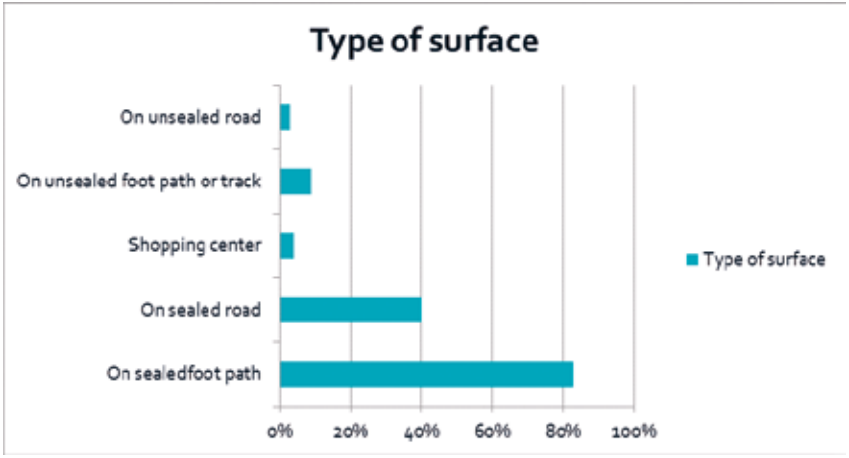
E-WALKER

TURGUT ERCAN

Mobility aids such as a walker are an important part of the daily life for the elderly and people with mobility limitations. There is an increasing number of elderly people who are using walkers every year and this number is expected to grow as the aging population in Australia increases each year. Mobility assisted walkers usually consist of a supporting frame and four caster wheels. They are used by people who are still able to walk but need assistance and are challenged when walking long distances.

The major design problem with existing walker products in the market is that the aging person finds the pushing of a walker as troublesome, especially with the small wheels they have and the poor condition of the surface environments they use it on (foot paths etc.)

To tackle the design problems, my proposed project the “E-WALKER” will implement larger wheels as it will allow it to go over bumps and obstacles with greater ease. But when larger wheels are put on the walker the force needed to push the walker will also be greater. To address this, a high torque low revving motor attached to the wheel will be implemented to assist and help the user. This motor will allow the user to still get the support from a walker but without the need of pushing it.



Types of surfaces mobility aids are used on

INDUSTRIAL DESIGN

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POWER LIMB

ISABELLA HAWKES

Parkinson's disease [PD] affects approximately 70,000 Australians[1] and more than 10 million people worldwide[2]. It is a progressive neurological condition that hinders an individual's ability to perform everyday tasks, and significantly impairs their quality of life. At this time, there is no cure for this degenerative disease, nor is the etiology of Parkinson's known. Those diagnosed, often experience a combination of motor and non-motor symptoms, varying in its severity and progression from patient to patient. Freezing of Gait [FOG], postural instability and resting tremor are the most common motor symptoms, whilst anxiety forms part of an extensive list of non-motor Parkinson's traits.

Whilst a cure or development of stem cell therapies seems to be a distant notion, shouldn't improving the quality of life of those diagnosed with Parkinson's have upmost precedence? This, along with a personal affiliation with Parkinson's having witnessed first-hand; my Uncle fell victim to this degenerative and disabling disease. It was what propelled me to help alleviate the everyday burden of PD.

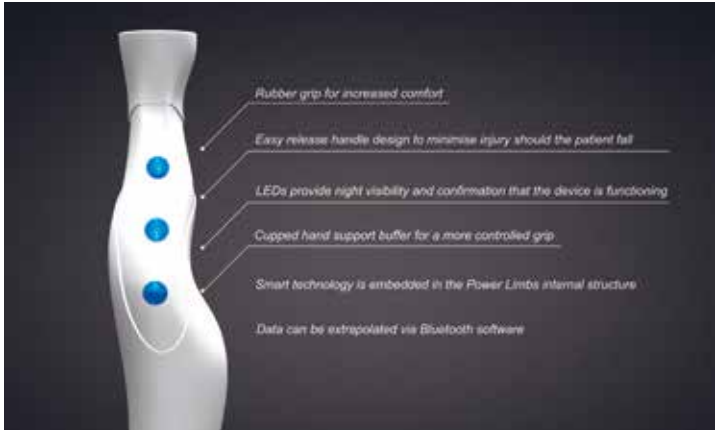
The Power Limb has been designed to bridge the gap between research and the patients themselves. The Power Limb resembles that of a walking stick, however through the application of smart technology; data capturing, wayfinding features, SOS communication, and an inbuilt vibration pacing system Parkinson's traits can be monitored to provided critical insights and support to the patient. The deployment of this device will enable widespread data collection over an extended period of time, as opposed to clinical trials that often occur within a few hours or days. Other features include a medication reminder, quick release handle should the patient fall, a lightweight and supportive carbon fibre frame, and a GPS tracking and navigation system.

1 (Parkinson's Australia, 2015)

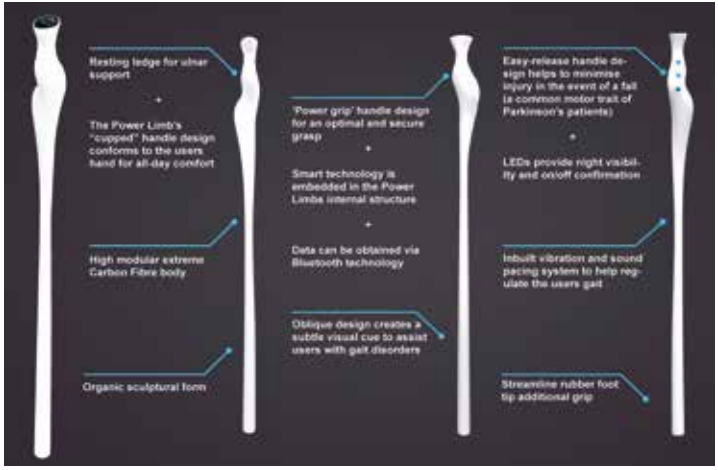
2 (Parkinson's Disease Foundation Inc., 2017).

Power Limb's user interface (Hawkes, 2017)

Rear view of the Power Limb (Hawkes, 2017)



'Power grip' handle design for an optimal and secure grasp (Hawkes, 2017).



Power Limb design features (Hawkes, 2017)

INDUSTRIAL DESIGN

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PORTFOLIO
v3.pebblepad.com.au/spa/#/public/
zh7mfgdzmWRR8qtdqpZpzW6cwc

HandMassager

SUHAN LEONG

Australia and many other first world countries have an increasing aging population. In Australia, over 15% of the population is over 65 years of age, and this number is expected to rise to 20% by 2050. Statistics from Arthritis Australia has shown that nearly 50% of this age group suffers from some type of arthritis, a condition which cannot be cured.

The two most common type of arthritis are: Rheumatoid arthritis and Osteoarthritis. Arthritis is a condition in which the tendons around the joint swell up with inflammation, causing pain and immobility. In many cases, these may affect only the patient's hands. The inflammation can be reduced with massage and exercise, which is the aim of this hand massager. While there are several other hand massage products on the market, none of them exercises the fingers through stretching, which is recommended by several physical therapists. This type of massage acts as both prevention and reduction of the symptoms of pain from arthritis.

This hand massager uses air pressure to grip the fingers while a servo mechanism stretches them out by moving the palm of the hand. The user simply inserts their fingers into the holes and place their palms on the ball of the massager. A display screen indicates the functions that are in use at any given moment (power, program, heat and timer). The combination of heat and massage, aids the reduction of swelling and strengthens the hand at the same time.

Rendering of the file in Solidworks

Sketch of the product in use

Final Solidworks material rendering

INDUSTRIAL DESIGN

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CTRL+TABle

TIMA RESIDOVIC

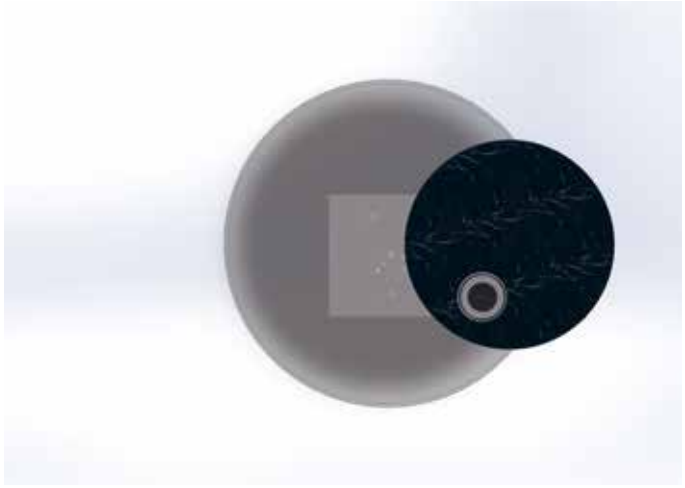
The modern side table features wireless charging technology for mobile phones along with a subtle, pulsing LED light to notify when emails arrive via Bluetooth connectivity, seamlessly integrates into a smart and minimalistic design, which blends into any home environment naturally.

The side table is an unobtrusive work tool that is seamless in its functionality, providing the opportunity to engage with work as required in the home environment. The table streamlines on duty time for work in the off-duty space. The table's simple design means that it can blend in with ease as a bedside, lounge or hallway table, or used to add some style to the home office. It can fit in wherever you plan on placing it.

Wireless charging is a smart and convenient way to power your device. The technology enables users to quickly and easily charge their device, then simply pick it up and go. This effortless efficiency helps us to move one step further into a wireless world and removing work-related clutter from the home.

With the increase in people working from home, the rise in smaller spaces and smarter homes, this table answers the need for furniture which is multi-functional. Technology features strongly in our lives, now and in the future, the CTRL+TABle seamlessly integrates technology, functionality and design into any pre-existing furniture.

Notification table & charging plate.



Top view

Profile view

INDUSTRIAL DESIGN

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RECOGNITION ASSISTANCE

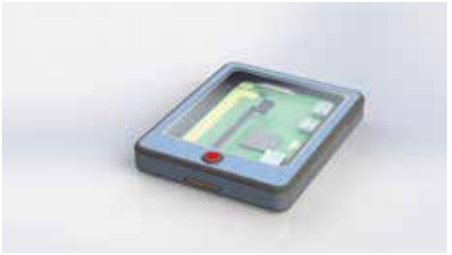
HARRY TRAN

Dementia is affecting almost 1/5 elderly patients aged over 50 with no cure in sight. While there are 7 stages of dementia/Alzheimer, there are no preventative measures. Taking that into consideration, this product is designed to reduce the risks of dementia's devastating effects.

Dementia mainly affects the intended user by memory disorder meaning the patient cannot process any fundamental memory. With that being said, there are ways to aid in reducing the effects of dementia through facial recognition.

But why just facial recognition? As dementia mainly affects the elderly, the people who they are surrounded by are usually their carers or family members. With this in mind, the product is mainly designed for patients with early on-set dementia.

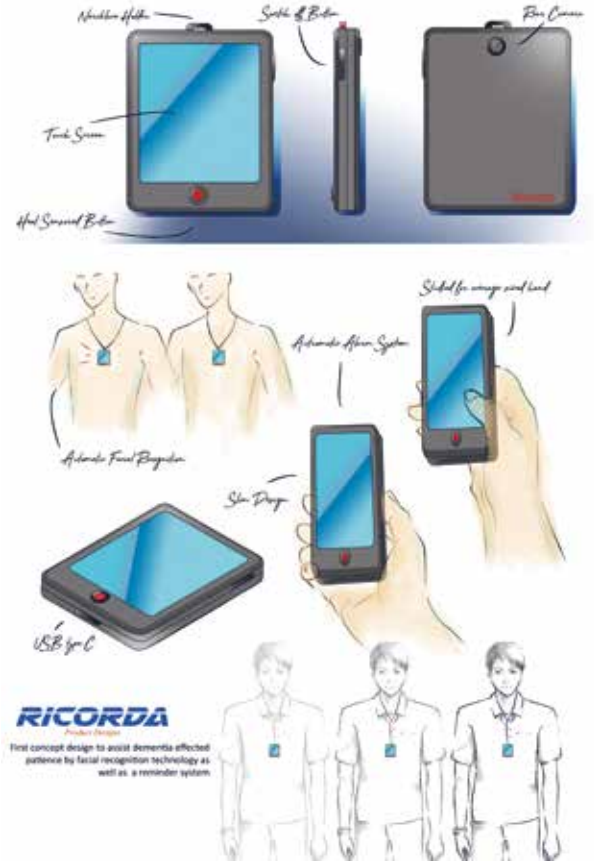
Creating a simple product that can be worn around the neck area and simply automatically detecting facial status's as well as recognising other intended users is would be life changing. Not only would it help reduce the dementia stages, but can help aid and prevent it going further.



Ricorda

Ricorda Exploded

Rapid Prototype Ricorda



Graphic Panel

INDUSTRIAL DESIGN

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SENWALK

THI THANH THAO TRAN

SENWALK - A walking cane with extra support in both standing and sitting positions.

It is a challenging concept to change the traditional method of mobility aid for senior citizens. SENWALK is designed with the goal of building the most comfortable yet stylish support system for a senior citizen's daily walking journey. Whilst simultaneously, enhancing the ergonomic feature for standing up and down.

Using a leaf motif to connect with the senior lifespan, the SENWALK becomes the focus idea for mobility aid for seniors. A 30-degree upward angled handle allows the user to maintain their hand and wrist in the most neutral position. It reduces strain and discomfort for long periods of time especially for Arthritic seniors. Specially designed soft memory foam in the shape of a leaf integrated with a non-slip grip is designed to prevent slipping and provides a firmer grip in wet conditions.

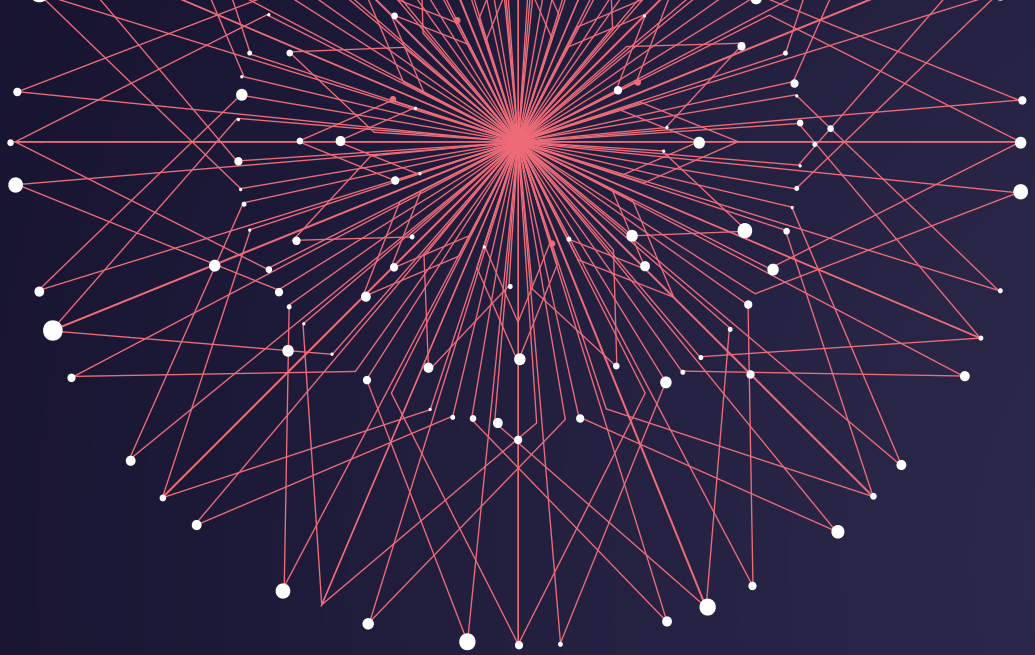
'Push Down', 'Turn Opposite' and 'Click to Lock' are actions required when the user needs extra support when sitting and standing up. The entire leaf component can be separated into two components; an aluminium leaf at the top and the soft lower leaf foam can be pulled down and locked into the opposite direction. There is also an adjustable tube which allows the user to change the height to suit their needs.

With minimal parts and a 'screw-free' assembly, the SENWALK is a sustainable and cost-effective design.

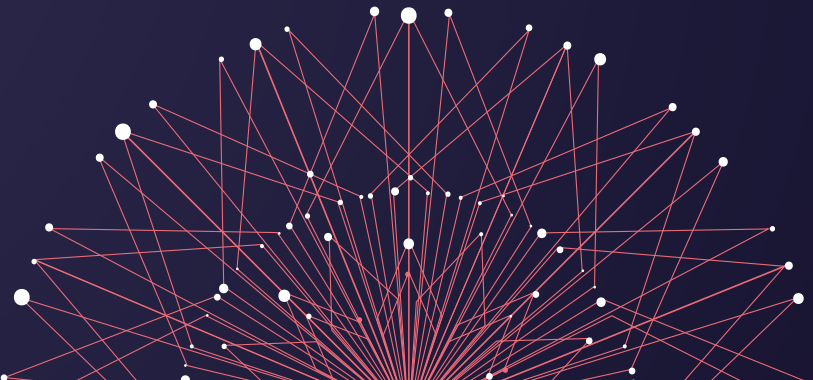
Stylish cane

Cane in walking position

Cane in standing position



EuMe PROJECT



EU-ME AUTONOMOUS ELECTRIC VEHICLE PROJECT

Eu-Me (You + Me) is a low speed electric vehicle designed for short-range travel within precincts that are dedicated to pedestrians, cyclists and public transport.

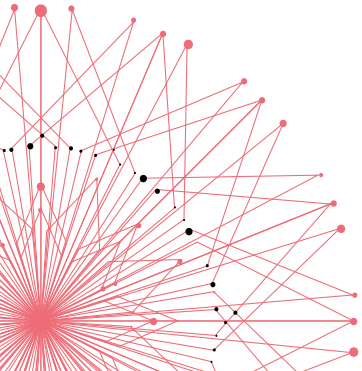
Eu-Me presents a design solution that is pivotal to a larger sustainable mobility plan that could potentially encompass electric scooters, bicycles and driverless vehicles. *Eu-Me* supports community and wellbeing, facilitating social meeting points and quiet cities with a human focus, and breathing life into spaces that are normally congested with petrol-driven cars.

Our EV project draws inspiration from the cosmopolitan wasp, the *Mason Wasp* (*Eumenianae*), which builds its nest from plant material mixed with its own saliva. Similarly, *Eu-Me* will utilise a hemp-bio composite matrix for all its major body parts.

INDUSTRIAL DESIGN

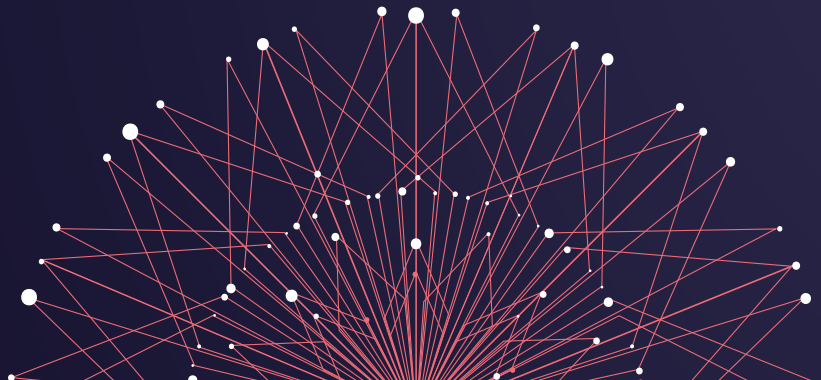
STUDENTS
JOHN BALLANTINE

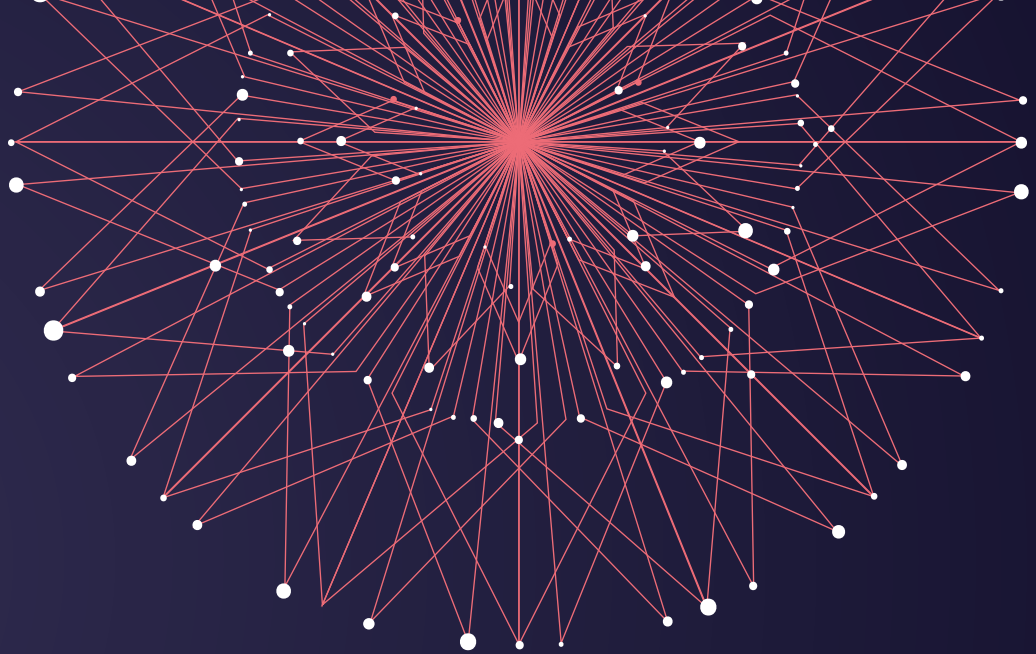
SUPERVISORS
JAMES BERRY
JEAN PAYETTE
KAREN YÉVENES



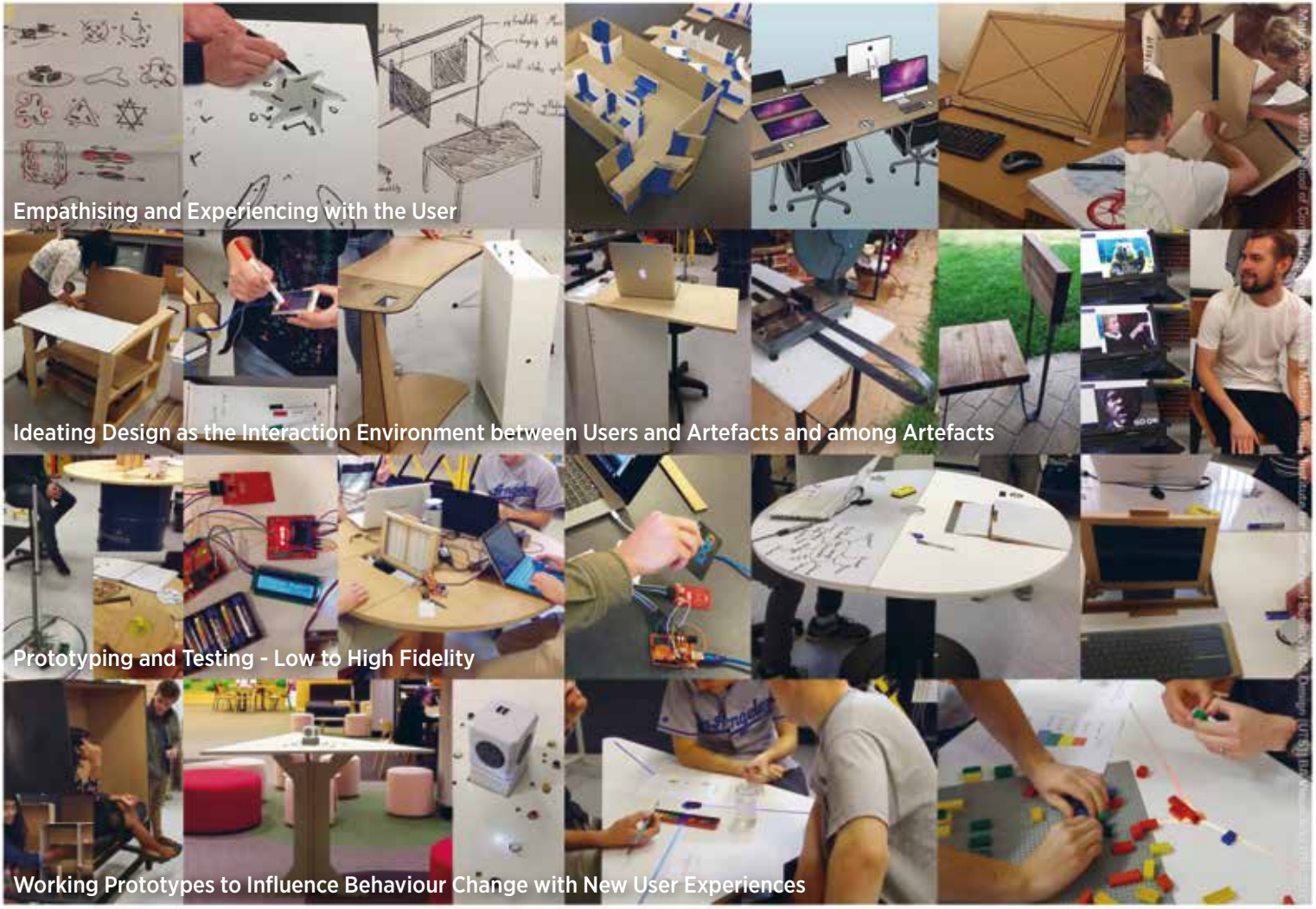
BACHELOR OF INDUSTRIAL DESIGN

THIRD YEAR STUDENTS





DESIGN STUDIO 6


Empathising and Experiencing with the User
Ideating Design as the Interaction Environment between Users and Artefacts and among Artefacts
Prototyping and Testing - Low to High Fidelity
Working Prototypes to Influence Behaviour Change with New User Experiences

DESIGN STUDIO 6:

AMBIENCE, PLACE AND BEHAVIOUR. TOPIC NEW LEARNING ENVIRONMENT.

COORDINATOR: MAURICIO NOVOA
TUTOR: BELAL ALSINGLAWI
INDUSTRY PARTNER: ANDREW FORD

These are Design Studio 6: Ambience, Place and Behaviour highlights. Final capstone for Industrial Design and Design and Technology with topic "New Learning Environment". It is based on human-centered design, empathic design, design heuristics and human computer interaction. We partner with SEBEL Furniture, a leader in industrial and learning space design. Per benchmark, design is not seen only as product styling. Students needed to solve environments holding interaction between humans, humans and artefacts, and artefacts with artefacts.

Six prototype iterations per student pursued unique value propositions through minimum viable products. Computers and digitality were just other materials to intervene with coding to produce meaningful solutions. STEAM supported CDIO (conceiving, designing, implementing, operating) framework to validate design by proving it works through use and adoption, rather than thinking design is successful just at concept proposal stage as before.

Students learnt through play when activating their experience by dialogue, observation, empathy, critical making (low to high fidelity prototyping and testing) and working models able to influence behaviour change. They proposed from learning in the outdoors around campus to intervening and changing classrooms (lecture theatres, collaborative learning spaces and computer labs). They reinterpreted conventional environments (tables, chairs, computers on wheels, etc.) by bridging the physical-digital divide with modular solutions available on demand and customized to course and student learning. As with chairs that cared for participants' wellbeing when prompting (computer screen) them to change position or exercise, and tables that actively interacted in the learning process (Arduino, Bluetooth, C+, Processing, Python, Raspberry Pi,).

LASER WIZARD INNOVATION AWARDS

2017 Theme: Smart Sustainable Homes

WINNER AND RUNNER UPS

LASER WIZARD
INNOVATION
AWARDS

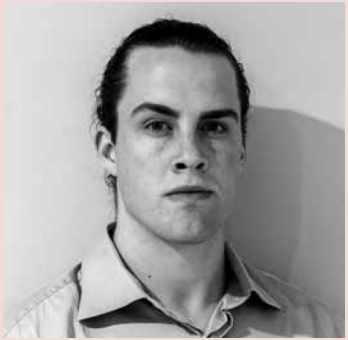
WINNER

MYcompost
JAMES WESLEY

MYcompost is a fully compostable food waste container designed to meet the needs of a growing population living in apartments without access to traditional composting methods. The containers are made from sustainably sourced agricultural waste and bonded together using Mycelium. The containers are safe, odourless, strong, fire resistant; and best of all: environmentally friendly.

MYcompost containers can be used on their own or partnered with a stylish container stand for convenient storage and access. Once full, the containers are collected and crushed by a professional composting service. The service providers take responsibility of the collection and processing of food waste which is returned as high-quality mulch to feed apartment gardens and green spaces. This circular system replaces the linear and wasteful system of buying, using; and then disposing of waste food.

MYcompost is about reusing the waste that we create every day. It is a novel approach to sustainability that uses the waste produced before the consumer to create products and services that tackle food waste after the consumer. Agricultural waste that is created when producing food becomes the primary resource for making the containers, while the stands are built from construction waste that is generated when building the apartments that MYcompost will serve. Food wasted in the home becomes a resource for growing green spaces and gardens.



LASER WIZARD
INNOVATION
AWARDS

1ST
RUNNER
UP

MODULAR HOUSING
TRISTAN HOOD

Modular housing is a concept that deals with material waste when a home is renovated or demolished. It also enables consumers to upsize or downsize at any time. It is a whole system that takes into account the insulation needs, structure standards and even manufacturing methods. This concept can be disassembled down to raw materials for reuse and/or recycling. I hope that this product can change the perspectives of architectural and construction businesses to show that a house doesn't need to be on a linear pattern to demolition but instead can be recycled, reused and modular.

Instead of focusing on products to be more sustainable in the home, I decided to take a step back and consider the house as a product. Why not design and manufacture the house around sustainability? My concept of modular housing can be rearranged, upsized and downsized, furthermore it has the potential to be completely reused, recycled or remanufactured.

LASER WIZARD
INNOVATION
AWARDS

2ND
RUNNER
UP

SOLAR FOLD
MARC TAN

The concept of a foldable table sparked my interest as there aren't that many that are available on the market. Also implementing sustainable features such as solar panels to power a charging dock also caught into the design of the concept. Making the product as simple as possible with less parts ensures that assembly and disassembly is at ease.

Recycled high density polypropylene (HDPE) as the main material for the product ensures that the reuse of old plastics can be incorporated into the design, which makes it more sustainable. Laser cutting will be most suitable to manufacture this product, as most of the design is based off flat pieces/ parts.

The design features that make this product unique have suggested that this concept is a feasible design which will provide a future sustainable system for households in regards to an indoor and outdoor living environment which enriches a sustainable practice in the home.

FINALISTS

LASER WIZARD
INNOVATION AWARDS
FINALIST

COMPOST DRUM
MICHAEL FERNANDEZ

Currently, 21% of the total food available for consumption is wasted at the household level. Behavioural trends indicate that food is merely wasted and sent to landfill due to minor visual imperfections and as a consequence there has been a continuous increase in greenhouse gas emissions and use of natural resources required to waste food. At present, there are minimal household based composting initiatives that are affordable, sustainable and effective for long term usage.

The *Compost Drum* is an innovative and sustainable household composting system. It is manufactured using recycled steel for the frames and legs, and a recycled 44 gallon (205L) oil drum. Its seamless rotation allows for the effective mixing of composting materials with sufficient room underneath to open the access hatch and disperse the compost as garden fertilizer.

The *Compost Drum* provides an effective method of organic waste and ultimately reduces level of household food waste going to landfill. The access hatch enables food scraps to be easily deposited into the drum, with no further effort required to produce fertilizer mixture. When the compost is dispensed and the desired amount transferred to garden there is no further need to purchase fertilizer!

Ultimately, the *Compost Drum* reduces the use of natural resources required to dispose of and incinerate food waste and results in lower greenhouse gas emissions and preservation of the Earth's natural resources. It does not cost anything to run or operate providing long term sustainability!

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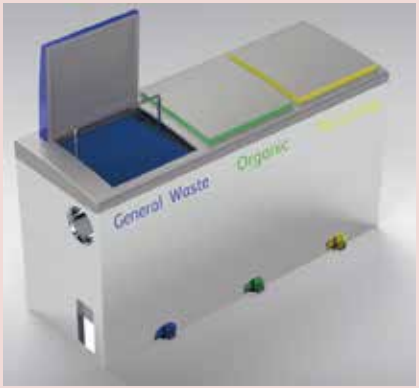
FINALIST

THE SMART BIN PROJECT
CHELSEA GASSON

The Smart Bin project is an innovative design project, aimed at improving the lives of people by enriching and educating them on sustainable waste practices. The design was researched and developed to be a solution for inadequate waste disposal systems in our current society that are impacting our environment. By basing the design off of previously existing and popular designs, the key functionality of the bin is kept, whilst improving on aesthetics and added functionality.

Education on proper disposal of everyday items is crucial in the improvement in decreasing the amount of waste each person creates each year. By incorporating new voice recognition and wifi technologies the Smart Bin enables the users to gather information on these ideal waste disposal techniques. The innovative AI technology included in the Smart Bin, is an adapted version of previous technologies such as Apple's "Siri" and Google Assistant.

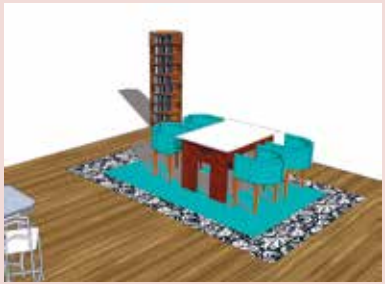
The design features convenient, internal removal chambers with durable and strong handles which allow the user to easily remove the bagless waste bins and transport them to the outdoor wheelie bins. These chambers along with the labels and lid rims are colour coordinated with the wheelie bins outside to ensure the correct contents are recycled, composted or correctly disposed of.



LASER WIZARD
INNOVATION AWARDS
FINALIST

MODULARITY
GISELLE GUAGLIARDO

Modularity is an uprising solution to a problem involving limited space in homes, providing consumers with products that are multifunctional, arrangeable/customisable, cheaper, and ultimately, space saving. The aim of this project revolved around incorporating these aspects while also being sustainable in areas such as materials, manufacturing, transport/ packaging and even sustainability of the consumer needs. This product, or simply Modular Units are individual units that customers can buy and easily arrange together, with the options of arranging them as a coffee table, stools or bookcase to name a few, but customers can arrange them in anyway they desire. Along with this, customers can purchase any amount of units in their preferred shape/style/colour and have them fit together, and if a customer eventually needs more or less, e.g. after moving house, they can always buy more or use the extras in different areas (i.e. have some as a coffee table and some as a permanent storage space/ bookcase). These units are an ultimate product of modular furniture incorporating numerous functions, a range of customisation, and is also a sustainable solution having the products made of recycled wood, and flat packed with cardboard to reduce waste, transport and resource consumption in the industry.



VERTICAL HYDROPONIC FARM

THOMAS MCLAURIN-SMITH

This product concept aims to reduce food waste and food related power usage within households. By combining an aquaponics system with small-scale vertical farming techniques, users can grow organic food in their own home utilising a small space while also averting the need for refrigeration and the use of environmentally detrimental plastic packaging and pesticides. Aquaponic technology utilises the living environment of fist or other aquatic creatures to supply nutrients to plants grown hydroponically, which in turn purifies the water. Growing high quality herbs, fruits or vegetables this way is highly self-sustainable and easy.

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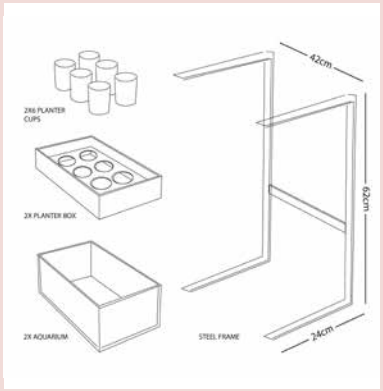

LASER WIZARD
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FINALIST

THE GUARD-HEN - MODULAR POULTRY RUN

LACHLAN TWEEDIE

The Guard-Hen is a minimalistic modular design chicken run product system that is produced to save the homeowner time and money in pest control management. It does this by protecting the fenceline perimeter from migrating pests from neighbouring yards. Poultry birds have been found to be effective in reducing insect and weed populations in backyards. When restricted to focus areas they have proven efficient in terminating existing and migrating pests.

Most homeowners make some form of effort to maintain a healthy uniform garden by eliminating unwanted pests and weeds. It has become a common and unsustainable trend that the average homeowner - gardener will use an array of hazardous pesticides and herbicides for weed and insect control. Most of these sprays contain highly toxic chemicals that leave both environmental and social effects.

The Guard-Hen manufacture process has been made to be critically minimalistic, so it can be manufactured and boxed as quickly as possible to push out as many units as possible. This will not only allow the Guard-Hen to keep up with consumer demand but also keep production cost low through savings in labour, tooling costs, freight and packaging. Modularity in assembly allows the product to consist of less individual components which also contributes to dematerialisation. Not only does this make the product easy to assemble and package but is more sustainable through the saving of unnecessary materials and resources. All components of the product are designed to be easily flatpacked. The design will consist of no screws or bolts for sustainability, ease of use, and manufacturing reasons. Due to these factors a company such as laserwizard could fabricate and package these products all within its own facility.

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