: Melbourne

Tikkun Olam Makers

SWINBURNE DESIGN FACTORY MELBOURNE

SWINBURNE Engineering Practice Academy

TOM @ UNIVERSITY REPORT 18/19

TOMMELBOURNE.ORG

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WHO WE ARE

TOM: Melbourne is an innovative disability tech start-up committed to delivering extremely affordable solutions for people living with disabilities. By connecting Need-Knowers and Makers, individuals with a deep understanding of disabilities and those with the skills to create solutions, we facilitate the development of impactful, human-centred assistive technology. We believe that technology has the power to make these solutions accessible and affordable to all.

We create, develop and deliver uniq ue assistive technology solutions. Our 3 phase approach is integrated into events, university curriculum and developer groups. All solutions developed through our process are available in the public domain, meaning they are freely available for anyone around the world to access. Founded in 2016, TOM: Melbourne is made possible by Debbie Dadon AM, together with government, corporate, philanthropic and community partnerships.

TOM is courageously pursuing a bold 10-year vision to positively impact the lives of 250 million people worldwide.

TOM: Melbourne is one of the leading TOM communities. Since its launch in 2016 TOM: Melbourne has achieved significant milestones:

- **Facilitated 3 Makeathon events**
  Creating 29 unique assistive technology solutions (2016, 2017 and 2019).
- **Established a Developer Group**
  A program advancing four TOM prototypes into final products (cycle 1, 2018).
- **Established TOM @ University**
  In Partnership with Swinburne University's DFM and EPA, developing 8 prototypes and 2 final products.
- **Launched a TOM @ Schools workshop**
  Offering innovative STEM workshops for schools ranging from year 7-10.

TOM @ UNIVERSITY

Building on shared values of design, innovation and inclusion, TOM: Melbourne and Swinburne University of Technology successfully piloted the first ever TOM @ University program in 2018/2019.

TOM @ University is the first of its kind in Australia - combining the TOM process, where teams of Makers and Need-Knowers create extremely affordable assistive technology solutions for the daily challenges of people living with disabilities, together with interdisciplinary, human-centred design and engineering curriculum.

TOM @ University is broken down into two stages, the prototyping stage held at the Design Factory Melbourne (DFM) followed by the productising stage at the Engineering Practice Academy (EPA). In addition to the development of unique assistive technology products, students also develop digital product files, allowing the solutions to be digitised, uploaded to the TOM web platform and distributed across the world.

PHASE 1: DFM

12 Weeks - 2018
9 Challenges
10 teams

PHASE 1: DFM

6 Weeks - 2019
2 Products
2 Teams

3 Need-Knower Partner Organisations:

solve Disability Solutions

Vision Australia
Blindness. Low Vision. Opportunity.

scope
making it happen

NIMESHA FERNANDO

OCCUPATIONAL THERAPY STUDENT TEAM JULES

We actually created something that can help Jules continue a meaningful activity. As an OT student that is realy what we try to do - make sure our clients can do what they love!

NICOLE COULTHARD

INNOVATION ADVISOR SCOPE

TOM @ University is a great example of how starting with the needs of one person can meet the needs of many.

DOUG HAIG

CEO, SOLVE DISABILITY SOLUTIONS

Having real life projects and Need-Knowers for students to interact with is a real world experience for them rather than just an academic exercise.

REBECCA RAE-HODGSON

OCCUPATIONAL THERAPY STUDENT TEAM JULES

The most rewarding this is working with someone that has a problem and needs a solution, and then actually coming up with something that meets that need.

THE PROCESS

CHALLENGE → PROTOTYPE → PRODUCT

PHASE 1: DFM
2018

PHASE 2: EPA
2019

SWINBURNE DESIGN FACTORY MELBOURNE

SWINBURNE Engineering Practice Academy

PHASE 1

DESIGN FACTORY MELBOURNE

As a key pillar in the Swinburne Innovation Precinct, Design Factory Melbourne provides an interdisciplinary platform for industry-engaged research. It brings end-users, students, researchers and industry together in early stage product and service development, to experiment with concepts and their potential value.

The first twelve weeks of the project involved the Design Factory Melbourne where Master of Occupational Therapy students work alongside Design Honours and Masters students to create prototypes for 8 unique challenges provided by TOM: Melbourne's disability organisation partners: Vision Australia, Scope, Solve Disability Solutions. Prototypes from the DFM program were documented by the students and presented as design demonstrators or working models, with a focus on the value these design solutions provide to the Need-Knowers.

TEAM ANGELA

GRIP FOR CRUTCHES

CHALLENGE

Angela has multiple disabilities and prosthesis. She is able to walk around with the aid of crutches, but has complex issues with her right hand that make holding a standard handle crutch complex and painful. We have made a very rough grip aid for her to hold the crutch, but this is only seen as a short-term solution. Ideally, we can design and build a more generic hand grip for her crutch that allows her to more easily use the crutches.

PROTOTYPE

Team Angela created both a functional and aesthetic prototype solution that enables Angela to mobilise a crutch. The functional crutch is scanned and moulded to Angela's arm and is covered by a rigid material to form a pouch. The aesthetic crutch takes into account Angela's colour, design and style preferences.

TEAM HANK

COMPRESSION STOCKING ASSISTANT

CHALLENGE

Hank is a Communication Access Assessor at Scope. In 1985 he suffered from an acute asthma attack, causing an acquired brain injury (ABI) as well as Action Myoclonus, a condition characterised by muscular jerking induced by voluntary movement. Hank's ABI has impacted his speech and mobility. Hank finds it extremely difficult to put on compression / support stockings without assistance and wishes to do so independently.

PROTOTYPE

Team Hank developed a 3 part compression stocking donning solution that includes a lightweight, telescopic applicator that is used alongside a "Doff 'N' Donner" to help Hank easily don compression stockings.

TEAM GEOFF

NIGHT TIME ASSIST

CHALLENGE

Geoff lives with 2 other people in a supported home and Scope staff are present overnight. Geoff does not walk and relies on an electric wheelchair. Geoff has very limited body mobility. At present, Geoff is unable to signal to staff if he needs assistance during the night and he must wait for a staff member to check in. It would be great if Geoff could use some form of assistive technology to allow him to communicate with the staff overnight. Such technology is likely to be based on his available head mobility.

SOLUTIONS

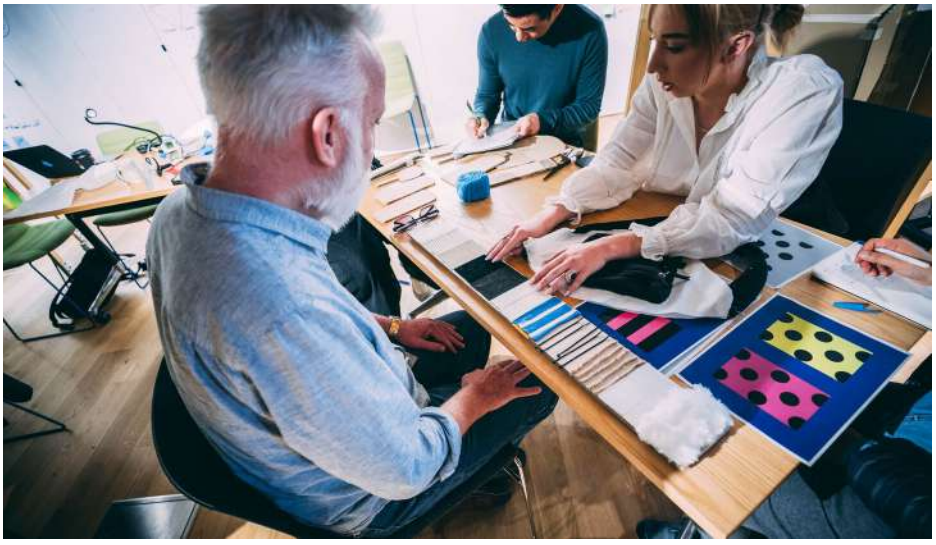
Team Geoff did a fantastic job at exploring the multitude of technologies and devices available in order to help Geoff more easily signal for help at night. Some of the technologies included bite sensors, blow sensors, eye tracking and advanced voice monitors.

TEAM STEVE

HANDS FREE BAG SOLUTION

CHALLENGE

Steve has genetic Macular Degeneration with limited peripheral vision and no central vision. Currently Steve uses both an Ident and Rollerball cane, as well as his voice-activated iphone and seeing AI app. Steve has difficulty carrying a multitude of visual aids plus cumbersome case(s) and umbrellas or coffees. Steve would like a hands free solution to carry coffee cups, water bottles, umbrellas and more, one that is portable and lightweight.



PROTOTYPE

Team created an accessible backpack called the "Steve Sling" that can be accessed while worn over the shoulder and swung around to the front. It contains several tactile compartments that are purpose built for Steve, with Macular Degeneration and limited vision, to more easily access things while on the go.

TEAM NICK

DETECTING LED LIGHTS

CHALLENGE

Nick is an IT professional and highly technology proficient. Nick is seeking a device that will enable him to detect wether an LED light is on or off and also what colour light it is. Currently there are no devices available on the market that do both tasks. Various electronic devices might use small LED's that indicate the status of functions, these small led's might blink in different colours to indicate different states. Nick's vision is for a device that both is a light detector and one that can tell the colour of things with a small enough probe that could be placed on a single LED.

PROTOTYPE

Team Nick have developed a device that can accurately detect the colour of small LED light indicators. The device contains a fibre optic cable that can be manipulated in any direction that attaches to an arduino board. When the LED is placed underneath the reader, and LCD screen attached to the arduino identifies the colour of the light!

TEAM MANDY

WHEELCHAIR WHEEL CLEANER

CHALLENGE

Mandy is a quadruple amputee with two prosthetic arms and legs. Mandy was a Need-Knower in both the 2016 and 2017 Makeathon with two unique challenges. Mandy's challenge for TOM @ University is based around her wheelchair. Whenever she uses her wheelchair in the garden or out on a dirt road, her husband needs to clean all 6 wheels manually with a brush. For many permanent wheelchair users, this simple task would be made extremely difficult, especially without the appropriate support. Mandy would like to create a wheelchair docking station, akin to an automatic car wash, where you could roll in the wheelchair, have the wheels cleaned and then roll straight off again.

PROTOTYPE

Team Mandy (AKA Team DAS) developed a wheelchair wheel cleaning prototype that allows Mandy to clean her wheelchair independently utilising the power from her own chair to drive the cleaning mechanism. Mandy would simply drive on, put the chair into reverse, allowing them to power the cleaning mechanism before driving off the device.

TEAM JULES

ACCESSIBLE BOWLING DEVICE

2	2	8
Teams	Prototypes	Students
Pin Pals Bowling buddies	Spring loaded Cannon Reverse Catapult	Design + Occupational Therapy

CHALLENGE

Jules has a history of degenerative muscle condition and is a full time power wheelchair user. Jules is able to use his hands to operate a joystick to power his chair and also use a mobile phone. Jules would like to play indoor bowls but the commercially available products do not have the required functionality. Jules would like a device that can be clamped to his power wheelchair with the appropriate guidance and actuation.

PROTOTYPES

Team Jules, consisting of Bowling Buddies and Pin Pals, have created two unique solutions for Jules in order to help him bowl more accessibly. Bowling buddies created a reverse catapult bowling arm while Pin Pals creates a spring loaded cannon with spin control and laser pointer. Both prototypes were selected for Phase 2 of TOM @ University! Swinburne's Engineering Practice Academy will further develop them into final products.

TEAM STACEY & JOHN

WHEELCHAIR IN WINTER

2
Teams

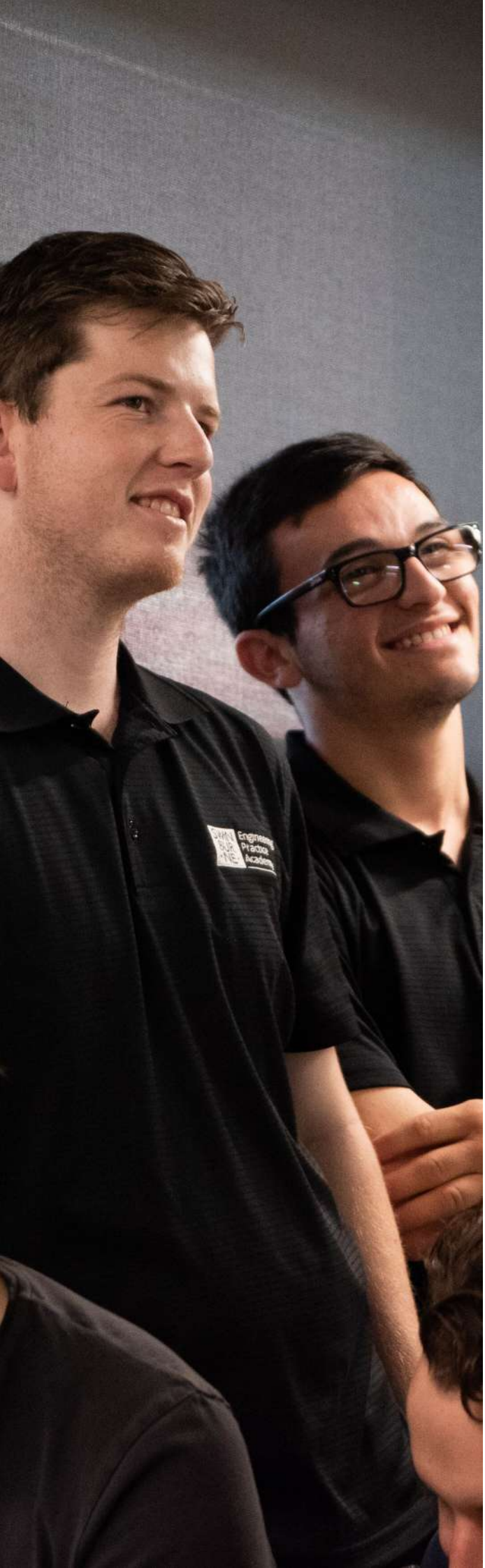
scope
making it happen

CHALLENGE

Stacey has muscular dystrophy and is a wheelchair user. In 2016 Stacey was a Need Knower at the 2016 TOM: Melbourne Makeathon where her team developed a portable, lightweight magnetic ramp to help her to mount any curb. John, a wheelchair user, is a Big Issue seller and sits out in the cold for hours on end. For both Stacey and John, keeping warm and staying dry during winter is a priority. Stacey would like a device that keeps her legs warm and protected from the rain. Her umbrella does not cover her legs and once they get wet, are difficult to warm up again due to poor circulation. John would like a solution that keeps his legs warm, ideally in a similar style to heated car seats.

SOLUTIONS

The students have worked with Stacey and John over the semester to develop a heated blanket that would help to heat the extremities and also remain stylish. The device utilises a concealed heat pack powered by a battery or wheelchair to provide additional heating as required.



PHASE 2

ENGINEERING PRACTICE ACADEMY

The second phase of TOM @ University involves associates from the Swinburne Engineering Practice Academy developing both a digital product file and a refined physical product based upon prototypes and reports provided by the DFM teams.

The two challenges chosen to proceed to the second phase of the process were:

- **Mandy (wheelchair wheel cleaning device)**
- **Jules (accessible bowling device)**

This process of development involved regular touchpoints with Mandy and Jules to ensure the final outcomes met their needs. The students (known as associates) had access to a purpose built makerspace as well as their regular classroom studio. The physical products were handed over to Mandy and Jules by the students, while the digital product files created by the associates have been uploaded onto the TOM web platform providing access to other Need-Knowers around the world.

Phase 2 Dates:
Monday 4th of March 2019 --> Friday 12th April 2019

JOE PERKINS

ASSOCIATE, ENGINEERING PRACTICE ACADEMY

It is amazing to oversee someone's quality of life improve from such a simple thing like bowling.

ALEX GRAHAM

LECTURER, ENGINEERING PRACTICE ACADEMY

Having real life projects and Need-Knowers for students to interact with is a real world experience for them rather than just an academic exercise.

WILLIAM REDDROP

ASSOCIATE, ENGINEERING PRACTICE ACADEMY

Being involved in communicating with Jules, finding out what he wants and not necessarily what we want to give him was the most challenging and also the most rewarding part of TOM @ University

CELESTE STAAF

ASSOCIATE, ENGINEERING PRACTICE ACADEMY

This is the first time we have had the opportunity to work with someone living with a disability. It has been so rewarding to work with Mandy in the co-design process.

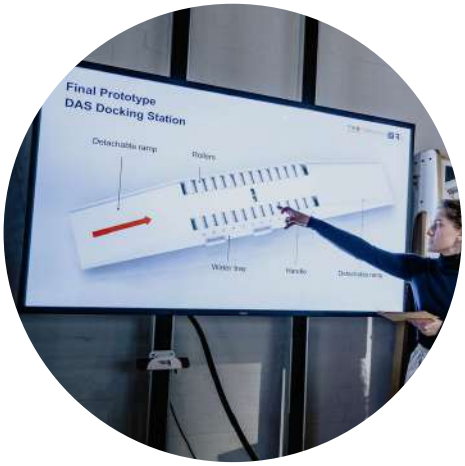
TEAM MANDY

WHEELCHAIR WHEEL CLEANING STATION

"The team have done great job! They asked lot's of intricate questions to make sure they had covered off everything."

CHALLENGE

Mandy's challenge was to create an automatic wheelchair wheel cleaner, similar to a car wash for wheelchair users around the world.



PROTOTYPE

Team Mandy developed a prototype of a wheel cleaning docking station. It is similar to an automatic car wash - where wheelchair users can simply drive on, put the wheelchair into reverse (activating the washer through a ratchet and hammer system) and then drive off.

PRODUCT

Mandy's team of Associates have created a robust and low profile wheelchair wheel cleaning device that is made from aluminium. The device contains three sets of brushes, cleaning both front and back wheels as well as the centre wheel using a simple water tray that can be easily accessed from the side. The deivce contains handles and wheels making it easily transportable and is fitted into Mandy's garage.

TEAM JULES

ACCESSIBLE BOWLING DEVICE

CHALLENGE

Jules would like a device that can be clamped to his wheelchair with the appropriate guidance and actuation to allow him to play bowls!

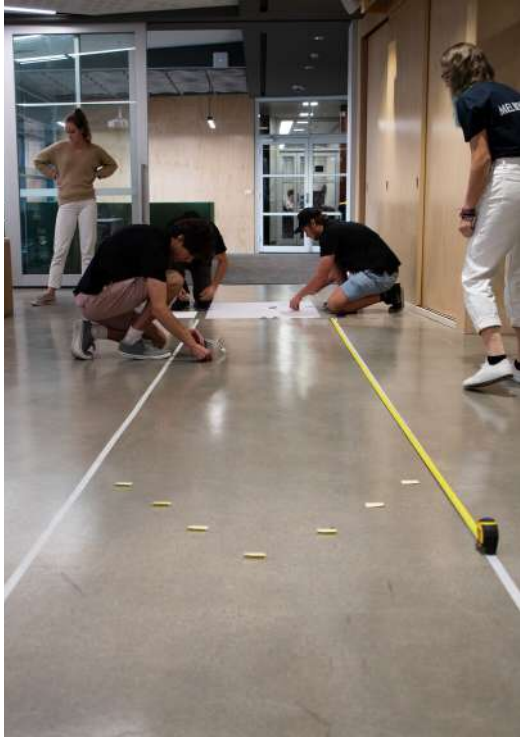
PROTOTYPES

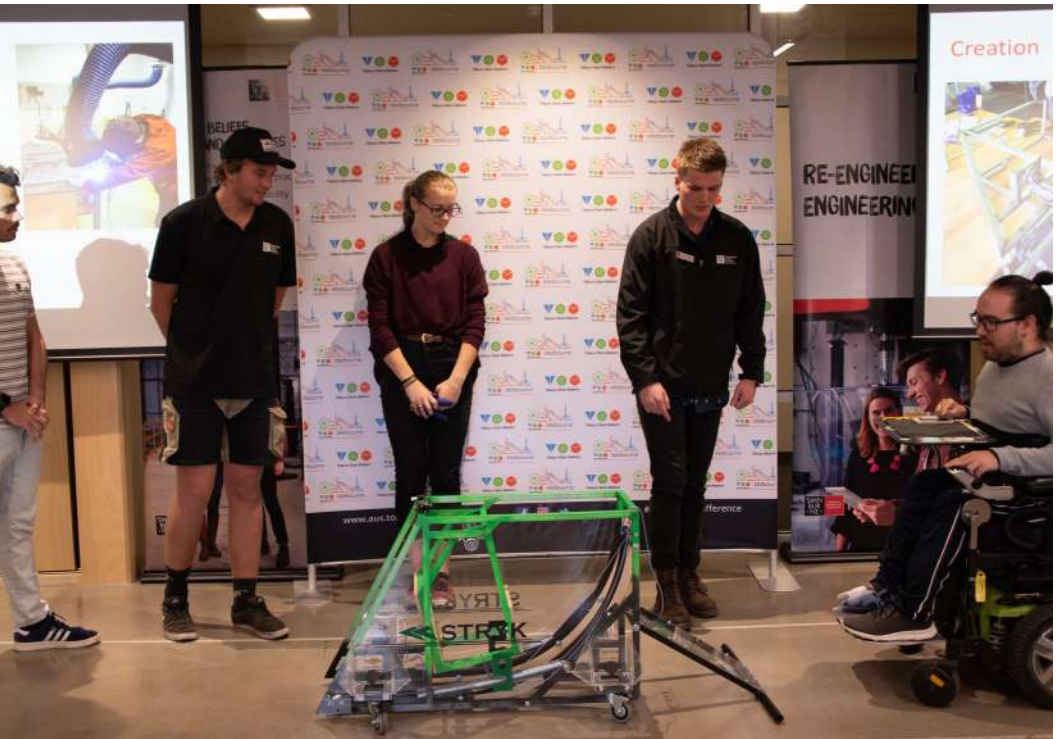
Team Jules, consisting of Bowling Buddies and Pin Pals, have created two unique solutions for Jules in order to help him bowl more accessibly. Bowling buddies created a reverse catapult bowling arm while Pin Pals creates a spring loaded cannon with spin control and laser pointer.

PRODUCT

Jules' team of Associates developed an bowling machine that attaches directly to Jules' wheelchair. Once attached, Jules can lign up the machine using a laser pointer. Jules then determines the velocity of the ball, which is lifted up by a modified drill, and can release the ball using a trigger mounted to a box on his wheelchair tray.


NO FOX




Creation
RE-ENGINEEI
ENGINEERIN
STRAK

TOM @ UNIVERSITY STAFF

DESIGN FACTORY MELBOURNE

PAULIINA MATILLA

UNIT COORDINATOR
DESIGN FACTORY
MELBOURNE

ALEX GRAHAM

LECTURER
DESIGN FACTORY
MELBOURNE

NICK HALL

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ENGINEERING PRACTICE ACADEMY

LLEWELYN MANN

MANAGING PARTNER
ENGINEERING PRACTICE
ACADEMY

ALEX GRAHAM

FACILITATOR
ENGINEERING PRACTICE
ACADEMY

TOM @ UNIVERSITY PARTNERS

TOM GLOBAL COMMUNITY

TOM was established in Israel in 2014 with a moonshot goal of impacting the lives of 250,000,000 within a decade. Five years later, TOM has established 35+ communities across 20+ countries, creating 300+ unique solutions for individuals living with a disability.

Click here to visit the global web-platform and see more about how this vision is being achieved:

Tikkun Olam Makers