

• THE NTUITIVE STORY •

# MAKING A DIFFERENCE

{ YEAR IN REVIEW }

FY2019



PUBLISHED 30 APRIL 2020

# *From NTUitive Chairman*

MR INDERJIT SINGH DHALIWAL

We've come to the end of the financial year. It's also an opportune time to take stock of our current state of affairs and to ensure we're still on track with the work that we do, for the years to come.

Around 6 years ago, the Enterprise Committee of the NTU BOT decided to relook at how we could better support all the Innovation, Entrepreneurship and Enterprise activities for NTU. The conclusion was that we needed to create an organisation that had the agility and entrepreneurial spirit to better support the university with greater efficiency. In April 2014, NTUitive came to be – with twin mandates of commercialising the research output for the University as well as developing a vibrant ecosystem for innovation and entrepreneurship.

It was a bold step to take for NTU and when we started NTUitive, our goal was to create a much more vibrant ecosystem in NTU to support research commercialisation, spinoffs, startups, enterprise creation and entrepreneurship education. We also wanted to contribute to the national effort of creating a more entrepreneurial economy for Singapore.

With the COVID-19 crisis, there's now an even greater focus on developing technologies that solve real world problems, as well as the need to grow more agile companies that are able to pivot their businesses when their core is disrupted. We're facing unprecedented situations and as a result, finding ourselves having to adapt to "the new normal". Innovation, adoption of technologies and developing new business models have become even more urgent today. We at NTUitive want to help ignite an innovative and entrepreneurial spirit among our NTU community and also a wider Singapore and regional community. NTUitive has the foundations of a strong ecosystem capable of helping many startups, spinoffs and researchers to commercialise their R&D.

This Year in Review piece thus aims to offer a snapshot of the important work of innovation that the NTU community has proudly taken on, and to also set the tone for NTU to achieve even more in the field of innovation for the benefit of current and future generations.

Echoing that same spirit, NTUitive will continue to move forward as an organisation and remain committed to its role in elevating NTU innovation – henceforth under new leadership with Dr Alex Lin at the helm. I'd also like to take this opportunity to thank Dr Lim Jui for taking on his role as head honcho of NTUitive since Day 1 with so much energy and heart.

We thank Dr Lim for his valuable contributions and wish him all the best in his future endeavours.

# I think, I feel, I believe

## CEO'S NOTE

To our comrades-in-arms and our comrades-to-be in the NTU innovation and enterprise community,

We present to you highlights of NTUitive's achievements in FY2019 ending 31 March 2020. This may seem peripheral coming at a time of great medical, economic, and social distress as a result of the COVID-19 outbreak. The timing may be unfortunate, but what is implicit in the numbers and stories is not.

Beyond the sobering numbers of the afflicted and departed, and the damage done to livelihoods as a result of COVID-19 counter-measures, the outbreak has demonstrated the role of innovation in this crisis. As we speak, thousands of companies and institutions worldwide are engaged in the development of better diagnostics and novel therapeutics for COVID-19; and progress has been tangible if not immediate. Some companies have even made temporary pivots from their usual businesses to address critical shortfalls in medical supplies. This too requires some degree of innovation. Whatever the level of innovation involved, the outbreak has been a clarion call for innovation capacity in any unit of organisation, from labs and universities, to companies and countries.

NTUitive has played a key role in the development of such innovation capacity at NTU, as reflected in our licensing output and the number of spinoff companies created. Both hit record numbers in FY2019 with 116 licenses cut and a staggering 23 spinoff companies created, across a multitude of specialty areas.

The exemplar of how our innovation capacity is contributing to Singapore's efforts to combat the outbreak is the National Additive Manufacturing Innovation Cluster (NAMIC), which was conceptualised, and is administered by, NTUitive. NAMIC is currently coordinating nationwide efforts to 3D-print a new generation of nasopharyngeal swabs to increase yield of viral ribonucleic acid (RNA) so that quantification is more accurate. It is doing likewise in coordinating existing 3D-printing capacity to address critical shortfalls in personal protective equipment (PPE) for frontline workers.

The outbreak also drives home the point about the new normal in respect of employment: its fragility. It calls for an approach to education that emphasises the development of an agile, confident, and resilient mentality; so that when bad things happen to good people, the good people have the capacity and confidence to respond, survive, and thrive.

Yet, agility and resilience in a knowledge-based economy is not an easy thing to achieve. It requires depth – and breadth. It requires books – but also practical experience.

At NTUitive, we believe that exposure to entrepreneurship provides practical experience like no other. Through our Overseas Entrepreneurship Program (OEP), which immerses students in startup companies for extended periods of time, NTU undergraduates experience first-hand the risks and uncertainties, as well as the strategies to overcome them, that all entrepreneurs face, especially at the beginning of their endeavours. I am happy to report that as a result of the success of this programme, NTUitive is transferring OEP to NTU so that it can grow even bigger. Outside of OEP, NTUitive provides year-round activities, from training programmes to social events, that give students exposure to entrepreneurs and entrepreneurship. More than 100 events were organised in FY2019, or one every three days on average. We also helped our students and alumni start 32 startup teams/companies in the course of the year.

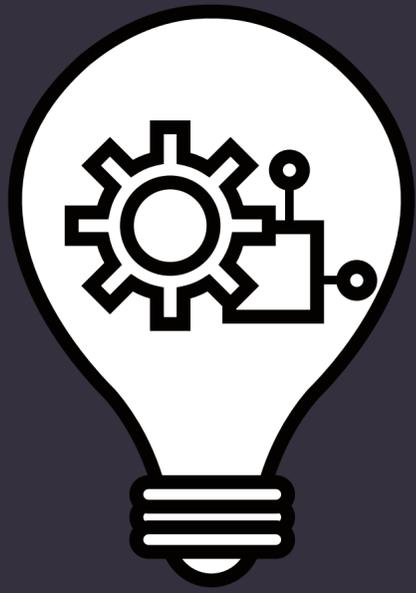
In the following pages, we highlight 4 companies out of the 55 we started in FY2019 to give you a flavour of the types of companies coming out of NTU, and the diversity of our stakeholders. Aliena, FasRaP, PBrain, and SoftGridinc, as do all of the other 51 teams/companies, each has their own unique story of innovation and enterprise; but what is common to all the companies we start are scientific rigour, aspiration, and will. They represent our mantra at NTUitive: I Think, I Feel, I Believe. These are conditions precedent to I Do.

To all students, alumni, researchers, and faculty members we have worked with, we would like to thank you for your support. Please know that you are our *raison d'être*, and we will continue to work hard, and work with you, to realise the impact that your work deserves. And to all prospective newcomers, we say: check us out!

I should also like to take this opportunity to say farewell, as I leave NTUitive for SGIInnovate, and to introduce Dr Alex Lin, who will be holding the fort at NTUitive. Alex is a veteran of the national innovation and enterprise ecosystem, and you will find in him tremendous experience and expertise, together with the capability and will to take NTUitive higher and further.

Thank you, and goodbye, my friends!

**JUI**



# YEAR IN REVIEW

**379**

Technology Disclosures

**1,543**

Patent Portfolio

**116**

Licensed Agreements

**S\$1.4m**

Licensing Income

**55**

Startups and Spinoffs

**S\$24.4m**

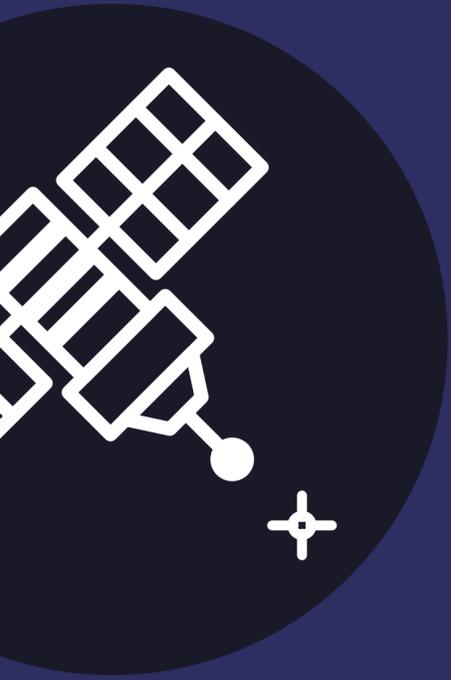
Follow-on Funding

*Among the many companies that NTUitive has lent our support to over this past year, we are showcasing 4 of them in our Year in Review.*



**IT ALWAYS  
SEEMS  
IMPOSSIBLE  
UNTIL IT'S DONE.**

*Nelson Mandela*



# EMPOWERING A NEW GENERATION OF MINIATURISED SATELLITES IN SPACE

# Small satellites face a challenge brought about by the lack of propulsion systems in the market – it shortens operational lifetime and limits mission capabilities of small satellites.

**Aliena** - a homegrown space-tech startup that designs and develops ultra-low power propulsion systems for miniaturised satellites, including microsattellites and nanosatellites.

Aliena's core technologies lie in the innovative designs that make their propulsion systems extremely small in form factor, which allow miniaturised satellites to perform sophisticated operations that are technically not feasible by conventional systems.

The unique design configurations developed by Aliena originated from ideas conceived within Nanyang Technological University, Singapore (NTU Singapore) and have been tested at various levels.



Aliena was co-founded in 2018 by NTU alumnus turned adjunct faculty member Dr Mark Lim, former NTU staff Mr Tony Leung, Mr Wee Hwee Nam, and current PhD student at NTU Mr George-Cristian Potrivitu; and the team works closely with researchers and engineers from the University's Satellite Research Centre.

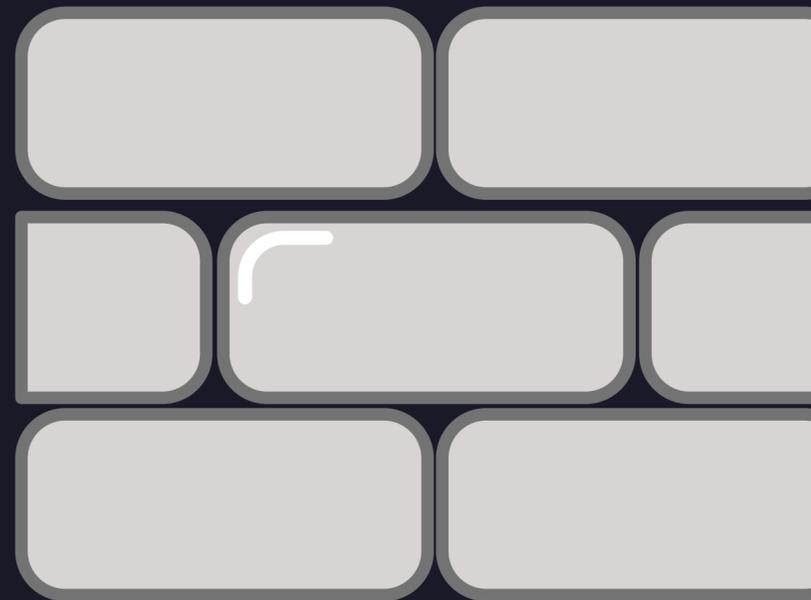
Aliena received support from NTUitive in the form of the University's Strategic Research Innovation Fund (SRIF). The team also sought NTUitive's assistance on licensing and commercialising their technology. Through NTUitive, Aliena met with potential venture capitalists and investors who became extremely high value stakeholders in the startup.

In the past year, Aliena had the opportunity to present their research work to a delegation from the Australian Northern Territory. They also participated in a funding round led by Cap Vista Pte Ltd – the strategic venture investment arm of Singapore's Defence Science and Technology Agency – and successfully raised S\$1.5 million (US\$1.1 million).

Mark has since been appointed as Space Expert-In-Residence to the Darwin Innovation Hub where he oversees collaborative opportunities between Singapore and Northern Australia with the aim of building up an ecosystem for collaboration in the space industry.

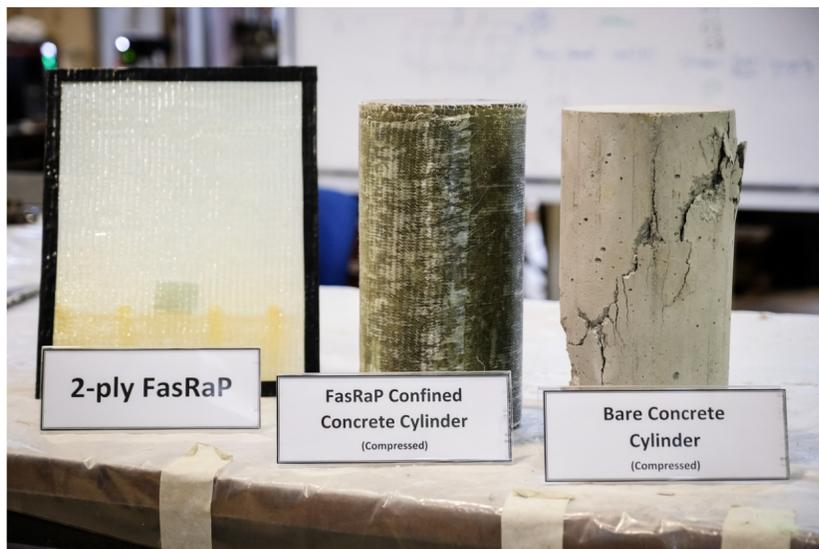
**Aliena is currently in the midst of commissioning a Jet Propulsion Test Facility, as well as a Satellite Assembly and Integration Centre. The team and their partners are also hard at work developing the NuX-1 satellite – the world's smallest satellite to house a fully functional Hall-effect thruster – which is set to be launched out of a SpaceX Falcon 9 rocket in 2021.**

# REINFORCING EXISTING STRUCTURES WITH NEW QUICK-FIX WRAP



**Fibre Reinforced Polymers (FRPs) are widely used to strengthen structures against stresses and deformations. Although simple and effective, the conventional application process of FRPs is tedious, labour-intensive and skill-sensitive.**

**FasRaP** - Analogous to the double-sided tape, the novelty of FasRaP lies in having sticky FRP rolls that can be easily and immediately applied on-site onto the structure for reinforcement. There is no need to apply any resin separately, and thus this approach is not dependent on the experience and skill of the workers to achieve consistent finishing. FasRaP is therefore a revolutionary ready-to-use FRP solution that eliminates the need for equipment while improving productivity at the same time.



FasRaP will greatly benefit urban cities as it enables them to rehabilitate ageing infrastructure - including buildings and bridges that may have developed issues such as cracks and delamination of concrete over time.

**For FasRaP, the first commercial deals - which the team is close to securing - are critical. Furthermore, new markets are emerging especially due to the Infrastructure Protection Act - this will bring exciting opportunities for FasRaP.**

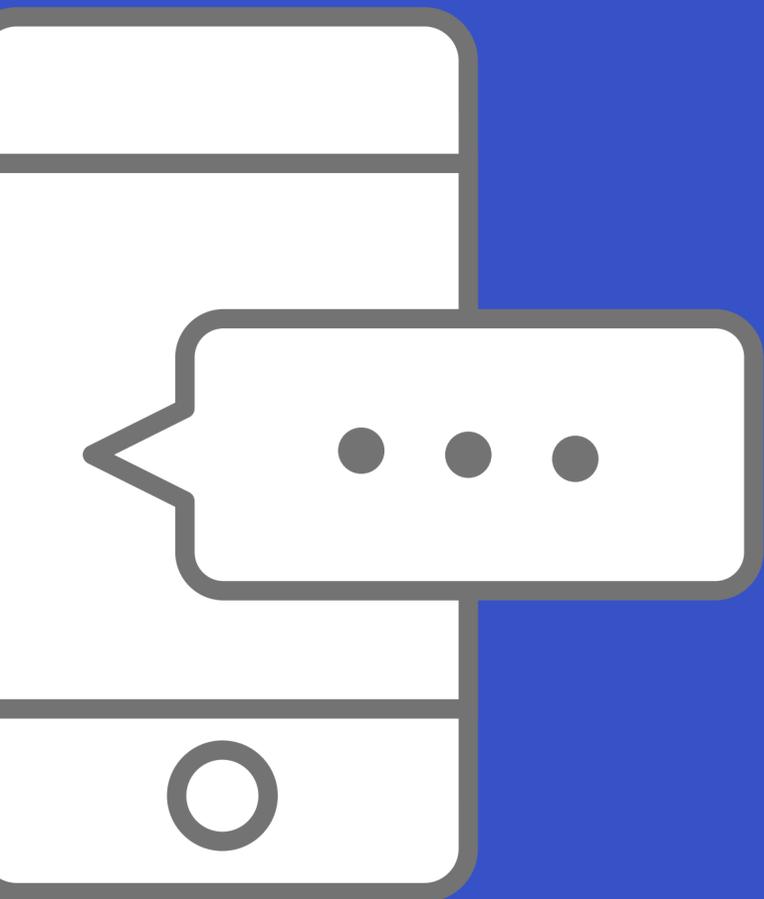
FasRaP has also been proven to enhance the blast resistance of structures.

FasRaP is a unique development born out of a three-way collaboration between Nanyang Technological University, Singapore (NTU Singapore), JTC, and their industry partner Prostruct Consulting Pte Ltd.

Through NTUitive, the FasRaP spinoff - founded by Assoc Prof Ng Kee Woei from NTU's School of Materials Science and Engineering - managed to secure seed funding under the Gap Fund (Proof-of-Concept or POC Grant). In addition, the team is in the process of securing the University's Strategic Research Innovation Fund (SRIF).

Beyond funding, FasRaP also has been receiving support and guidance from NTUitive in setting up their spinoff. This includes market analysis as well as business plan and strategy development, mentoring the team through the Lean LaunchPad (LLP) programme, Intellectual Property (IP) protection, and introduction to - and negotiations with - potential investors and business partners.

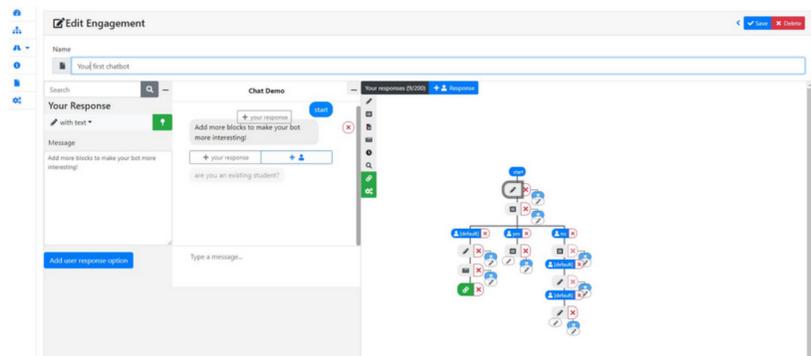
# AUTOMATING BUSINESS INTERACTIONS THROUGH CHATBOT BUILDER



# Chatbots are software applications that conduct online conversations in place of direct contact with a live human agent - using Artificial Intelligence (AI) & Natural Language Processing (NLP).

**PBrain** - a revolutionary chatbot solutions provider working towards empowering companies to maximise customer engagement while minimising cost. In 2016, Facebook - by opening up its developer platform - showed the world what is possible with chatbots through their Messenger app. Since then, chatbots have been a staple feature on customer-facing platforms such as websites, social media, applications, and others.

Through their proprietary Conversational Automation Platform (CAP), PBrain's codeless chatbot solutions are easily customised and adopted. CAP is also highly intelligent and constantly self-upgrades through learning from customer interaction, and satisfied clients have reported an improved efficiency rate of up to 30% and cost savings of 40%.



The people behind PBrain are founder and Nanyang Technological University, Singapore (NTU Singapore) alumni Dr Xiao Yuhong, with NTU PhD student Mr Jeow Li Huan, Mr Ted Chan and Mr Koh Shi Xiang rounding off the team.

The funding support received from NTUitive via the Multidisciplinary Team (MDT) Project Grant made it possible for the PBrain team to kick-start their idea into a full-fledged business at exactly the right time. In addition, NTUitive continues to provide the team with mentorship to help them tackle the challenges ahead, as well as networking opportunities - from exhibition sponsorships to business matching - enabling them to establish many useful connections.

To date, PBrain has ongoing projects with clients from a wide range of industries including electronics, FMCG and industrial, including NTU. In the United States, PBrain is in various stages of engagement with multiple Silicon Valley tech giants for implementation.

**The team is also in the final development stages with a major international FMCG company to execute their chatbot solutions in six languages across numerous regional markets. In the second half of 2020, PBrain will be launching a Human Resources (HR) and onboarding system with a Hong Kong listed conglomerate.**

# LEVERAGING IOT FOR REAL-TIME MONITORING OF LIFTS



**With over nine hundred thousand units in U.S., six million in China and eighty thousand here in Singapore, lifts are an essential invention of convenience used in buildings to serve residents and tenants.**

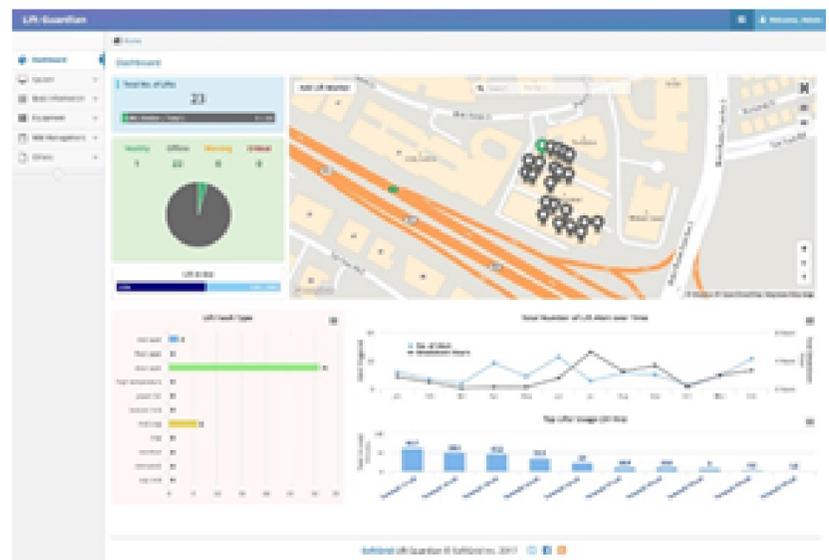
**SoftGridinc** – co-founded by NTU alumni Mr Long Fei (Long) and Mr Yi Ludi (Rudy) in 2017 – is an Industrial Internet of Things (IIoT) startup dealing in the business of lifts. Their core product, LiftGuardian (LG), is an integrated IIoT system that conducts real-time status remote monitoring of lifts.

Their journey began when Rudy shared the idea of developing an integrated lift monitoring system with Long. This struck a chord with Long after his personal experience with lift breakdowns: his wife was once stuck in a lift for three hours at a condominium they were staying at. What was even more frustrating was how it was a norm for the lifts to break down – which is also a legitimate safety concern – something which Long thought could be better managed with systems such as the LG.

Lifts are connected through sensors to SoftGridinc's Lift IoT platform, ensuring the operating safety is under constant supervision. When any breakdown or emergency is detected, LG makes swift judgement and auto-alerts the relevant personnel to assist in the necessary repairing or rescuing task. The system is also able to generate fault evaluation and onsite situation reports for relevant use.

With the support and guidance from NTUitive, SoftGridinc was recently awarded two major grants this past year

**To date, more than fifty lifts in Singapore are using SoftGridinc's technology, and the team is looking to equip a thousand lifts with their innovative solution over the course of the next year.**



Under the Cities of Tomorrow R&D Programme Grant by National Research Foundation (NRF), SoftGridinc – in collaboration with Housing Development Board (HDB), Agency for Science, Technology and Research (A\*STAR) and Singapore Institute of Manufacturing Technology (SIMTech) – SoftGridinc will be developing R&D solutions for lift safety monitoring and remote diagnosis. Fifty HDB lifts have been selected as the test bed for the project.

In addition, SoftGridinc will be working on an attraction management system for Jurong Lake Gardens with the Call for Innovative Solutions for Smart Estates Grant by Infocomm Media Development Authority (IMDA) for National Parks Board (NParks). The system will consist of Augmented Reality (AR)-based navigation, IoT-based people counting solution and a backend attraction management portal.

# Thank You



A big thank you to Dr Lim Jui, NTUitive's founding CEO, who will be leaving us after 6 years.

As you look back on your time with us, know that our achievements would not have been possible without you at the helm. It has been our pleasure and honour to have worked alongside you.



**[ntuitive.sg](http://ntuitive.sg)**

NTUitive Pte Ltd ("NTUitive" in short) is the innovation and enterprise company – and a wholly-owned subsidiary – of Nanyang Technological University, Singapore (NTU Singapore). NTUitive manages the University's intellectual property, promotes innovation, supports entrepreneurship, and facilitates the commercialisation of research.