VRcollab

We make BIM accessible.

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VRcollab is a Singaporean software start-up first incorporated in December 2016 that is invested by ***SGinnovate, Entrepreneur First*** and ***HTC VIVE***.

VRcollab's notable clients and collaborators include ***Sembcorp A&E, BCA, Surbana Jurong, HDB, NUS, Beca, Greatearth*** and many others.

THE STRAITS TIMES

Construction site of the future

On Tuesday, an Industry Transformation Map to lift the construction sector — which is the worst performing in Singapore and is set to grow by only 0.3 per cent this year — was unveiled. It aims to push the industry towards more automation, digital technology and sustainable design. Research is underway to create or improve various tools that are part of the construction process. The Straits Times looks at some of these.

1 SMART CRANE

• With more prefab components on the way, the Nanyang Technological University (NTU) and Kimly Construction are looking at improving a remote-controlled smart crane capable of tracking and stacking units from the time of their creation to when they arrive on site.

• These will rely on each component having its own Radio Frequency Identification tag, as well as a host of cameras, satellite tracking and microchips.

• Among other things, it will improve safety by reducing "blind lifting" situations that those in traditional cranes often come across.

• It will also result in 10 to 20 per cent productivity gain for those in site logistics, and shave off a third of the time needed for inventory checking.

2 DRONES

• Construction firms, developers — and research institutions are using commercial drones and photography to survey and map — to ascertain measurements between objects. The process

3 ROBOTICS

• The use of robotics to reduce manpower needs and safety risks, speed up tasks and ensure more consistent quality is in the works.

• For example, Singapore electronics company Eid Technology worked with NTU to create an automated gondola system that can clean and paint high-rise buildings (far right). It not only cuts the number of workers needed to wash or paint a building facade from five to two, but it also ensures that both of them do not have to be on the gondola.

• Engineering firm Pod Structures is also working on an intelligent lifting system that can automatically — instead of manually — adjust the balance for heavier prefab units as they are being stacked. This is especially useful for tall buildings, where wind may affect the balance of the units.

• Research institution ETH Singapore SEC and construction firm Gammon are also working on a tiling robot that tile rooms and floors.

UAL REALITY (VR) COMMUNICATION

ase of VR tech will take group
gs beyond Skype or Google Hangouts.
ware firm VRcollab has worked
l Architects to create a
virtual tour of a project,
t everyone can provide feedback
asy-to-digest model.

• It also allows architects who have a wealth of experience but may not have 3D know how to give their input.

TEXT: RACHEL AU-YONG PHOTOS: KEVIN LIM, KUA CHEE SIONG, STRAITS TIMES GRAPHICS

THE EDGE

16 • THE EDGE SINGAPORE | NOVEMBER 13, 2017

START-UPS & ENTREPRENEURS

VRCollab lets architects 'walk' in their buildings before they are even built

BY SHARANYA PILLAI

At the Harbourfront office of ID Architects, virtual reality head Gerard Teo is showing off the company's "VR cave": two huge screens and a 2.5-sq m space surrounded by warm orange spotlights. Slipping on a HTC Vive headset, Teo is transported to a virtual mock-up of Kallang Riverside — a 30-storey mixed-use condominium development designed by his company.

Within this environment, he can perform a range of tasks: measure the height of a wall, determine which angle a door should swing in and leave annotations for his colleagues. The system also allows multiple users to inspect the VR building simultaneously, similar to a multi-player computer game.

The key benefit for architects, Teo says, is getting a realistic sense of the building's proportions and pre-empting design flaws before on-site construction. "It's almost like you are in the building before it's built. If you look down from one of the high floors, you can even feel a sense of vertigo."

The software powering ID Architects' cave was developed by VRCollab, a local start-up that provides VR solutions for architecture and construction companies. Besides ID Architects, the one-year-old start-up counts Sembcorp Architects & Engineers, LAND Architects and the Building and Construction Authority (BCA) Academy among its early clients.

VRCollab was co-founded by computer science graduate Gong Yiwei, 23, and former software engineer Tee Ba Ben, 28. The duo met last year through the start-up accelerator Entrepreneur First, which has provided $25,000 in pre-seed funding to VRCollab. The start-up received a further $42,500 from SparkLabs Global Ventures, a Silicon Valley-based venture capital firm, and $56,000 from IGInnovate, which invests in deep-tech start-ups.

Gong says VRCollab's multi-user interface takes inspiration from multi-player computer games. "I was planning to build a multi-player game using VR. I never thought that I would be doing VR in the construction industry," he says. "But it has turned out to be very exciting."

Teo says the building industry is an untapped "gold mine" for VR players. Traditionally, architects and contractors have relied on 2D drawings of building prototypes. Adjustments for clashes in design are generally done on-site, resulting in added costs for abortive works. "For people who are collaborating on a construction project, it's more useful to move around in a 3D VR space. Then you get the exact viewpoint, and can communicate more easily. Through VRCollab, we are essentially trying to solve the communication problem in this industry," Teo says. "We are quite lucky that we have one foot in already."

Building industry goes virtual

As the building industry adopts new digital practices, VRCollab could see increased demand for its software. One trend that is catching on fast is Building Information Modelling (BIM), which involves simulating the construction of an entire project in 3D on a computer before any on-site work commences. This allows architects and contractors to better estimate the time frame and costs involved in a project.

VRCollab's software can convert a 2D BIM layout into VR in under 10 minutes. The software is priced at an annual subscription fee of $1,000. It would take a VR artist about a month to manually construct a VR landscape based on a 3D model. Even then, such a model would be useful only for visualising the prototype. VRCollab's software, on the other hand, allows users to inspect building elements and add annotations.

While BIM and VR technologies have been around for about a decade, their adoption in Singapore has gathered momentum only recently. "This could be attributed to the fact that Singapore's construction sector is fragmented and dominated by small-scale firms that compete mainly for local contracts, which are decided predominantly by price," says Mukund Sridhar, a partner at McKinsey & Co Singapore who leads the infrastructure practice in Southeast Asia. "As a result, these small firms have low profit margins and little incentive to invest in technology."

In the past few years, however, the government has increasingly made technologies such as BIM a requirement among contractors bidding for public projects under the Government Land Sales scheme. This move has caused more industry players to explore the technology. Jin Sung, executive director of ID Architects, says: "We started using BIM in 2010 but, over time, we wanted to add more interactive elements to it that could give our collaborators a good sense of the building. Younger architects also find the work process more exciting with VR."

Dean Freenan, research vice-president of Gartner, says adding VR to BIM is "a powerful tool" for builders to improve productivity. "VR brings great advantages to BIM. In the old days, you had building blueprints in 2D," he says. "Now, with VR and BIM, I can put on a set of goggles and visualise what my building is going to look like and know what the dimensions are. I can virtually walk into rooms and know what it's going to look like if I move a wall five feet back. So, there are a lot of creative, innovative things you can see [and do] with VR and 3D capabilities."

Freenan says VR start-ups in the building industry have significant potential to grow, especially since many incumbents in this "old-school business" tend not to innovate, leaving market gaps for young and agile companies to fill. For adults, however, that it may take at least five years for technologies such as VR to catch on in the sector. "It's like when the smartphone first came out: Younger people started to buy and use it, whereas some older people still used a Blackberry."

McKinsey's Sridhar echoes this sentiment. The construction industry is standardised worldwide, using the same jargon and building methods everywhere, which makes it a highly-scalable industry. "In other industries, you don't get this flexibility. In aerodynamics or automotives, it's impossible because every company has its own knowledge base and they don't share it with each other. On the other hand, in the building industry, you can jump between countries and all the technology is the same," he says.

To fund VRCollab's growth, Tee and Gong

Gong (left, with ID Architects' Jin (centre) and Tee) says VRCollab's multi-user interface takes inspiration from multi-player computer games

Environment and Facility Types and Best Practices

CO-LOCATED BIG ROOM	MEETING ROOM	VIRTUAL BIG ROOM
Multiple trades or disciplines are co-located in a single space for in either or both design and construction phases, providing the benefits of real-time collaboration of shared knowledge, as well as improved information flows and rapid feedbacks. The primary benefit of co-location is elimination of information-sharing and decision-making latency. e.g. • Construction model development / production and continuous update Since full-time co-location is resource-intensive, other	A dedicated meeting room for issue resolution, planning, reviews, etc. where multiple stakeholders and project team members can come together to accomplish a specific tasks or resolve a specific problem, preferably on the spot, through the use of the virtual model, and where the model is interrogated and updated towards resolution. e.g. • Coordination meetings or ICE meetings during design or construction • Site planning and sequencing, safety risk assessment • Project scheduling planning, pull planning, or other	An alternative to physical co-location, in which project teams in different locations to work collaboratively in real time, as though they were in the same room. In this set-up, project models are hosted virtually to permit multiple project team members to access them from wherever they are. e.g. • Design development, coordination, and collaboration with consultants in various locations The technologies required to implement virtual co-location may include BIM platforms (Common Data [illegible], visualization and communication [illegible] collaboration and knowledge [illegible] platforms, which combined, serve to [illegible] lifecycle from conceptual design to [illegible] in a virtually co-located space.

THE BUSINESS TIMES

S'pore, Latin-American and Caribbean businesses in tie-ups

By Stephanie Luo
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MORE business opportunities in technology and education are being explored by businesses in Singapore and the Latin America & the Caribbean (LAC) region as sectors of growth.

Minister for Trade and Industry S Iswaran, speaking at the 12th edition of International Enterprise (IE) Singapore's Latin-Asia Business Forum (LABF) on Friday, noted that Singapore-LAC economic relations have deepened.

"We have seen good growth in commercial activities between Singapore and Latin America and the Caribbean. Today, there are more than 200 Singapore companies with 400 points of presence across the region, which is double the number of companies from 2015. The LABF and associated activities are a very important part of this effort, and we think it's an important platform that can grow in stature and effectiveness as the years progress."

E-commerce is thriving in LAC; the number of digital buyers in the region has grown from 97 million in 2014 to 131 million this year, so Singapore is seizing investment opportunities beyond traditional sectors of commodities, oil and gas and infrastructure.

On Friday, CrimsonLogic and the government of Suriname signed a Memorandum of Understanding to explore a "single window system" to facilitate customs clearance for trade; this follows CrimsonLogic's bagging of another such project in Bahamas late last year.

Another Singapore company, VR Collab, a start-up with capabilities in advanced virtual reality for real estate, infrastructure and construction development, has teamed up with Brazilian firm Constrativo, an engineering technology company focusing on engineering and infrastructure management, to implement a collaboration tool for architects, engineers and contractors to work on projects simultaneously before construction. The platform uses virtual reality to cut wastage and raise productivity.

In the last two years, companies such as Educare and Star Publishing have made their first forays into LAC, supporting educational reforms and working with the public and private sectors seeking to adopt Singapore's education framework, teaching methodology and content.

Singapore's bilateral trade in goods with LAC amounted to S$18.1 billion last year. Cumulative foreign direct investment from LAC into Singapore stood at S$16.5 billion in 2015.

In the same period, Singapore's stock of direct investment into the region was S$6.9 billion.

In April, engineering and masterplanning company Surbana Jurong opened its first office in Mexico; Ascott, CapitaLand's serviced residence operator, announced its entry into LAC through two franchises in Brazil.

G Jayakrishnan, group director for Emerging Europe, Latin America & the Caribbean in IE Singapore, said: "There is much potential for deeper trade and business with Latin America and the Caribbean. The stability and pro-business governments in major LAC markets present opportunities for Singapore businesses. In the current global economic environment, we expect LAC to look increasingly towards Asia to diversify investments and tap its growth."

Mr S Iswaran notes that there are more than 200 Singapore companies with 400 points of presence across the LAC region. FILE PHOTO

CORE TECHNOLOGY

VRcollab's mission is to redefine collaboration and design coordination in the ***Architecture, Engineering and Construction (AEC)*** Industry.

+Automated One Click Conversion,
From BIM to VR.

+Quick and Accurate,
4 GB BIM model in 7 Minutes.

+Optimized for Large Models,
Tested on 7 GB BIM Model.

*Patent Process Pending

BIM VR WORKFLOW

2a.
VRcollab
LITE

2) Automatically
Convert Design in
VRcollab

Interoperable

3) Multi User VR
Coordination
Meeting

2b.
VRcollab
STUDIO

1) Design Building
in BIM Software

4) Generate
Coordination Report

Information Loop for
next meeting

KEY BENEFITS

+Depth & Perspective Information

Such information is often loss when viewed on a 2D screen

+Faster Design Approvals

In both external client presentation and internal coordination

+Intuitive Manipulation of BIM,

No time wastage due to BIM software that was not created for coordination

+Less Design Errors,

Errors in design flare up in VR allowing for quicker and more pinpoint mitigation

OUR PRODUCTS

VRCOLLAB LITE

Meeting Room Setup,
Cross Office Design
Coordination

VRCOLLAB STUDIO 2.0

VR CAVE System,
Presentation to large
groups of stakeholders

OUR PRODUCTS

VRCOLLAB LITE

SGD $3000 per Annual License

One concurrent VR user per License

+VR headgear used to view design

Allowing all stakeholders to view and coordinate in VR

+Navigate in as-build design

”Walk around” building before even the first brick is laid

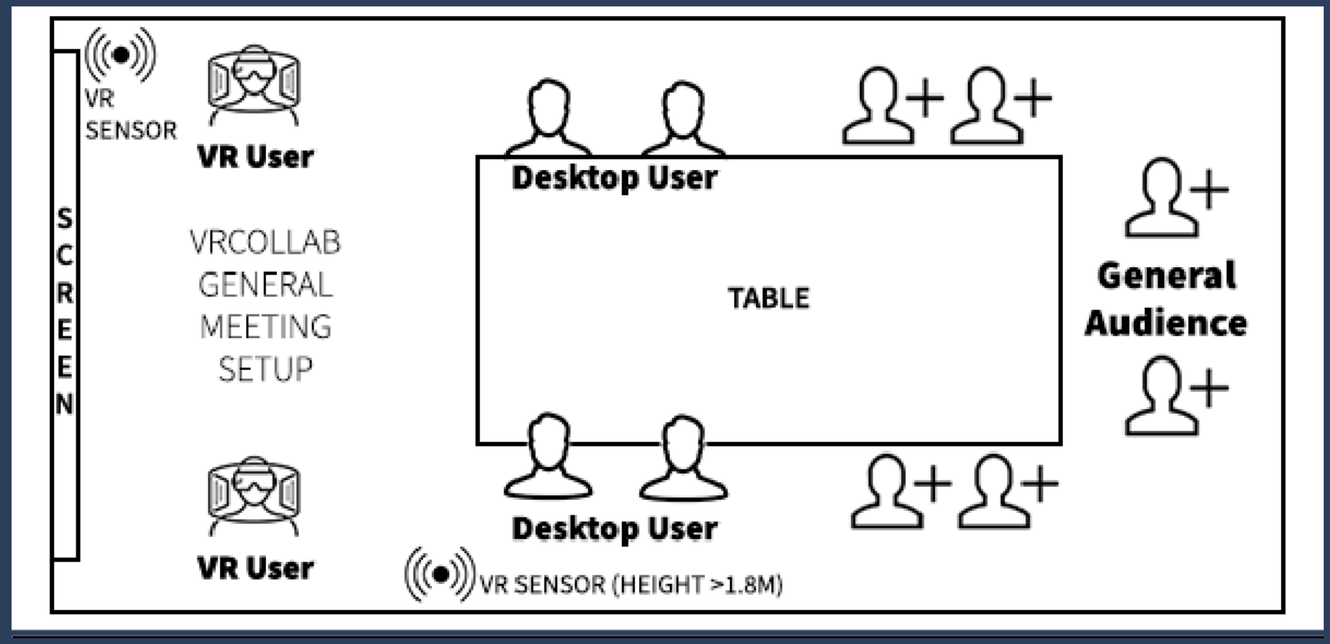
+Cross-office multi-user VR

Allows for cross office virtual coordination over the internet, up to 8 concurrent users

OUR PRODUCTS

VRCOLLAB LITE

+Ideal for meeting rooms and on-site

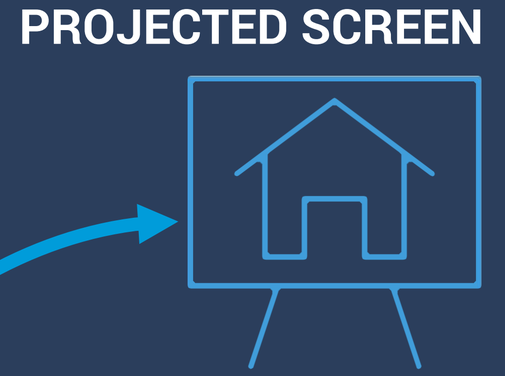


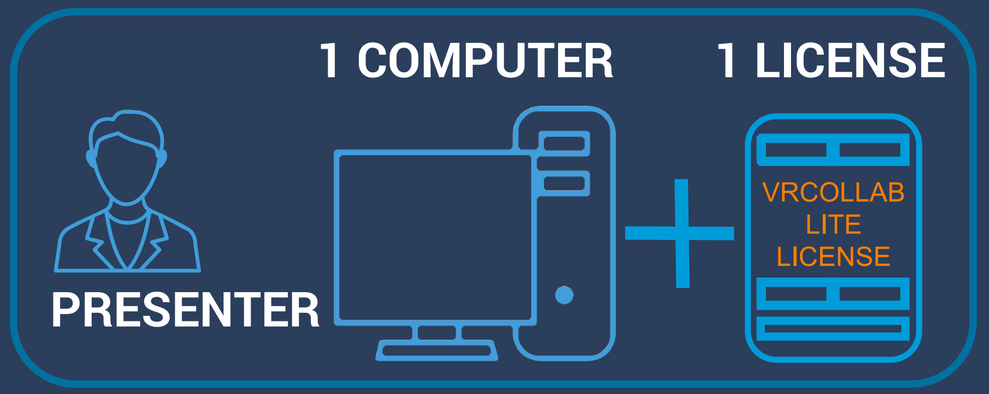
1 VR User = 1 Computer + 1 VRcollab Lite License + 1 VR Headgear

VRCOLLAB LITE SET-UP

Requirements:

1. **STAKEHOLDERS (1 in VR)**
   - *Client*
   - *Consultant*
2. **VR HARDWARE (1 SET)**
   - *Commercially available*
3. **COMPUTER (1 SET)**
   - *Laptop – Mobility*
   - *Desktop – Fixed Setting*
4. **SOFTWARE (1 LICENSE)**
   - *VRcollab License*





OUR PRODUCTS

VRCOLLAB STUDIO 2.0

+General Audience uses 3D Glasses

Stereoscopic projections allow for immersive and non-isolated viewing

+Impressive viewing for larger group

Allowing for group viewings of up to 10+ people, with one VR pilot using Lite License

+Customizable to specific requirements

Number of projected sides, Floor area, Number of pax, Varying use-cases

Contact us

Enquire at *info@vrcollab.com*

OUR PRODUCTS

Video of Stakeholders viewing new project and immediately mitigating issues

VRCOLLAB STUDIO 2.0

Contact us

Enquire at *info@vrcollab.com*

VRCOLLAB STUDIO SET-UP

Explanation:

1. **STAKEHOLDERS (AUDIENCE)**
   - *Stands in CAVE AREA,*
   - *View BIM model through 3D glasses -15 persons*

2. **CONSULTANTS (PRESENTER)**
   - *Guides from VR SANDBOX*
   - *Uses VR Gear*

3. **CONTROL BAY (COMPUTERS)**
   - *VR Ready Desktops and Projector Controls*

4. **SOFTWARE (1 LICENSE)**
   - *VRcollab STUDIO License*

CONTACT US

VRcollab

We make BIM accessible.

Do not hesitate to drop us a message where we can further discuss how we may value add to your workflow.

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Also, visit us at vrcollab.com for more info!