

UNISEC-Global The 22nd Virtual Meeting

June 18, 2022, 22:00-24:00
(Standard Japan time GMT +9)



22nd Virtual UNISEC-Global Meeting

Host: UNISEC-SAR (South African Region)
Time: 22:00 - 24:00 (JST)
June 18, 2022



Moderator & Opening Remarks: **Arno Barnard**, Stellenbosch University

PRESENTATIONS

Ivandro Rodrigues, GGPEN-Angolan Space Office
Topic: GGPEN Satellite Activities

Robert van Zyl, AAC SPACE AFRICA
Topic: The Africa we want - how can nanosatellites contribute

Mike-Alec Kearney, CEO CubeSpace Satellite Systems
Topic: TBD (Pre-recorded Presentation)

Khalid Manjoo, CEO of Astrofica Technologies
Topic: Astrofica's 2020 Space Internship Program – A model for skills development and uptake into the Space sector

Johan Erasmus, ISISPACE South Africa Branch Manager & Systems Engineer
Topic: ISISPACE Enabling offerings for HCD and Mission Success

BREAKOUT SESSION
All Participants
Moderator: TBC

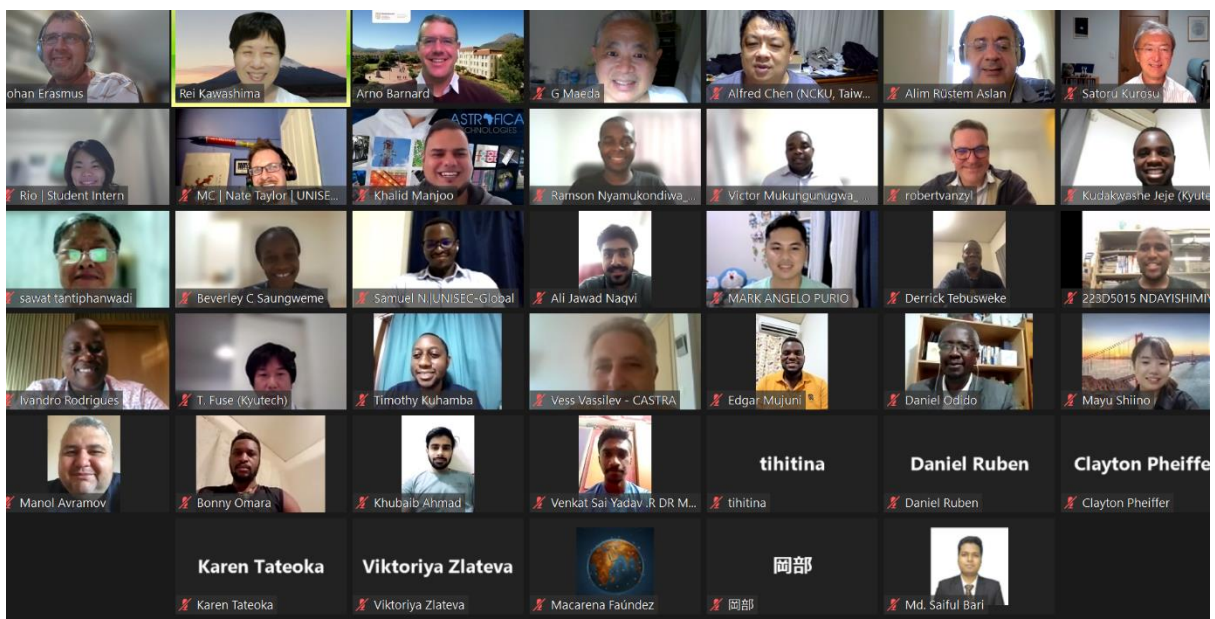
ANNOUNCEMENT & CLOSING
Rei Kawashima, UNISEC-Global
and those who have announcements

Theme:
Satellite Engineering Training in Southern Africa Region: The impact of Universities, Industry, and Government





[HTTP://WWW.UNISEC-GLOBAL.ORG/VIRTUAL-MEETING.HTML](http://www.unisec-global.org/virtual-meeting.html)



The following report was prepared by UNISEC-Global Secretariat
June 18, 2022.
Japan

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1. Presentation on “GGPEN Satellite Activities”

Ivandro Rodrigues, GGPEN-Angolan Space Office

Ivandro Rodrigues' field of specialization is telecommunication and his present research interest are wireless communication and space mission design and analysis.



Pictured: Ivandro Rodrigues presenting GGPEN Satellite Activities

Highlights:

- Angolan National Space Program Management Office (GGPEN) created in October 9, 2013
- Investment: +350million USD with seven departments, 70 employees
- Under MINTTICS (Ministry of Telecom Technology Formation and Social Communication)
- Vision: Make the country a **benchmark** for excellence in space science and technology
- Mission: Promote the peaceful use of space, ensuring the **creation of skills** in space technology
- Angola Space Strategy 2016-2025 five fundamental Actions:
 - Space Infrastructure Development
 - In 2017, Angola launched its first satellite ANGOSAT -1 into orbit and in 2022 will be launching ANGOSAT-2 with aim of delivering broadband internet
 - Capacity Building and Promotion
 - Ensure capacity building and dissemination of space activities, contribute to creation specialized in human capital
 - Industry and technology: initiate the private sector aiming to diversify investment in space
 - International Positioning
- In 2021, Angola have become member of COPOS and leading some critical regional initiatives
- SADC Satellite Network Project, focuses on the space infrastructure and satellite resource sharing
- Organization and Cooperation
 - Organizational structure that makes sure all the intended goals are implemented through corporation and collaboration
- Angola involved corporations: UNISEC, UNOOSA, IAF (member), SADC, MIT
- Human Capacity Building:
 - 60 Specialists in space and science technology; 5PhD, 22 Masters, 28 Bachelor Degrees
 - 45 certified as satellite operators
 - Recognition awards:
 - 3 specialists in a top 10 **most promising young people in the African Space Industry under 30 years old**
 - A GGPEN expert accepted into the **UNICEF Drone and Data Academy**
- **4000hrs of training:** in Assembly, Integration and Testing (AIT), Satellite design, Satellite Mission, Control and Operations, Space Applications

- From 2013-2016, sent some specialist to Japan to do CLTP program to become leaders
- In 2018-2019, course for educators from different institutes in Angola for complete CubeSat design
 - Launch was done using the helicopter
 - Invited international speakers
 - Managed to involve 164 students and lecturers from 26 Universities and 30 Institutions
- Engineering Training on Satellite Communication
 - Since 2021, established a corporation with one of the best universities called ISPTEC
 - Prepared a course in satellite communication
 - No. of participants: 197 general public and 10 from companies
 - Awareness in how to do startup in space area
- Earth Observation Program
 - In 2018, a tool was installed in mission control center called OpenGeo Lab
 - Idea was to give training to the specialists in the treatment of satellite image
 - Areas include Agricultural, Demographic, Sea oil spill detection, Land and border monitoring
 - 10 Angolan specialists trained in image processing and GIS
 - TECH-AGRO application service for monitoring of agricultural fields
 - TECH-ECOLOGIA application service for monitoring oil spill
 - Attendance of 40 participants in 2-day workshop on how to use satellite data, available data
- Future Activities
 - Make sure mission control center is ready for structure and equipment working 100%
 - Capacity Building by designing ANGOCUBE, a CubeSat for academic purpose
 - **Launch of ANGOSAT-2 IN 2022**

2. Presentation on “The Africa we want - How can Nanosatellites Contribute”

Robert van Zyl, AAC Space Africa

Robert van Zyl is Director of French South African Institute of Technology at CPUT, Cape Peninsula University of Technology. He obtained his Bachelors, Masters and Doctoral degrees in Electronics Engineering from University of Stellenbosch in South Africa. He is appointed as Managing Director at AAC Space Africa. He served as the founding Director of Satellite program at Cape Peninsula University of Technology. Under his directorship, the CPUT team developed Africa's first nanosatellite, Tshepiso Sat that has been launched in space in 21 November 2013 that later was followed by four more satellites. He later joined the AAC Clyde space group as founding Managing Director of its affiliate, AAC Space Africa. Passionate about leveraging all levels of the space value chain to improve the lives of all of us on this beautiful continent.

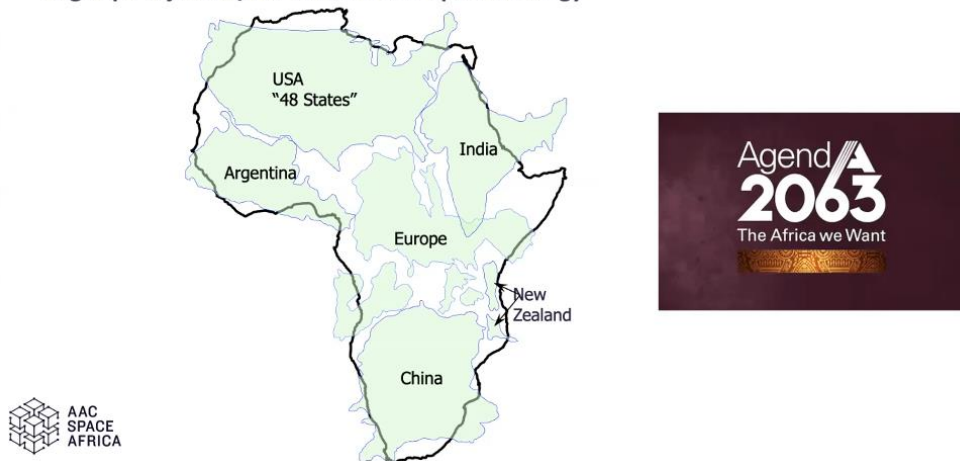


Pictured: Robert Van Zyl presenting on "The Africa we want - how can nanosatellites contribute"

Highlights:

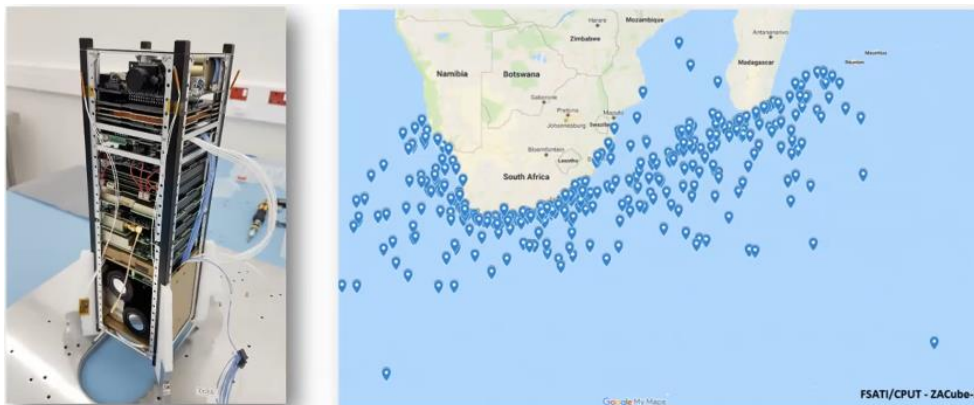
- AAC Clyde Space was founded in 2005 and headquartered in Uppsala, Sweden
- World leader in Small Satellite Technology and Services
- 170+ employees in 6 countries across 3 continents
- Publicly traded, ISO9002:2015 accredited
- Extensive heritage and proven quality- more than 1000 years aggregated in orbit
- Focus on Environment and Blue Economy
- Agenda 2063 of Africa encapsulated Africa's Aspirations; talks about the Africa we want
- Aspiration 1 of 7: Prosperous Africa based on inclusive growth, sustainable development
- Goals:
 - Well educated society underpinned by science and technology
 - Transformed economies and jobs
 - Industrialization and value addition
 - Modern agriculture for increased proactivity and production
 - Blue/Ocean Economy
 - Sustainable climate and resilient economies and communities
- Flagship Project 11/15: Africa Outer Space Strategy aims to strengthen Africa's use of outer space

Flagship Project 11/15: Africa Outer Space Strategy



Pictured: Geographical Comparison of Africa Continent

- In 2008, spoke to the government to start a satellite program in CPUT (Robert van Zyl and team)
- Capacity building and skills for emerging industry but funded by government
- Developed ZACube-1 which was first nanosatellite developed and launched by Africa
- Developed advanced 3U CubeSat ZACube-2 in 2018, which still has values because it tracks ships around the coast lines



Pictured: ZACube-2 and Captured Dataset by ZACube-2 of Ships around the coast line

- Africa's first mini-constellation of nanosatellites MDASat-1a, b, c launched in January of 2022
- Focus was also on commercialization
- Cutting edge application of nanosatellites today
 - Lunar, debris, space weather, narrowband connectivity for IoT, hyperspectral imagery
- HOW can this be achieved in developing countries?
 - Have to go from Academia to Industry level ('New Space as a vehicle')
 - Catalyzing all phases of the industrialization chain must be done by having:
 - Community involvement, students, trainees
 - Research and innovation, Commercialization of innovation
 - Roadmap – "tech demo" to applications
 - University, Industry, Government, Civil Society: None of them can do it alone
 - Quad helix of University, Industry, Civil Society, Government must work together
- Nano-satellite increasing exponentially but African is not really contributing to growth
- Need perspective change on new space
- Need to get the youngsters involved
- There is a lot to do and there is a lot of opportunities
- Africa is the youngest continent in the world, therefore, a lot can be done
- The youngsters here are ambitious and talented
 - Saw in the Kenya last week in the space Expo tremendous excitements of the students
 - They are not inhabited by impossible, they just see what is possible
- If we can create that frame work of capacity building industry, downstream and upstream ecosystem vibrant innovation commercialization
- Bring youngsters on board as entrepreneur
- Positive on **Nelson Mandela's** statement
 - *"sometimes, it falls upon the generation to become great. You can be that great generation. Let your greatness blossom."*
- Must give the youngsters tools and opportunities

Q&A:

Rei Kawashima:

Explain how the ecosystem works in your model?

Robert:

That's the long term decision but started off with government having a vision and government having a long term vision. Government change sometimes the vision which is not sustain in our case. South African government have the long term vision of supporting the space industry at the time and specifically capacity building so that first and foremost important. The CPU chip program would not have been what it was if the government is not supporting from 12-15 years. It's been doing that ever since. So, the ecosystem need s the government impediment, need policies frameworks to catalyze all of this. If your policies are not aligned with your industry development then your all kinds have problems down the line because the industries are the end of today needs an ecosystem that they can upgrade in effectively in nationally, regionally and internationally. Then, the other one is that you need immunity engage from lot of money. The satellite industry, even the new space industry, it's not a low cost exercise in devoir, it's a capital intensive in devoir. Government has to weight that investment which is longer term to shorter term devoir needs of its population. So you need get government on your side. In a lot of outreach and initialization so that it conveniently seal the value of space which is a bit of longer term and don't able to see the value of space, you don't realize what you have in the front mostly comes from space solutions. Lastly industry, the whole thing would not work if it's not an uptake of intellectual property of the expertise, of the skills etc. that balls it into the commercial devoir because that extends business. So this is bit of entrepreneurship consent because entrepreneurs identifies certain need for community, they are very good at that. University and government serves industry is very effective in doing that and industry became pulls off and guide the research and innovations capacity building that needs to happen and it packets in such a way that is economically available and becomes a product that is useful as an impact for the society and you go back society baying etc. for capacity building, government longer term support decision, all this systems starts to sustain itself.

3. Presentation on “The University’s Role in Building a Leading Space Manufacturing Company”

Mike-Alec Kearney, CubeSpace Satellite System

Mike-Alec Kearney is an energetic business executive with a strong technical background through a master’s degrees in both electrical and mechanical engineering respectively. After his studies, he co-founded an aerospace company called CubeSpace Satellite System which is now one of the largest satellite attitude determination and control system suppliers globally. He is a people focused person who cares for those around him. He inspires micro positive difference in people’s life through directly uplifting and empowering them.



Pictured: Mike presenting on University's role in building a leading space manufacturing company

Highlights:

- CubeSpace holds ADCS (Attitude Determination and Control System) part of a satellite that measures the orientation of the satellite by looking at:
 - Where the sun is relative to the satellite
 - Where the earths and stars are
 - Determine and control orientation so as to point the satellite into desired direction
- Important for the satellite to fulfill these purpose and operate its payload
- For measuring the orientation of the satellite,
 - 4 sensor in which 3 are main fine sensors and another is magnetometer sensor
 - Star Tracker for CubeSpace
 - Infrared Earth Sensor
 - Wide angle fine Sun Sensor or imager based sensor
- Radiation tolerance flight computer takes sensors data and runs estimator and control algorithms
- Flight computer commands the rotators of the satellite to actually rotate the satellite and orient
- Magnetic torquer and reaction wheels available from 2U cubesats to 70 kg satellite
- Provides sensors and actuators separately but main offering is integrating them into fully closed loop
- Customization possible
- Needs up to 7 sensors for this system where customized both mechanical and electronic interface
- Provided over 2000 individual ADCS components since 2014
- Involved in full control of over 200 satellites
- Best in price and achieved through innovation in mass manufacturing and automation
- Provides bulk discounts for constellation where the bulk 10 or 20 or 50

- Provides lead time as short as 1 month again through the mass manufacturing approach
- CubeSpace came from universities and firstly started with a lot of master's ADCS research
- Products are mostly based on research done at university
- In 2013/14, involved with 50 projects which was the browser project
- Taught with building 15 ADCS system for other universities that didn't have the ADCS expertise
- Built own satellite as part of QB50 project goes it as ZA-AeroSat
- Allowed to test drive the ADCS and learned the lessons of how to integrate that system into a satellite
- Spin-off from the university 7 years ago and the company is owned by students including myself
- Professors and all the shareholding in the company being aligned for company's growth
- Incubated in the business incubator for a short
- Self-funded, no investors' money were taken
- Organic growth through product sales
- Currently exporting to over 30 countries, resellers in 5 countries
- Everything is manufactured inside Africa
- Currently 32 people, growing sales year on year with 40-60%
- First ADCS units for QB50
 - Dramatically refined the designs over the years
 - Those were the first prototype
 - Came from taking the research project and turning them into the hard layers
- Building ZA-AreoSat was a massive learning experiences and to get exposé
- Difficult to handle the EMI problem, communication problem
- Learned a lot about what the challenges are and use those lessons
- Make it easier for other people to build their own satellite
- Not only generated income for university but employed a lot of people
- Trained the employees to I2C, soldering, assembly, and wire assembly
- Trained people in project management and more variety of skills and continuing to do so
- Placed more formal programs to further upskill the employees
- Upskilling the local manufacturing and supply chain
- There were no manufacturing company capable of machining to the required accuracy
- These companies does were insufficient for what is need for space
- Supply of component was insufficient and soldering was not of standard
- Last 8 years of working with these suppliers, also helped them to feedback requirements
- Upskilled themselves and increase their manufacturing capabilities
- Other companies inside Africa like New Space, Samaira, Dragon fly, Cubecard, Hypernova
- Contributed in upskilling the local manufacturing supply chain
- Local company brings foreign currency to Africa
- Sponsoring research at the university, sponsoring master's project from the revenue
- Self-funded and sustainable and not depending upon government funding anymore
- Loop of research and commercial
- The way the research and commercial work together is the only way to create sustainable energy
- Technology starts with university research and relatively low funding available
- With time more funding is available for that research
- At some point government gets involved and then more money is available for growth
- Then at some point that technology becomes commercially available
- Then some need funding and focus takes on the technology
- CubeSat industry have found itself in the last 5 year with commercial companies popping all around
- Budget and total market size for the CubeSat industry is just growing exponentially quickly
- If any questions send:
 - email at mike@cubespace.co.za
 - website www.cubespace.co.za

4. Presentation on “Industry-Driven Space Internship Program”

Khalid Manjoo, Astrofica Technologies

Khalid Manjoo started a journey becoming a pioneer of a new wave in satellite programs and space science in his career. Khalid has worked in SMD integration and verification specialist advisor, senior project engineer, engineering manager and is currently co-founder and CEO of Astrofica Technologies. Khalid is a registered extra professional engineer and was a member of International Astronomical Federation work force development for young professional program committee. He has also had an opportunity during the 16 years in the satellite industry to present academic practice at various local and international conferences. Khalid has core experience in satellite system integration and he claimed to experience across the space value chain. He has also successfully work from 7 satellite projects both in South Africa and internationally ranging from CubeSat clause 1-3kg micro satellite clause of 500kg. The satellite mission included university human handheld capacity development, technology demonstration, operational earth observation and national security. Khalid is very passionate about is progressing Africans space technology and thereby its people.

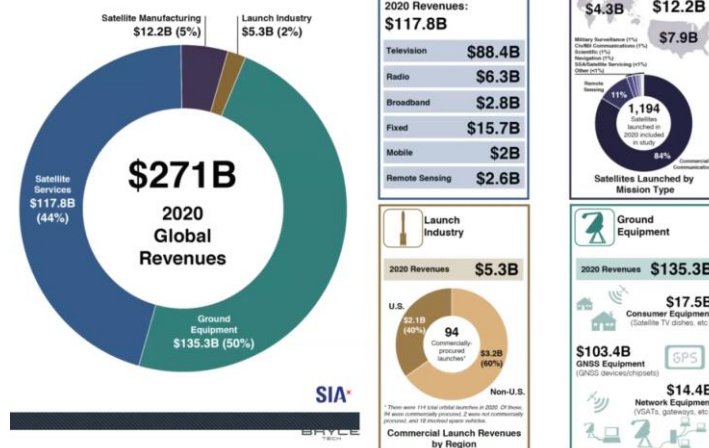


Pictured: Khalid Manjoo presenting on Industry-Driven Space Internship Program

Highlights:

- Astrofica Technologies is a high-technology services and solution provider
- Keen interest in commercializing actionable solutions from partner and proprietary technology
- Founded in 2017 by Khalid Manjoo and co-founded Jessie Ndaba
 - Went fully operation at the beginning of 2019
 - For industry standard, company is in early stage
- Core skill across the valued end to end design and development chain
- Contribute toward SDG, contribute toward socio-economic upliftment and development
- Given opportunity at CPUT team under ZACUBE-2 at the time
- Demonstrated professionalism and capability under the Astrofica banner
- Helping the university with the assembly integration and testing AIT project management
- Opportunity in 2020 to run an internship program
 - Needed to do that to create a flagship program in industry to implements everything
 - To create the talent pipeline out of university into industry and impacting intangible solutions
- Industry growing more than trillion US dollars.
- Space is an essential enabler of
 - Global Economy at large
 - Without Space, economies will become less competitive over time.
 - The Currently Disadvantaged People
 - No access to data for disadvantaged people

2020 Top-Level Global Satellite Industry Findings



Pictured: Khalid Manjoo presenting Top-Level Global Satellite Industry Findings, 2020

- Government and Government Agency Efficiencies
 - Quality data for better decision making, management of resources, services
- It is growing very fast. Timing is Important
 - Compound Annual Growth Rate in certain areas over 100%
 - EBITDA over 15%
- The Internship Program
 - Funding came from Media and ICT sectors
 - Traditionally funds big companies in terms of development of the digital economy
 - Opportunity by the skills development department of Western Cape Government
 - Funding was minimal but was able to serve as a proof of concept for ASTROFICA
 - Specific aspiration to not just focus on satellite engineering
 - Also expose the interns to the opportunities that the space value chain offers
 - The satellite was not the end goal
 - It is a necessary goal that provides critical insights that cannot be done by terrestrial systems
 - Able to expose the interns to industry giants
 - It is currently under the space tech ownership of state entities
 - Access to more than 200km square of space
 - Criteria from sponsors
 - Core had to be South African
 - Had to have certain level of qualifications
 - Minimum of 5-10 years of working experience
 - Those interns that do not necessarily have an engineering background were selected
 - Astrofica funded them from their own pockets
 - Interns had metric qualification with no formal university experience
 - But had shown that they were willing to continue the study with excellence
 - Needed to see the passion.
- Statistics
 - Total number of interns = 30
 - Age Groups: 20 to 34
 - Countries: Nigerian, Kenya, Uganda, Ethiopia, Zimbabwe and Mozambique
- Facility exposure, 3D CAD rendering, hyperspectral data analysis
- Satellite Human Capital Development (HCD) programs ideal for advancing science and technology
- Space is firmly domiciled in Astrofica with rich heritage
- Continue to work on programs with non-governmental organizations
- Astrofica partnered with Stellenbosch University in a high altitude balloon outreach program
- Will continue hosting exchange programs from the University of Illinois

5. Presentation on “ISISpace Enabling Offerings for HCD and Mission Success”

Johan Erasmus, ISISPACE South Africa

Johan Erasmus studied at Columbus University and received the Bachelors and Master’s Degree in 1999. He started his industry career as a Micro Network Engineer at Telecom of the weekly route to the satellite industry. For almost nine years he worked at Transpace external company from Columbus University where he started as an RF product Engineer and later was an AIT team leader for multiple satellite projects including 80kg, 200kg and 400kg microsatellites. His final role at transpace was a satellite system engineer on the Sumbandila Satellite project and he was a team leader of the technical team responsible for the Sumbandila launch campaign. For the past 12 years, he has been with ISISPACE where he started as an RF and AI engineer system engineer. He is currently the Branch Manager and System Engineer at ISISpace South Africa.



Pictured: Johan Erasmus presenting ISISpace offering for HCD and Mission Success

Highlights:

- ISISPACE is a Dutch Company founded in 2006 and South African subsidiary was founded in 2012
 - Company was founded by students and has 130+ employees from 25+ nationalities
 - 40+ missions enabled with 2000+ subsystems delivered
- ISISPACE has fully furnished development labs, workshops, assembly labs, integration cleanroom, environmental testing facilities, satellite control room
- Reason behind the establishment
 - Initially to provide trainings related to satellite to universities which led to more programs
 - With this the aspiration, payloads and complexity of the satellite also grew
 - ISIS now offers wide variety of missions ranging from 1U, 3U, 6U to 12/16U CubeSat
- Also sell components produced by ISIS as well as other third parties
- Funcube series satellites
 - An excellent learning tool that allows students to see that the satellite is real.
- Training Solution 1- Ground Station
 - Ground station for VHF/UHF/S-band
 - It allows to communicate with satellites and monitoring them
 - NOAA APT Weather Satellites
 - Radio Amateur Satellites



Pictured: Johan Erasmus explains the wide varieties of CubeSats classes provided by ISISPACE

- Training for Generic Engineering Model (GEM)
 - Ideal for a team wanting to build and launch their own FM but not ready to start from scratch.
 - Provide short courses of 1-2 weeks depending on clients need and demand
- Training Solution 3 – Training node
 - GEM is quite expensive
 - Training node is newly developed training solution which is scaled-down version of GEM
 - Much more compact and cost-effective training solution for hands-on training
 - Includes EM structure and Electrical version of deployable antenna
- NCBR-1 (Launched 2014), NCBR-2 (Launched 2021) and ITASAT (Launched 2018)
- Support for Nayif-1, 1U satellite from UAE, JY1-SAT from Jordan, Napa-2 from Thailand
- Training Solution 4 – Get it Launched!
 - Solution for taking satellite up to space
 - Developed ,4 door Quadpack, Deployer system, space for four 3U and 12U
- Offer launch service and has grown tremendously over past years with over 350+ satellite launches
- Coming up launches:
 - ISILaunch 38: Falcon 9 – Q4, 2022
- This has been a learning curve opportunity to offer extra capacities to client base
- World record for some of these launches



Pictured: ISISPACE satellite solutions delivery to clients in different countries

6. Announcements and Closing Remarks

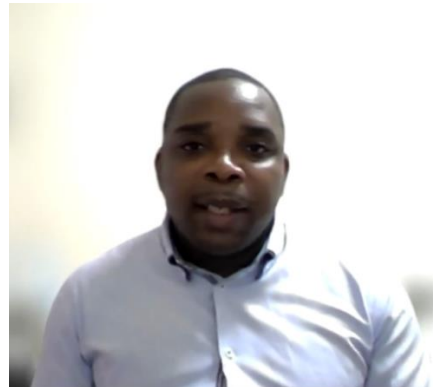
Rei Kawashima, UNISEC-Global



Pictured: Kawashima-san introducing new points of contacts and giving closing remarks

Highlights:

- New Points of Contact
 - Dominican Republic: Gorki Encarnacion
 - Zimbabwe: Timothy Kudzanayi Kuhamba and Victor Mukungunugawa



Pictured: Timothy(left) and Victor(right) introducing themselves as new national points of contacts from Zimbabwe

- **Timothy Kudzanayi Kuhamba**
 - From Zimbabwe
 - Recently appointed as National Point of Contact for UNISEC
 - Part of UNISEC training for CLPT-10
 - Masters student at Kyushu Institute of Technology (Kyutech)
- **Victor Mukungunugawa**
 - From Zimbabwe
 - Employee at The Zimbabwe National Geospatial and Space Agency (ZINGSA)
 - At Kyutech, Project Manager of BIRDS-5 project
 - In BIRDS-5 project, Zimbabwe and Uganda are building their first satellite
 - Collaboration with Japan
- <http://www.unisec-global.org/pointofcontact.html>
- Zimbabwe to introduce their regional activities in next virtual UNISEC Global meeting
- **Next Virtual Meeting:** Date: July 16, 2022 10:00 pm - 0:00 am (JST)
 - Theme: TBD, Confirmed speaker: TBD
 - Local Chapter presentation: TBD, Host: TBD



Pictured: Rustem announcing 11th Nano-Satellite Symposium

- 11th Nano-Satellite Symposium
 - October 17-19, 2022
 - 11th Nano-Satellite Symposium
 - Website for October event
 - <http://nanosat11th.itu.edu.tr/index.php>
 - Expecting 50 presentations and up to four keynote speakers
 - One of keynote will be Prof. Nakatsuka
 - 3 days of Nanosatellites workshops
 - 2 days of 8th UNISEC GLOBAL meeting
 - If any questions then one can find mailing address in website
- Receiving replies and hope to get good crowd
- Accept abstracts within July 2022
- Looking for exhibitors as well
- Many news/exhibitors from Turkish private space sectors

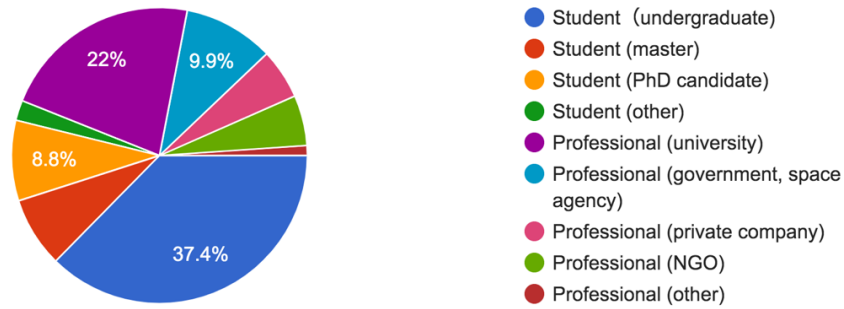
7. Participant Statistics

91 registered participants from 29 countries/regions participated in the 22nd Virtual UNISEC-Global Meeting.

Country/Region	Number of registration	Country/Region	Number of registration
Angola	1	New Zealand	1
Argentina	1	Nigeria	1
Australia	1	Pakistan	3
Bangladesh	3	Peru	1
Bulgaria	4	Philippines	5
Chile	3	Rwanda	2
Colombia	3	Russia	1
Egypt	3	South Africa	8
Ethiopia	1	Taiwan	2
India	17	Thailand	1
Italy	1	Tunisia	1
Japan	17	Turkey	3
Kenya	4	UK	1
Morocco	1	Zimbabwe	2
Nepal	1		

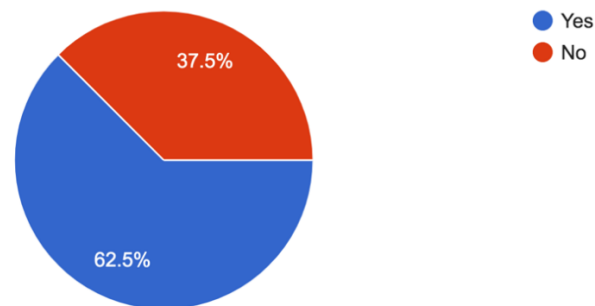
Student or professional?

91 responses



Have you participated in the UNISEC-Global Meeting previously?

88 responses



UNISEC-Global Social network accounts



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https://www.instagram.com/unisec_japan/



<https://www.linkedin.com/groups/8982613/>

Thank you