UNISEC-Global The 18th Virtual Meeting

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1. Opening Remarks

Prof. Alim Rustem Aslan, Istanbul Technical University, Turkey

Prof. Aslan graduated as an Aeronautical Engineer from the Istanbul Technical University (ITU), Department of Aeronautical Engineering. He received his MSc degree from the same department in 1985. Then, he completed the Diploma Course of the von Karman Institute for Fluid Dynamics with a scholarship in 1986. He received his Ph.D. from the same institute together with Universite Libre de Bruxelles in 1991. The same year, he started working as a faculty member (Assistant Professor) in the Department of Astronautical Engineering of ITU and became professor later. He has established seven labs including the spacecraft systems design and test lab. He is manager and founder at Space Systems Design and Test Laboratory. He is also the manager and founder of SmallSat Communication Laboratory. He is president of UNISEC Turkey and member of IAF, AMSAT-TR and UNISEC-Global. Prof. Aslan's research interests include the design, analysis and development of 6 CubeSats (three are in orbit), manned and unmanned rotorcraft systems, computational fluid dynamics, fluid mechanics and aerodynamics, and defense and education technologies.

Pictured: Prof. Dr. Alim Rustem Aslan giving the opening remarks

Highlights:

- It will be beneficial to all Local chapters within the umbrella of UNISEC Global
- We have two strong talks regarding industry academia collaboration
- There are different parts: the academia part, research centers parts both in academia and industry
- At the end of February, NanoSatellite Symposium as part of ISDS circuitry which is full online
- Mark their calendars for **NanoSatelltie Symposium and UNISEC Global Events**
    - Date: **October 17th-21st, 2022**
    - Organizing Institution: **Istanbul Technical University**
    - City: **Instabul, Turkiye**
    - Announcements soon

2. Presentation on "What the Space Industry Needs from the Academic World?"

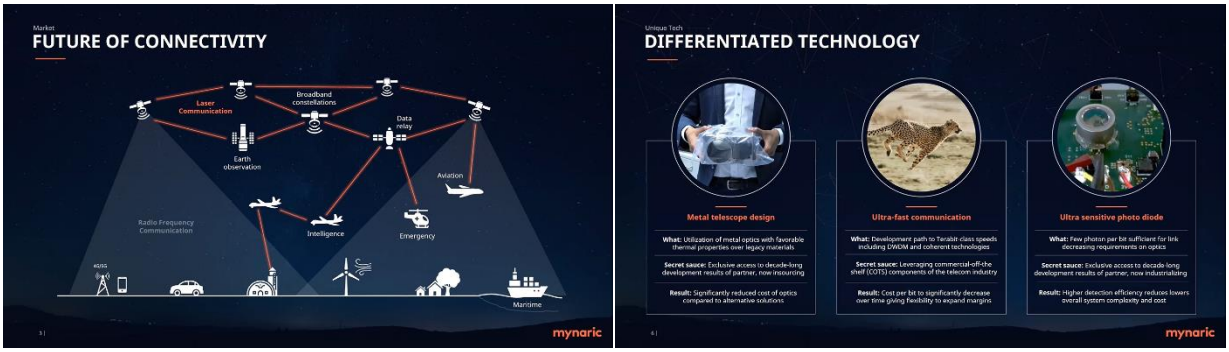
Bulent Altan, Mynaric

Bulent Altan is a New Space veteran and CEO of Mynaric, the leading optical communications company for aerospace applications, and Investment Partner at the European NewSpace venture capital fund, Alpine Space Ventures. He began his career as one of the first employees at the then newly-established SpaceX in 2004, having graduated from Stanford University in Aerospace and following completion of his studies in Computer Science at the Technical University of Munich. At SpaceX, he was essential in growing the company's avionics department from seven people to over 200 and was as Vice-President responsible for the avionics of the Falcon rockets as well as the Dragon capsule. Bulent was Vice-President of Satellite Mission assurance for SpaceX's Starlink satellite mega-constellation. Bulent left SpaceX from 2014 to 2016 to co-found the start-up ecosystem and aerospace industry in Europe, during which period he held positions as one of the partners and mentor at the Munich area industrial start-up accelerator TechFounders and took on the role of Head of Digital Transformation and Innovation at Airbus Defense and Space.

Pictured: Bulent Altan giving Presentation on need of space industry from academic world

Highlights:

- Mynaric Optical Communications Company: optical communications terminals for satellite missions
- Mynaric builds components and terminals
- Builds equipment for aircraft satellite space stations and ground stations
- Will build mobility platforms as well that allow data between all different types of satellites to communicate at very high speed over very long distances.
- Working already on terabits per seconds in comparison
- Backbone that builds today's mega constellation portion
- Airplane terminals are Hawk Terminal
- CONDOR terminal, which is our space terminal, mostly being utilized for different satellite constellations
- Used in defense realm by the USDOD, DARPA and space development agencies
- Consumes less than 60 Watts and meets the bridge distances of 8,000 km



Pictured: Space Investor Bulent presenting the optical Communication technology Mynairc develops

- Challenge: Hitting eight centimeter target from 8,000 kilometers away with a laser beam of about two satellites moving at 28,000 kilometers an hour
- Cost effective and scalable.
- All metal telescopes that are made from aluminum which can be issue in radiation and thermal environment
- Telescope took us six years to perfect to make it cost-effective, to get cheap. Consumer wants this
- Terabit is our next design.
- Terabits or a single optical channel is already a challenge already on Terra firma.
- In space, it is even more of a challenge
- Challenge is to bring the power consumption down, and increase the length distance

Pictured: Mynaric in-house testing and qualification facilities

- In-house capabilities: clean room, testing capabilities for very specific optical metrology equipment
- Vertical integration as an asset for the company
- To give a little bit of an overview of how big the company is:
    - 250 people and headquarters in Munich. Offices also in Los Angeles, Washington DC
    - COO in-charge of our production, logistics and quality
    - Looking to build optical instruments in thousands a year.
- Mynaric's perspective, three pilars the company looks for while working with academia
    - Future technologies with miniaturization and cost optimization
    - Specific workforce with good mindset
    - Entrepreneurship and spin-off

Pictured: Bulent Altan CEO of Mynaric explains Industry's needs from Academia

Highlights (Continued):

- For future technologies: High-speed research, today working on terabytes.
- There are amazing companies out in the world, in the fiber optics that have budgets that the space industry can only dream of that build chips today, DSPs
- The Achilles heel is the radiation capability of these chips and getting terabit class chips in resistant
- Radiation tolerant capabilities are the absolute pinnacle
- Need to find ways in serial production of high precision optics
- Allows a Telescopes to be built in a matter of tens of minutes and be polished and dominant
- Leave behind the standard materials and use from Silicon Carbide to Ceramics
- How can we can do it mass producible and make it cheap
- **Cost reduction technologists are a big deal. Technology in itself, if it's not affordable.**
- Any research on amplification of optical power in a fiber is always interesting
- Happy to see Professor Aslan, six CubeSat in orbit
- Got into Stanford, I had Prof. Twiggs
- CubeSat became a standard that changed the industry
- Today, very few students coming out of academia without any hands-on engineering
- When hiring:
    - What did you do?
    - What did you actually build?
    - How did you apply the knowledge that you gather?
- Hands-on engineering very often comes with three interesting concepts and importantly hitting cost targets
- CubeSats working within a limited budget and hitting cost targets
- Working in iterative, agile, and innovative ways
- Academia needs to always teach the linear solution methodology.
- Important capability to have: problem, analysis, solution and iterate
- In SpaceX, took that to the extreme saying, "we will fly really risky first rocket"
- Lost three out of three rockets until we really realized how rockets work
- In other cases, failure is not an option but iteration can be important for learning
- Something, we probably don't teach in the space engineering side very often
- Important while the world is getting to constellations is serial manufacturability.
    - What makes a design?
    - What makes a certain engineering much easier to serially manufacture?
- In the aerospace world, not taught how to do this
- Very high stress, low budget turned into big competitions, like the DARPA jet, Hyperloop competition, Formula SAE. These are large projects that are very multidisciplinary

Highlights (Continued)

- Same that exists in the commercial world as well, competition is built into everyone
- Spinning-off and entrepreneurship, need to teach beyond academics, entrepreneurship, taking engineering, making a business
- Entrepreneurship and the graduate school of business of Stanford
- Pitch ideas in front of VC (Venture Capitalists)
- Lot of the companies came out of it as well
- Not taking any risks, cannot be successful.
- Start making more failures, an industry that doesn't have any failures doesn't innovate
- Build entrepreneurship centers in the universities
- Here in Munich a institution called UnternehmerTUM, which does that
- Technical University of Istanbul and in METU as well. Impressed
- Universities are going to become hubs
- Need for entrepreneurial universities because they have tremendous amount of infrastructure

Q&A:

Prof. Aslan: *No questions. Well, let me ask the question about laser communication, needing no license currently, what will be the future for that?*

Bulent: *I think so far every conversation with the ITU and the FCC tells us that they are not looking into licensing it at all. The reason for ITU and let's face it, ITU is one of the biggest bureaucracies, but a very necessary bureaucracy, is the fact that it's rolled off a radio communication is filled with violators and victims. And you need to coordinate that and it's say, even the best radio technology has side Lopes. It goes everywhere. And that's the biggest advantage of optical communications. It's a point to point, physically point to point communication. And, you don't have these types of problems. So it's a victim free communication, as long as I don't shine it right into your aperture as well, which is very tough to do if you're not cooperating. So, I think if you're going to live in a licensed free optical communications world for quite some time.*

Illas: *What type of detector technology are you using?*

Bulent: *Multiple, depending on the application, we can be using an avalanche photodiode. Today, given our customers we are in the non-coherent rope, up to 10 gigabits, we do direct detection on off. And then we use ofcourse also just a simple pin diode for the higher end of the spectrum, for the higher end of the bandwidth, going into an FPGA to really decode that. But, today when we are going for a hundred gigabits. Of course we were going into coherence behind the pin diode. That's the easiest way to go.*

Herman Steyn: *Can you hear me? I'm more of a propulsion systems engineer. So, what is interesting to me is your pointing accuracy required with this laser communication, laser beam dispersed, but over a distance. So what is the distance? You mentioned the 8000 kilometers, it will display, what, what is the pointing accuracy for your laser transmitter? For example, the receiver must just be in that dispersion beam.*

Bulent: *Absolutely. At about 8,000 kilometers you end up with, I don't want to say too many arc seconds and arc radiant and whatnot. It's a tiny, really, really very bell, almost collimated beam. So it goes really, really well in one beam. When it arrives at the target satellite is just a few tens of meters wide. So, you're really trying to hit a perfect target, we have try to keep it as narrow as possible because that just increases my link budget and more photons land on my receiver side. But the receiver is about eight centimeters so not that big, the pointing accuracy is interesting. So, we are an active system. So, we actually use the incoming laser to shoot the outgoing laser. And we have an active control loop using a very fast steering mirror. And that's what every optical communication system does out there because we have to take out the satellite motion and we have to take out the vibration, but also there is never the perfect knowledge of the other satellite. And very often from the satellite from the wholesale, like we get the location of the other satellite in tens of degrees and that's about it. And then we have to find the communication partner can take us about 30, 40 seconds to do so, depending on how big the errors, but after that, they are in micro radians and pointing accuracy using our control system and the incoming signal.*

Prof. Aslan: *Yeah, I think there is an interesting question for students and new graduates. Let me read that. How would do as Mynaric, be able to support the new approach to empower students, to get entrepreneurial and engineering knowledge?*
Bulent: *To be fair, I think as Mynaric, and I think that all the other things that I'm involved in, I'm looking for a challenge that one can do while in the university. I think we did that at SpaceX and we did the Hyperloop challenge. Now they did the Boring challenge. Those were really five amazing races, which I'm quite proud that technical university won all five of them. Technical University Munich, I got to mentor them. They've won quite well. I need to find something similar optical capabilities always require a certain amount of additional capabilities. So we need to somehow summarize the difficulty of an optical link and build a challenge around it and build something around that line. And then I'm trying to do that it's going to be an interesting thing to put together, and I'm not really sure it's going to be just around the optical link. I'm involved also in a new launch or I'm involved in that satellite company, maybe a combo package of doing a demonstration with a prize. And let's face it when I engage students like that. Some amazing people come out.*

Prof. Aslan: *Do you have heritage coming from European Data Relay System?*
Bulent: *No, actually not. it's actually our optical communications technology has been a very German technology up until now. And the two leading companies come out of Germany. The one with actually more heritage is the one out west is, it's a subsidiary of Airbus called TESAT. And they have been working on the high end, really high, high end optical communications for quite some time together with the German Aerospace Research Center. And they are the terminals of flying on the EDRS system. We definitely look up to that. That's a great system. Our target has been more mass manufactured constellation terminals where TESAT is also beginning to be actable.*

3. Presentation on "Airbus Space Activities and its New Space Vision Named 'The Next Space'"

Dr. Mustafa Ilarslan, Business Developer Manager, Airbus Turkey

Dr. Mustafa Ilarslan graduated from the Electronics Engineering Department of Middle East Technical University in 1989. He worked at various positions and projects within TurAF. He was the department chair and then director of Aeronautics and Space Technologies Institute from 2009 until 2014. He chaired the 'Recent Advances in Space Technologies' conference during his tenure at the academy. He obtained his PhD from Yildiz Technical University of Istanbul. He was the head of the Space Department at TurAF headquarters in Ankara when he retired in 2016 to join Airbus Turkey. Since then, he has been working on the TURKSAT 5A and 5B program along with other projects.

Pictured: Dr. Mustafa giving presentation on Airbus Space activities

Highlights:

General Discussion: Space at Airbus (What Airbus is doing in Space)

- Airbus is a commercial aircraft manufacturer with two divisions- Defense and Space and helicopters
- Space in fact is the part of defense and space along with military aircraft, UAV's and connected intelligence.
- Largest aeronautics and space company in Europe and also worldwide leader in certain areas
- Airbus Space domain: 2020 revenues is 2.5billion euros which came from 70% products
- Airbus space is World's No.1 Earth observation export company in satellite
- World's No.1 telecom satellites, the exporter.
- In Europe, only the company working on human space flight
- Also the only company in the world other than the US companies providing human's space flight equipment and services to NASA
- Industrial footprint: Airbus is a global company but its root's place in Europe, employing more than 12,000 people and working at 13 sites located in seven countries including the US.
- From satellite manufacturing, space equipment, from launchers and launching equipment to a ground segment and satellite operations.
- Airbus has its own fleet of Earth observation at telecom satellites, providing services and data and also developing applications based upon the data coming from these platforms.
- Today, very few missions leave Earth without Airbus space equipment onboard
- Airbus has huge fleet of Earth observation satellites.
- Airbus employs many different sensors collecting data and providing to the customers on Earth where the most recent edition is the Pleiades Neo satellite with a 30 centimeter GSD (Ground Sensing Distance)
- In addition, with the launch for two additional supplies this year, Airbus will have four satellites.
- Pleiades Neo will be able to visit any location twice a day
- Total number is 16 and with the two additional Pleiades Neo now this year it will be 18.
- The Zephyr platform: a high altitude long endurance UAV flying above the commercial air roads, flying at about 70,000 feet and sustaining the operation for about two months
- Airbus conducts intensive flight tests for this. Zephyr services in the near future.
- Subsidiaries, some new space companies: HawkEye 360 which is a US-based small satellite company
- HawkEye has an operational fleet in space
- Use small satellites to employ ESM electronic passive receivers to collect electromagnetic signatures of the Earth that they are flying over
- Long heritage from the Asterix satellite, which is the first European satellite made in France by the Matra, which is the predecessor of Airbus up to Rosetta and Columbus.
- Airbus prefers to be named as a pioneer in space sector
- 2021 highlights of Airbus:
    - Airbus managed to launch 10 new spacecraft
    - Five of them are earth observation satellites
    - Two of them are Pleiades Neo
    - Four are connecting people and telecom satellites. Two of them were TURKSAT 5A and 5B
- Airbus has a broad spectrum of a portfolio for space equipment which serve more than one thousand equipment to the customers
    - 10 major programs are going On-Track regarding:
        - Moon mission
        - Mars mission
        - Science missions to other planets
    - Airbus has a new missions last year
        - One of them is a moon mission
        - Galileo Satellite Airbus will be making the second generation of Galileo satellites

Highlights (Continued):

- SuperBird-9 the 7th OneSat fully flexible satellite
- Airbus is supporting the World Space Week to inspire the school children all over the world.
- Airbus is also targeting a more sustainable future for space

- 9 main domains of Airbus Defense and Space:
  - Telecommunications
  - Earth Observation
  - Spacecraft equipment
  - Human spaceflight
  - Space exploration and science
  - Navigation
  - Services
  - Ground Segments
  - Launchers

Some inspiring projects and products that Airbus have developed:

- OneSat will be a game changer in the telecoms satellites market.
- Fully flexible satellite in coverage and in power/frequency.
- Airbus is a manufacturer OneWeb satellites
- A joint venture in the US with the OneWeb telecom services
- OneWeb satellite resembles revolution in satellite manufacturing. Mass production in satellite domains.
- Traditionally companies were able to manufacture upto three satellites per year.
- Now. redesign of the telecom satellite made it possible to manufacture two, three satellites per day.
- 2/3rd of the targeted number of OneWeb have been launched
- Final figure will be about 650 satellites
- Airbus is a part of the ExoMars rover project scheduled to be launched this year.
- **Regarding Mars, Airbus will be designed and developed after Earth Return Orbiter bringing the samples collected from Mars back to Earth by 2031**
- This is a part of the European Space Agency's contribution to the NASA-led Mars mission
- Airbus is a part of the moon mission, Artemis mission and making the European service module for the Orion vehicle that will be carrying the astronauts to Mars
- Airbus planning on a Jupiter mission to study
- Europe's main contribution to ISS is the Columbus module
- Built and operated by Airbus since 2000.
- As part of this in April 2020, Bartolomeo module has been installed at ISS
- The module makes more possible for the researchers and scientists to conduct experiments on ISS
- Available for rent by the Airbus marketing teams.
- Airbus has developed with the AI technology developed by IBM and DLR.
- The AI is a crew interactive assistant named as Cimon.
- The second generation of AI Cimon is in operation at ISS now
- This will be a part of the future missions to Mars and Moon

How Airbus is seeing the future with space and how Airbus would like to be a pursuit by all the stakeholders and the community with regard to its space activities

- Airbus is doing its part to reduce its carbon footprint
- Redesigning the aviation and the space in a much more sustainable way
- Airbus is a big supporter of sustainable aviation fuel

Highlights (Continued):

- By the year 2035, hydrogen will replace the existing carbon-based fuels.
- Airbus has obtained and investing in hydrogen technology to develop the future generation of aircrafts
- This is also valid for space. Space is critical for us in many ways, but would like to emphasize two points:
    - Space and space-based technologies are crucial to monitor Earth and atmosphere
    - Space is an asset and very critical for us but its sustainability. Needs taking care of
- That's why Airbus would like to stop using the 'New' space versus 'Old' space.
- **Instead use the concept of "Next" space.**
- What Airbus is doing to support this approach?
    - There is a little video that you can find it on YouTube and watch it. It's a one-minute video.
    - Airbus is doing things that really matters.
    - Example is Airbus is investing itself to change the dynamics of space
    - Competition is good but we are trying to avoid some destructive competition.
    - Even worse is the race between superpowers of Earth in space.
- Some critical technologies are developed by Airbus's own investment for instance Pleiades Neo
- Vital to get high resolution images all over the world.
- Innovative projects with the space agencies like CO3D to get a very high-resolution elevation database of the earth and Space Data Highway.
    - Bartolomeo is the experimentation at ISS and OneSat.
- Airbus ventures as a traditional player, as a pioneer is backing up many promising startups that are coming with very innovative ideas and developing the technology, HawkEye 360 as one example.
- Airbus is doing for satellites is what Henry Ford did a century ago for cars
- The OneWeb satellite manufacturing line is real representative of mass production of the satellite to match the production rates needed by the mega constellations
- Important to make it a non-destructive competition.
- Airbus has a huge database coming from its sensors about the atmosphere of our Earth
- Airbus are making these available for the users regardless of what background
- Should be working hand to hand and incorporation and collaborations to tackle the very challenging problems of the earth today and the sustainable space.
- The space debris and the responsible user job space, especially the low earth orbit is a very critical topic
- Airbus is committed to meet the international standards for the orbiting at the end of life of the satellite
- Airbus is introducing eco-design in our satellites not only to OneWeb satellites but also to other satellites
- Airbus is the first company to test the **debris removal techniques in space which uses a harpoon**
- We take the space traffic management very seriously.
- As for airline traffic management, Airbus sees it necessary in space traffic management and ready to contribute to the development of international standards for such traffic management

Q&A:

Mansur Celebi: *Any institutes from all around the world can apply for those funding programs, right?*
Mustafa: *Yes. But Airbus has all over the world offices and in some countries, we have engineering centers and innovation centers. So, it's better to check. I mean, to name a few, for example, in Singapore, we have engineering center and innovation center in China, in US. In fact, we are trying to have those centers in Turkey as well. So the regional challenges or regional competitions are conducted through these offices.*

Samuel: *Thank you, Dr. Mustafa for your interesting presentation. And I have two questions which are both related to sustainability of space. What are the challenges that Airbus has faced so far or is facing in speeding up the process of achieving sustainable space? And the next question is, are there any thoughts of producing electric aircrafts. Thank you.*

Mustafa:*I started with your second question. Yes, Airbus is working on Siemens and Rolls Royce on electric aircraft and ducted fan type engine will be employed. You can check the website for the details and coming back to your original question. Sustainability in space should be interpreted or in various ways, one of the most critical one, I think everybody would agree. It's the space debris issue to tackle this issue, Airbus is developing and the space debris removal techniques using various things. It means to collect the space debris and the activate satellite and pull it over to other places that are some new startups. Also working on this and Airbus is also funding and supporting some of these. Another way of participating this more sustainable space is the in-orbit service servicing capabilities. Airbus is also developing space robotics to achieve that along with some other big companies, as far as I know, Northrop Grumman is one good example, but also there are some startups and new space companies working on this. Airbus is also working with some of them and funding directly, some of them. But most critical things is because the space, I mean the mega constellations are big concern for the whole space community right now and OneWeb is talking about 650 satellites but for the other competitors we are talking about thousands of satellites. If add up on top of that, there will be some other initiatives coming from Chine, Russia. We can expect those so these mega constellations are really concerned not only for reflecting the light and making things harder or more difficult for the astronomers, observers but also managing this traffic is a big challenge and we definitely need some innovative ideas, artificial intelligence, algorithms specially designed for this purpose.*

Mansur Celebi: *We have very little time and we have two interesting questions. I want to read both of them. By adding these 650 satellites for the OneWeb, Airbus will be like SpaceX, making optical astronomers observation more impossible because of the light reflection from these satellites. Another one, are mega-constellations (e.g. Starlink, OneWeb) the responsible way to go from space debris point of view?*
Mustafa: *I think I have already addressed some but to answer the first question directly, Airbus make the satellites, but the satellites will be operated and owned by a different company, OneWeb Telecom Company. But, as a more responsible way of conducting business, Airbus has already tested the impact of this constellation to the work of astronomers and they found it acceptable. I've gotten talking about hundreds of satellites, but if you add up and Starlink alone talking about thousands of satellites, of course the impact would be much, much worse. And that's why we are inviting our competitors to be more responsible and sustainable way of using space from this perspective. And the other question is I already mentioned some deputy point airbus has already tested its OneWeb satellite that will be demolished properly on time at the end of their life. And also the debris will be created is much less because I'm talking about hundreds of satellites versus thousands of satellites.*
Mansur Celebi: *Thank you very much. I think we should stop here because there are many other questions coming on coming in. Nate's what do you think? Shall we go to breakout session or take one more?*
Nate: *Maybe take one more and then maybe take one more and then we'll, reduce the time for the breakout session. Because this has been very interesting. Yes, no, we'll do that next.*

Arifur Khan: *I am Arifur Khan from the University of Texas at El Paso. My question is very simple and easy I guess, but what are or is the most recent two principle research focus of Airbus in the space domain?*
Mustafa: *As I said, Airbus is active in main sectors or domains in space and each has its own state of the art activities and I can of course talk more about each of them but as I said, the most critical research areas are making space making less and less space debris so that we have a sustainable space. Because we believe that at the end of the day, if you think of the Kessler scrum or SpaceX can become the impossible for whole humanity regardless of the country or a company. It may sound like a horror movie or non-fiction movie scenario, but this could very well be the case and turning the fiction and nonfiction. So, these are the latest revolution let's say, or transformation of the ambitions of Airbus in terms of space technology.*

Mansur Celebi: *Thank you very much. I think we should switch to photo session. Right?*
Nate: *Excellent. Thank you very much for the stuff that was brilliant. And if everyone could please turn on their camera when I take a group photo, so please turn on your camera Kawashima, would you like to give your explanation on what everybody needs to do?*

4. Breakout Discussion and Sharing

Moderator: Nate Taylor, UNISEC-Global

Pictured: The session focused collaboration between industry and academia

Discussion Highlights:

- Team is divided into 35 minutes break out session
- Team is appointed to a task force with national space agency to grow the commercial space sector and to drive innovative technology solutions that can be transferred to other industries
- Each team will discuss to outline 3 ways to foster greater collaboration between industry and academia

Discussion:

Group	***Team***	***Highlights***
Room 1	*Prof. Aslan* ***Bolton*** *Dr. Cameron Kabeb*	- *Industry should establish the research labs in academia* - *And also fund the PhD research and provide professional assistance to academic guests that might be needed.* - *Industry should support defined interdisciplinary courses to be part of the curriculum in academia.* - *Space Industry and academia should define the topic to be taught in academia* ***Comments:*** *we should add also the space agencies in academia, and industry*.

Group	***Team***	***Highlights***
Room 2	*Abdul* *Mansur* *Sourov*	- *Actually we in our country, there is no particular space industry or particularly in the universities.* - *So discussed how to establish this and you know, what could the government do that. Like how, government first and foremost make an infrastructure that can help us, the university* - *Entrepreneurs or the industry, how should they take the initiative to support the universities. So that they can do more interdisciplinary research as well as aerospace.*
Room 3	***Arifur*** *Dom*	- *Prospect on energy harvesting where the academia industry and the space agency can collaborate with each other.* - *Specifically increasing the solar energy and some kind of connection with the three partners together.* - *Possibility of harvesting energy from space.* - *The three parties can collaborate together.*
Room 4	***Jeff***	- *The space agency can identify a certain social problem. For example, traffic management, using satellite images.* - *The space agency will initiate collaborative research and look for a suitable space industry, which can be partnered with a certain university so that the industry and the university can engage with each other to perform collaborative research.*
Room 5	***Ilias*** *Sirash* *Mohammed*	- *Space agency has a major role in bringing industry with universities.* - *Space agency helps all of the local universities funding space applications.* - *The very important for space industry companies is to create free zone for these companies to come and to invest because sometimes taxes, they do repair industry* - *Space industries need to hire young graduates once they graduate*
Room 9		*Importance of collaboration for academia, with the industry, so that academia can make research products for industry.* - *Students should be encouraged and supported to work in the industry during their studies and have been given the opportunity to do internships.* - *The importance of funding and industry should provide tools* - *In terms of private space activities, government should make relevant legislation and help through funding and encourage the private industry to work in the field of space exploration facilities.*

Group	***Team***	***Highlights***
Room 10	***Midori*** *Mustafa* *John*	- *Mr. Mustafa, according to his previous experiences and future plans in Turkey, he suggested to give one CubeSat projects in university under the Government and the space agency of any country and foster international collaboration and make students build those CubeSat and the corresponding project that goes along with it and try to launch together to create innovation.* - *It will be a win-win for the industry and the students because the industry will be able to gain innovation, new ideas while the students will be gained more experience* - *Basically a place to present how they could integrate and apply specific examples of space innovation to companies and other industries.*
Room 12	***Yasin***	- *Two way connection between space, industry and academia, and universities. They should feed each other and both depend on each other. They should provide internship opportunities and connections and network opportunities and software's.* - *Facilities space industry will provide the university to make good space engineers.*

5. New Member Acknowledgment, Announcements and Closing

Rei Kawashima, UNISEC-Global

Pictured: Kawashima-san making announcements for the UNISEC-Global Community

Highlights:

- **Pre-8th Mission Idea Contest(PreMIC8)**
  - MIC8 will be held in 2023
  - Encourage to organize regional competitions in 2022
  - Pre-MIC8 workshop will be held in Istanbul (or virtually) in October 2022
  - Requirement is that the mission is carried out by multiple satellite made of **6U CubeSat or smaller each**
  - Constellation missions and formation mission are both encouraged

- **Launch opportunities**
  - J-Cube which is a JAXA and UNISEC Japan's program is providing
    - Special discounted launch opportunities 1U-3U
    - Need to collaborate with UNISEC-Japan's university
    - Matching application deadline: October 31 2022
      http://unisec.jp/serviceen/j-cube

- **Next virtual meeting**
  - The date for the next virtual meeting is on **March 19, 2022 10:00 pm - 0:00 am (JST)**
  - Program:
    - Theme: TBD
    - Confirmed speaker: TBD
    - Local Chapter presentation: TBD
  - HOST Local chapter: TBD
  - Virtual UNISEC-Global Meetings take place on the Third Saturday almost every month in 2022

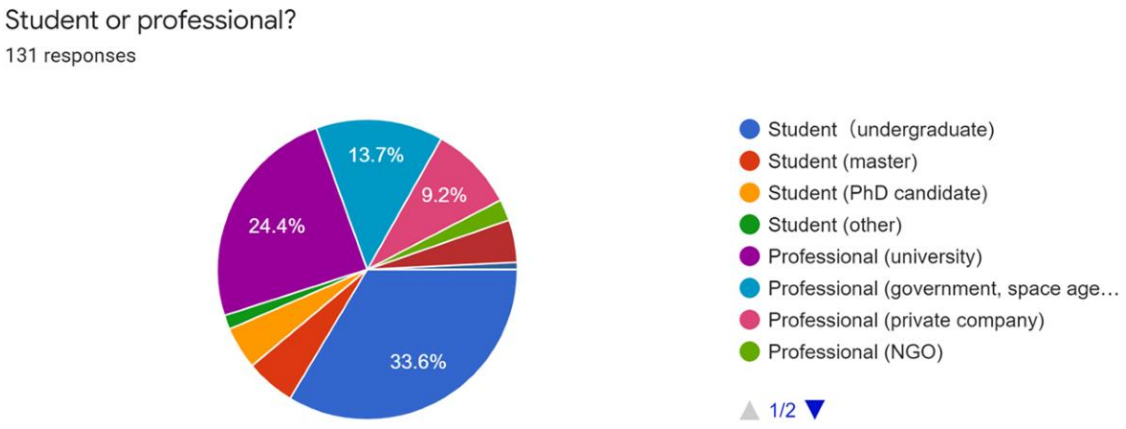
Pictured: Follow UNISEC-Global on socials

6. Participant Statistics

130 registered participants from **33** countries/regions participated in the 18th Virtual UNISEC-Global Meeting.

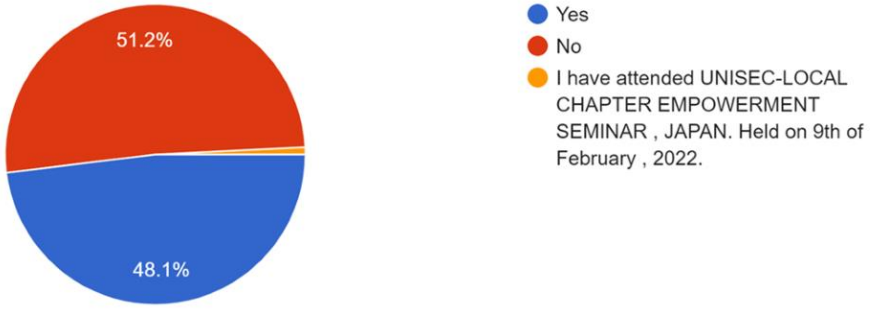
Country/Region	Number of registrants	Country/Region	Number of registrants
Bangladesh	9	New Zealand	1
Bulgaria	2	Pakistan	5
Costa Rica	1	Peru	1
Egypt	5	Philippines	39
El Salvador	1	Rwanda	1
Ethiopia	1	Singapore	2
France	2	South Africa	1
Germany	1	Sudan	1
India	1	Sweden	1
Iraq	1	Taiwan	4
Japan	10	Thailand	1
Kenya	1	Tunisia	2
Lithuania	1	Turkey	19
Malaysia	1	UAE	1
Mexico	1	United States	2
Morocco	1		

7. Participant Questionnaire



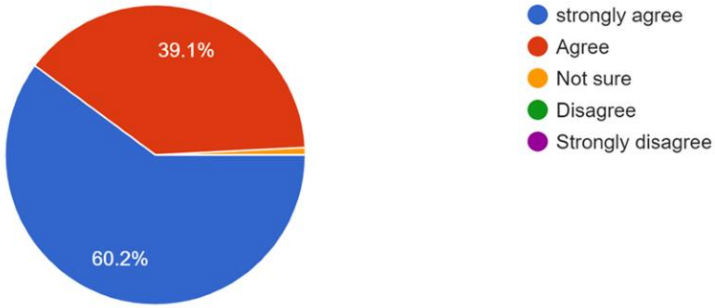
Have you participated in the UNISEC-Global Meeting previously?

129 responses



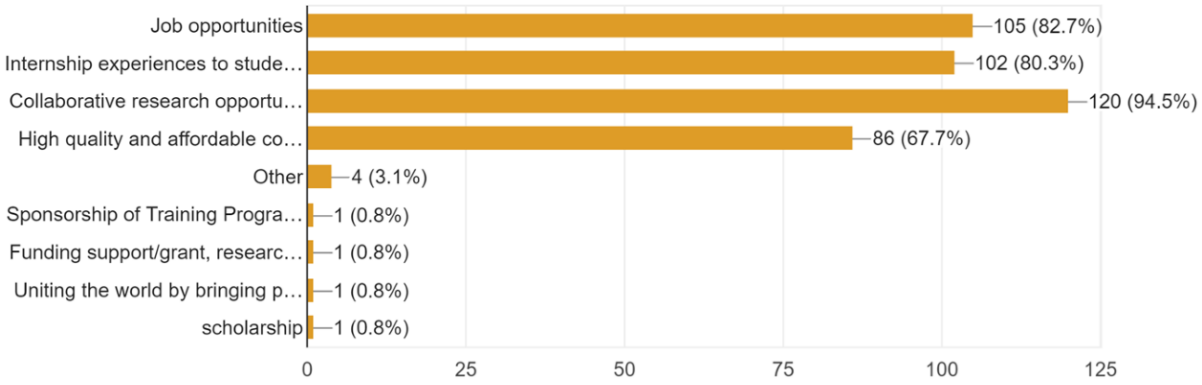
Do you agree that space researches contribute to the sustainable world?

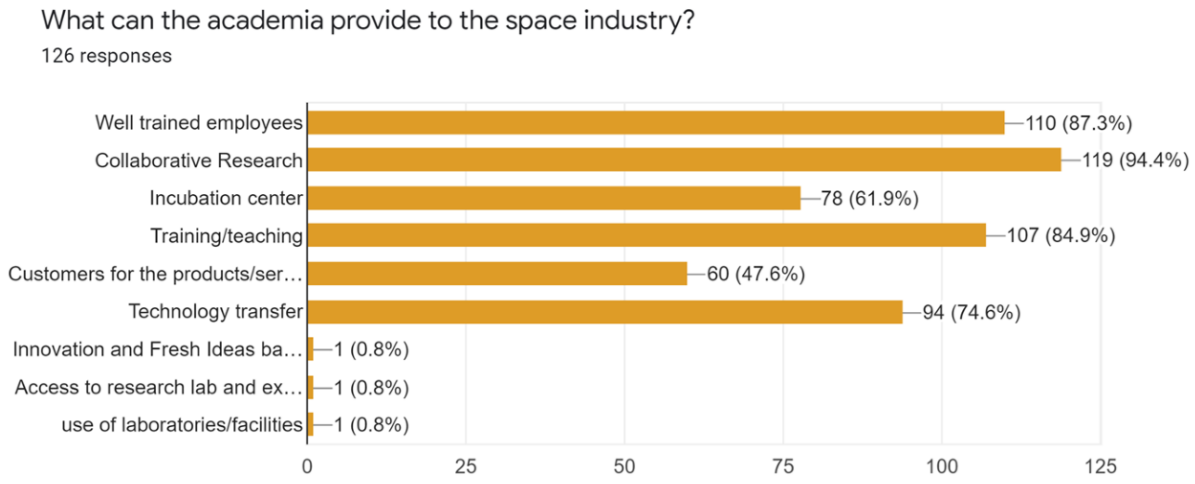
128 responses



What can the space industry provide to the academic world? (multiple choice is welcome)

127 responses





End of Report