

UNISEC-Global The 27th Virtual Meeting

November 19, 2022, 22:00-24:00
(Standard Japan time GMT +9)



27th Virtual UNISEC-Global Meeting

Moderator: Prof. Mohammed Khalil Ibrahim, Cairo University

	Prof. ATEF O. SHERIF Former Chairman of National Authority for Remote Sensing & Space Sciences (NARSS)	TOPIC Capacity Building in Developing Countries
	Prof. MOHAMED B. ARGOUN Professor of Space Dynamics and Control, Dept. of Aerospace Engineering, Former Director of Egyptian Space Program	TOPIC Transfer of Space Technology to Developing Nations
	Prof. MOHAMED B. ZAHRAN Chairman of National Authority for Remote Sensing & Space Science (NARSS)	TOPIC The role of NARSS in building up Egyptian Space Program, Case studies NARSSCube Satellites and NARSS Experimental Satellites

THEME
"Space Education, Transfer of Technology, and Capacity Building in Developing Countries"

Register here!  <http://www.unisec-global.org/virtual-meeting.html>

Host: UNISEC-EGYPT
Time: 22:00-24:00(JST)
November 19, 2022



Grid of participants:

- Prof. Mohamed Zahran
- UNISEC Office
- Rio Kawate / Student Intern
- Mohammed Khalil Iraqi
- Rainer Sandau
- Prof. Ayman Kassem
- HH
- Dr. Bahey Argoun
- Rei Kawashima
- Eyos Ergetu
- Daniel Odido
- Manol Avramov
- Adrian Salces
- Eliza Sapkota
- Fahd MOUMNI
- aosherif
- Pauline
- Haltham Akah
- Ndayishimiye yves rafiki
- KimR
- KUHAMBA Kudzanayi Timothy
- Somaia Mohamed
- Philippine Space Agency
- Marco Melgar
- NAHI MUMTAJ
- Daniel Ruben

The following report was prepared by UNISEC-Global Secretariat
November 19, 2022
Japan

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1. Presentation on “Capacity Building in Developing Countries”

Atef O. Sherif, Cairo University

Prof. Atef O. Sherif received his Bachelors, Masters and PhD from Cairo University, Aerospace Department. He began working as a professor from 1990 at Cairo University. Prof. Sherif headed the Aerospace Department from August 2007 to June 2008. He has served as chairman of National Authority of Remote Sensing and Space Sciences and editor of “Egyptian Journal of Remote Sensing and Space Sciences.” Prof. Sherif is a senior member of IEEE, AIAA, ESE, ESME ORSE, and SIM. Currently, he is the Professor Emeritus of Department of Aerospace of Cairo University Faculty of Engineering.



Capacity Building in Developing Countries **19 Nov 2022** **Cube Sat Discussions**

Atef O. Sherif, Professor Emeritus
Department of Aerospace
Faculty of Engineering- Cairo University

Moderator: Professor Mohamad Khalil Ibrahim (Cairo University)

19 Nov 2022

UNISEC, Space Education-Technology Transfer and Capacity Building in Developing Countries

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Pictured: Prof. Sherif's presentation on “Capacity Building in Developing Countries”

Highlights:

- Cairo University (CU) was founded on Dec 21, 1908
- Faculty of engineering was before university, established in 1820
- 14000 undergraduate and graduate students, 15 departments
- Aeronautics established on 1950, changed department of Aerospace on 1990
- Two tracks: Space Technology and Applications of Space Technology
- Graduate knowledge and qualities include Physics of Space, Modelling and GIS
- CUCubeSat BSc Graduation Projects
 - Explore CubeSat technology platform
 - Methodologies for functional proofing and space evaluation of satellite subsystems
 - Explore agriculture remote sensing, hyper-spectral sensor
 - Explore space environment testing
- CubeSat main specs
 - 1 kg, with main dimensions 10x10x10 cm³
 - High degree in Perigee 279 km with 98.5 degree inclination
 - High degree in Apogee is the sun synchronous orbit of 648 km
 - Orbit could be longevity of months/years
 - Uplink is 146 MHz and downlink 430 MHz
- CUCubeSat graduation project (2013-2014) in 3rd iteration
- Finite Element Analysis included structural (displacement, stress) and thermal
- Vibration testing include national frequencies, Unscrewing effect, Frequency Response Function
- Courseware design, development and modernization of laboratory, training of faculty
- Capacity building learnings include
 - passionate students make strong space capacity builders
 - Inspiration and tacit knowledge are good starting points

- Technical capacity building should be backed up by policy discussions
- Types of capacity; human, organization, structural or material
- Stages of capacity building:
 - Exploration, Emerging Implementation, Implementation and Sustainability
- Academic cooperation includes joint R&D projects, exchange staff/students,
- Collaboration include work with Japan and Canada
- Aerospace department had limited experience with receiving stations in 2014
 - Form a virtual constellation requiring modern receiving stations
 - Study of atmospheric data for atmospheric modeling and pollution
- Atmospheric modelling done by Aerospace department since 2001
- Models include modeling thermal inversion layers over Cairo, surface change

Q&A:

HH (from chat room):

How can we start the capacity building in country like etc which has not started yet?

Dr. Argoun:

As a country we do not have a clear plan to move to higher levels from lower levels. To me this research subject where we should really write reports and so on exactly what is needed to give recommendation to other countries to have a space plan. For example, one can say they have to have an organization that is responsible for space, they might have some research centers which have started to work on satellite subsystems. They might start with a CubeSat but there should be a document or a plan which details the options and alternatives of what can be done. A roadmap for any country to enter space. We don't have a clear roadmap. An organization that can help with that is the African Space Agency which is established in Egypt and it is a major contributor supposed to lead the Africa's space field. So try to use the capacity to do that and I think there should be a subject that started from here that needs further work by research from all our colleagues and friends. I welcome effort and I am ready to participate in it from all fellows from African countries to try to do. Thank you.

2. Presentation on “Transfer of Space Technology to Developing Nations”

Mohamed B. Argoun, Cairo University

Prof. Mohamed B. Argoun graduated from Cairo University in 1969 from Aeronautical Department. He obtained his Masters and his PhD from University of Toronto in 1979 and 1982 respectively. Prof. Argoun has extensive experience working at Nuclear Safety of Canada Authority, working for University of Wisconsin-Milwaukee, has published numerous paper and is the pioneer Egyptian Space Program since its inception in 1997. He worked as the head of NARSS and the Director of Egyptian Space Program. Prof. Argoun headed the first Egyptian satellite team, some of whom still are working in the space program now. Since 1988, he is a professor of Cairo University.



Pictured: Prof. Argoun stressed on the important aspects of technology transfer for space

Highlights:

- First part on how technology transfer occurs, second talks requirements for successful transfer
- EgyptSat-1 with Ukrainian Space Firm Yuzhnoe weighing 165kg (volume: 60x60x80cm)
- Medium size remote sensing satellite with two major payloads; multispectral and infrared
- Duration for 3.5 years between April 2003-Oct 2006, launch was on April 17, 2007
- Trained 52 engineers, scientists with 12 trainees
- Eight aspects transferred: program management, design, assembly, procurement/manufacturing, testing, engineering model, flight model, launch preparation
- There are eight lessons for successful transfer of satellite technology, explanation below
- #1 Recognize and keeping the main objective of the project
 - Why are you doing this project?
- #2 The team receiving the technology has to have more people
- #3 Document everything, failures, ICD, tools, reference materials, training tools
- #4 Reach objective and build the satellite at a slower pace, allow to absorb information
- #5 Adequate training is important
- #6 Space industry, there needs to be extensive testing
- #7 Transfer equipment, tools, documents including engineering, structural models
- #8 Continuity of technology after the transfer for economic, educational and industrial
- Technology transfer goes through three stages; transfer, localization and indigenous development

Q&A:

Rafiki Yves (from chat room):

This satellite was designed, manufactured and tested in Egypt (in-house) or in Ukraine? Do you have sufficient testing facilities for medium size satellite in Egypt? What are the capabilities of Egypt in satellite development as of today in terms of human resources and facilities?

Dr. Argoun:

Ukraine. The Egyptian Space Agency has the those [for medium size satellites]. We have Dr. Khalil here who is the former deputy of the Egyptian Space Agency. We have extensive facilities for testing. We built a huge AIT facilities. [Regarding human resources,] I don't know if I am the right person to answer this but Egypt came out of EgyptSat-1 program with very good numbers of specialists, we got all the equipment. All the lessons were applied. So for example, an engineering lab in the new agency. This lab has extensive equipment includes six or seven subsystems testing. We have clean rooms. Egypt is by any measure, quite advanced. We are reasonably well developed and can collaborate. We hosted African Space Agency.

Dr. Khalil (moderator):

We have launched an AIT (Assembly Integration Testing) Center with grants from China in 2016 and I suppose it will open sometime next year. It can test satellites up to 1 ton.

Hoda Awany (from chat room):

How do you rate the impact of that project on the development of the space field in Egypt? Do you recommend this model for other countries?

Dr. Argoun:

The actual question is how can it coordinated in other countries. What other countries are there for technology transfer? There are 30 countries that implemented medium sized satellite technology transfer programs. Including Brazil, Argentina, South Africa, Turkey, East Asia. Maybe our friends from Asia and Japan can say more. Egyptian program was unique, unique because we did not go as a common notion to quickly transfer technology to you and make you a space fairing nation. We designed our own technology transfer program. There was a committee in Egypt from 90s to 2000 until next year where developed a plan. We had a very clear plan for transfer of technology. The result is that Egyptian satellite is very good compared to other satellites. You can compare that, you can see. It's a very good satellite. The Egyptian team is very good team also. It's a team that properly acquired the technology. I think importantly, it's the issue of continuity. To answer your question, we have a first class satellite and technology transfer program.

Adrian Salces (from chat room):

Thank you very much for the informative talk. Can you share about your technology transfer activities from Egyptian Space Agency to other institutions within the country, if any?

Dr. Argoun:

The technology transfer program is not with me but it's with the Egyptian Space Agency. The question can be directed to the agency. You can talk to NARSS who's head is going to speak in a while. The second is Dr. Khalil who is the former deputy of Egyptian Space Agency. There's also department of Aerospac from Cairo University.

Which took a major lead in these projects. This is a policy question. You need somebody in the government to decide to do that. The question is; are you ready to share? My goodness, yes. We are eager to share. But has to come through proper channels.

Hoda Awny (from chat room):

Do you think Egypt should repeat such a project to boost the experience in different scale of missions?

Dr. Argoun:

Well, no we don't need to repeat it. We need to further develop it. As I said in the last slide. The transfer of technology goes through three stages. First one is transfer. You transfer 25%-30% of what technology is about. The second part is to reach out to 60%-65% project through indigenous technology. Develop a new project. The third one is 80%-100% which is the mature stage. We are in the second stage. We hope to complete in few years. First part was very successful.

3. Presentation on “The Role of NARSS in Building Up Egyptian Space Program, Case Studies NARSSCube Satellites and NARSS Experimental Satellites”

Mohammed B. Zahran, National Authority for Remote Sensing and Space Sciences

Dr. Mohammed B. Zahran did his undergraduate from KHIT and graduate studies at Cairo University. He completed his PhD in 1999 from the same university. Dr. Zahran has worked as the Head of Photovoltaic Cells Department in Electronics Research Institute (ERI) from 2015 to 2018. He also worked as the Technical Office Head from 2015 to 2016 in the same institute. He gained further experience working as NANO Tech. Lab Supervisor from 2017 to 2019. Dr. Zahran retained position as the Vice President of ERI until 2019. Since then, he has been appointed as the President of National Authority of Remote Sensing and Space Sciences (NARSS).



Pictured: Dr. Zahran provided insights on how NARSS is working towards space

Highlights:

- NARSS full form is National Authority for Remote Sensing and Space Science
- NARSS has eight division including Space Sciences and Strategic Studies
- Area of work include Remote sensing and GIS application, and Space Science and Space Tech
- Remote sensing areas include mining, groundwater, environment protection and archeology
- Space technology include satellites, build global competitive human and technology capacity
- Chronology of space development in Egypt
 - Launch of Space Research Council in 1998

- Launch EgyptSat-1 in 2007 and operated for 3 years and 7 months
- NARSSCube 1 and 2 launched in 2019
- Egyptian Space Agency (EgSA) launched in 2019
- Satellite Operation Center and Satellite Control Station operational
- Laboratories include:
 - Satellite Assembly and Test Center that can test upto 50kg satellites
 - Space Camera Systems Laboratory
 - Satellite Test Development Laboratory
 - Synchronous Design Center
- Satellite Assembly and Test Center had \$22 million equipment grant from China
- The center could open end of this year (2022) or early next year (2023)
- MisrSat-2 will be first satellite project, costing \$46 million, grant from China
- NexSat experimental satellite's first NexSat-1 has not yet been launched due to covid delays
- Phase wise building from NexSat-1 to NexSat-4 where inhouse capacity is built systematically
- Educational satellite program for universities by EgSA
- Collaboration of 14 private and public universities
- Spread culture of teaching, learning and building space systems for future
- Big impact because many undergraduate students received training and now work at agency
- The project was called National Space Alliance Project which launched two satellites
- Academy of Scientific Research invested 13 million Egyptian pounds, 70% made in Egypt
- Output include inhouse subsystem design including Fault Handling, Communication, Camera
- Egypt will be hosting African Space Agency (ASA)
 - Development of space technology and application in Africa
 - To develop regional corporation
 - Egypt possesses technological know-how to lead Africa in space
 - Welcome to join (if you are from Africa)
- EgSA mission is to the development of space technology to serve humanity
- Near-real, Medium Range and Long Range Targets (2030/40) progressively towards space self-reliance and space exploration to uninhabited planets
- Strategic plan for space program
 - First phase: Infrastructure in testing, laboratories and operations
 - Second phase: Capacity building through CubeSats, university projects, tech transfer
 - Third phase: Localization through inhouse manufacturing capability through partnerships
 - Fourth phase: Use of space technology through mature technology
 - Fifth phase: International cooperation through ASA, China, UAE, Germany, India

Q&A

Samuel Ndayizeye:

What would be the advice for countries that are looking for ways to develop their space sectors? What are one or two emphasis which you may have for those countries to find a way to develop their space sectors?

Dr. Argoun:

I can give a brief answer to this. Somebody once asked President of Malaysia of that time "what is your advice to other countries so that they can go on a track like Malaysia?" And his answer was, look at how other countries did before you and do as they did. Malaysia copied Japan in several aspects. Education and so on. And that's what we should do. Go look around you, find somebody who is close and do it, repeat it. There are many countries in Africa and Asia who have successfully done space. My advice is to go to a medium advanced country, not an advanced one. The advanced one will not give you very good technology.

Dr. Zahran:

I am confirming what Dr. Argoun said, for African Space Agency, any country from Africa can come and learn how space program is launched. We have to deliver space technology to them and we have this capacity. We have to as one continent, support each other. We have the experience through EgyptSat-1 that was cooperated with Ukraine. We have this technology, we have the documents, we have engineering models. And of course, we have expertise. Most of the people trained in the project are now working as leaders. With both NARSS and EgSA we have very good technology transfer, technology building training courses, we have laboratories. We have valuable infrastructure, at least 15 years through Space City and EgSA, to help any countries initiating their own space program.

Last comment: This is not the last communication. This is a good chance to start communication. If somebody would like to communicate, we are open to extend our help.

4. Announcement and Acknowledgement

Rei Kawashima, UNISEC-Global



Pictured: Rei Kawashima-san giving updates to UNISEC-Global community

- **11th Nano-satellite Symposium Completed**
 - Presentation: October 17, 18, 19 (morning)
 - Pre-MIC 8 workshop during the event
 - Official website: <http://nanosat11th.itu.edu.tr/index.php>
- **Pre-MIC 8 Completed**
 - Presentation at workshop (not contest), October 19, 2022 in Istanbul
 - MIC8 will be held in Japan in Dec 2023 (important dates will be announced soon)
 - Official website: <http://spacemic.net/index8pre.html>
- **8th UNISEC-Global Meeting Completed**
 - UNIGLO opening: October 19, 2022 in Istanbul
 - Local chapter presentation and breakout session: October 20, 2022
 - Local chapter empowerment workshop: October 21, 2022
 - All presentation files at official website: <http://www.unisec-global.org/meeting8.html>
- **New Point of Contact (POC), Romania**
 - **Bianca Szasz** received PhD from Kyutech and works in Romania
 - No local chapter yet in Romania
- **Details of J-CUBE opportunity**
 - Special (discounted) launch opportunities (1U-3U) [Almost 1/3rd price]]
 - Collaboration with UNISEC-Japan's university, application deadline: **Dec 28, 2022**
 - Website: <http://unisec.jp/serviceen/j-cube>
- **28th Virtual UNISEC-Global Meeting**
 - December 17, 2022 22:00-00:00 JST time (every third Saturday of every month)
 - Theme: TBD
 - Hosted by **UNISEC-Global Secretariat**
 - Jan 21, 2023 host by UNISEC-Japan
 - Feb 18, 2023 host by UNISEC-Colombia

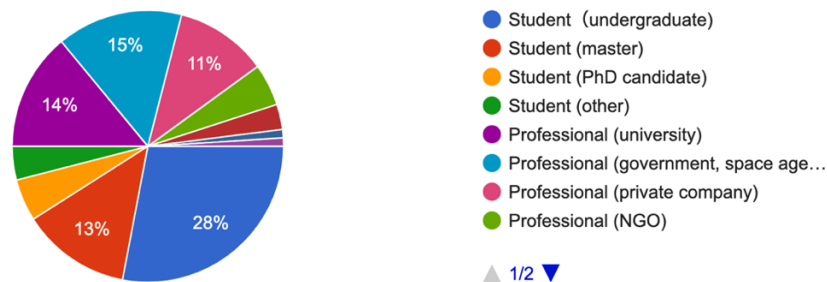
5. Participant Statistics

100 registered participants from 31 countries and regions for the 27th Virtual UNISEC-Global Meeting.

Country/Region	Number of registrations	Country/Region	Number of registrations
Afghanistan	1	Mexico	1
Argentina/Córdoba	2	Nepal	3
Australia	1	Netherlands	1
Bangladesh	3	Pakistan	2
Bulgaria	1	Philippines	12
Cambodia	1	Russia	1
Canada	1	Rwanda	2
Germany	1	South Africa	2
Egypt	26	Tunisia	1
Ghana	1	Turkey	2
India	7	UAE	1
Italy	1	Uganda	1
Japan	14	United Kingdom	2
Kazakhstan	2	United States of America	1
Kenya	4	Zimbabwe	1
Malaysia	1		

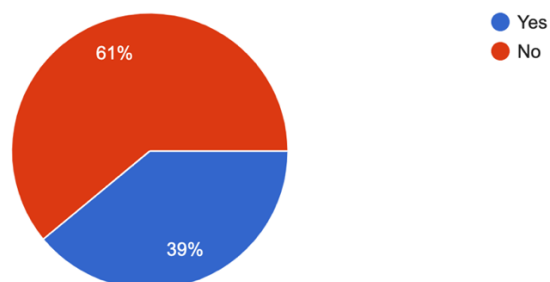
Student or professional?

100 responses



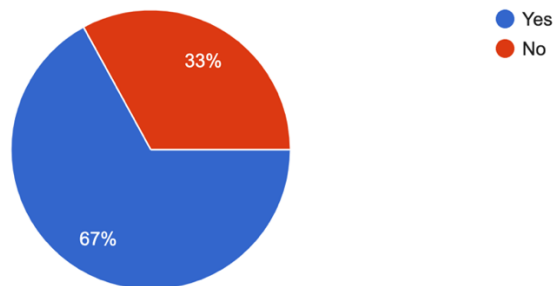
Are you familiar with space education and projects in Egypt?

100 responses



Have you participated in the UNISEC-Global Meeting previously?

100 responses



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Thank you