

Space Studies Program 2016

RETROSPECTIVE

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TECHNION
Israel Institute
of Technology



SPACE STUDIES PROGRAM (SSP)

- ISU was founded in 1987
- ISU is a diverse international student body learning from experienced **international** faculty to gain an **interdisciplinary** understanding of space in an **intercultural** learning environment, **3-i's**
- ISU programs provide a competitive edge for careers in space-related fields with 85% of ISU alumni working in the space sector
- Membership in an international network of leading space experts & professionals



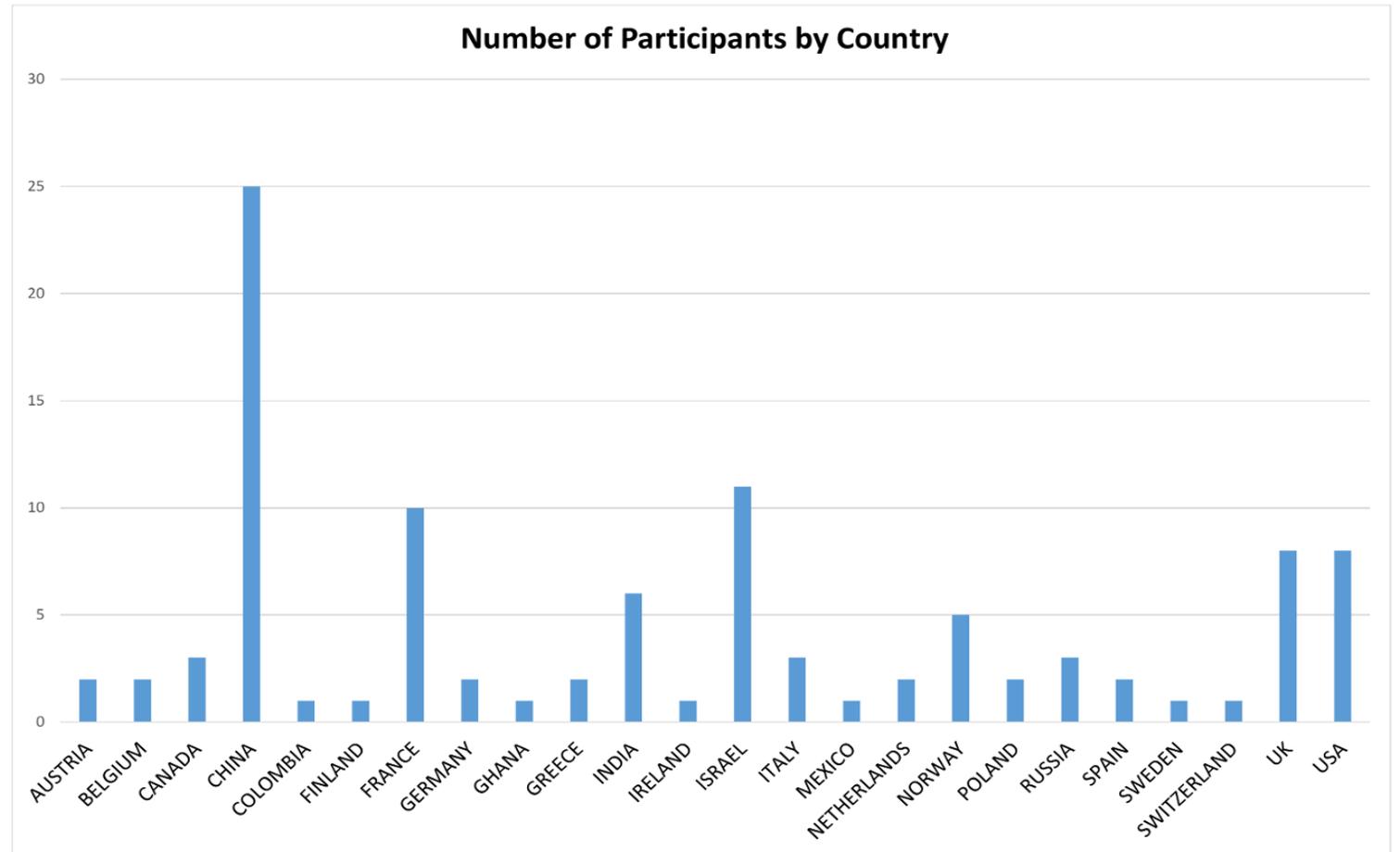
Faculty and Staff

- SSP invites approximately 150 lecturers and experts from around the world, which include top scientists, engineers, astronauts, space agency heads, artists, entrepreneurs, and managers from private industry, space agencies, non-profits, universities and research institutions.
- SSP faculty and distinguished lecturers included:
 - **Donald James** - NASA Associate Administrator for Education
 - **Buzz Aldrin** - Apollo 11 astronaut and ISU chancellor
 - **Jessica Meir**- NASA Astronaut
 - **Jeffrey Hoffman**- NASA Astronaut
 - **Avi Blasberger** - Israel Space Agency Director General
 - **Rona Ramon** - Head of the Ramon Foundation



Participants

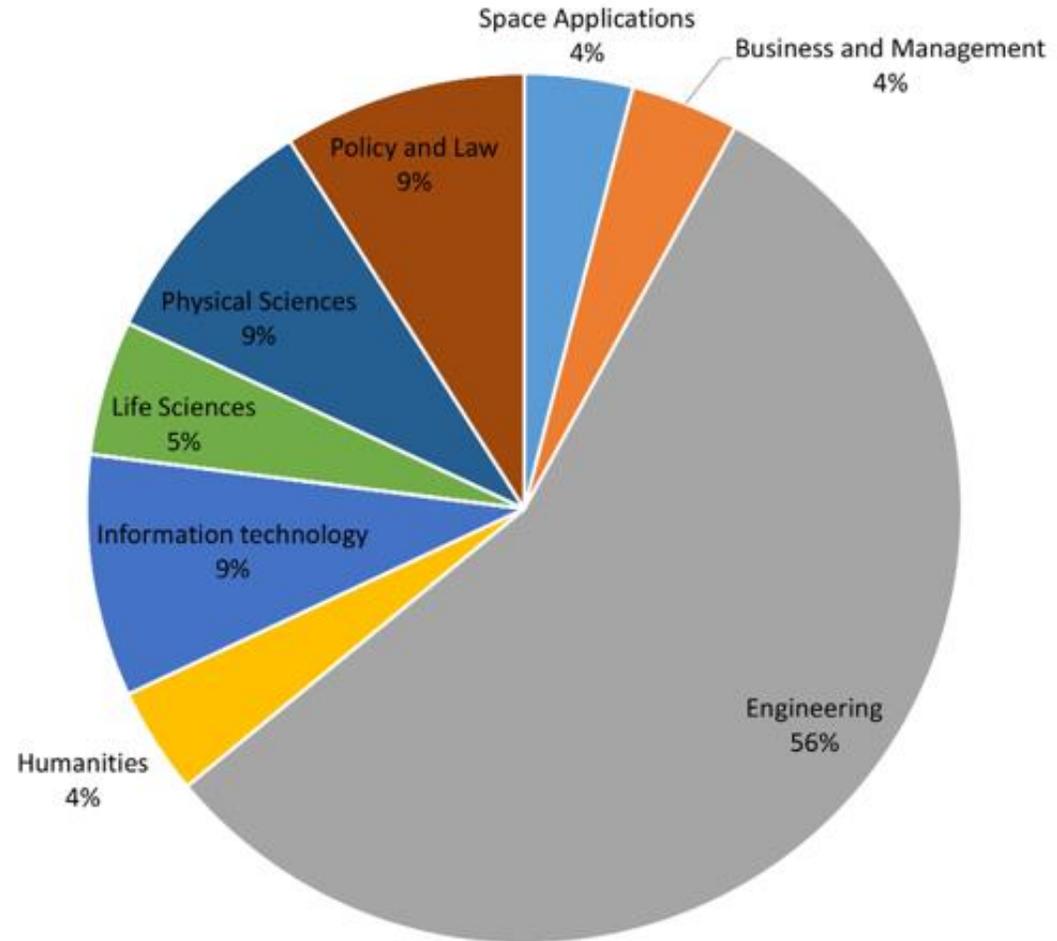
- 103 participants attended the program this year
- representing 23 countries.



Participants

Most had educational background in engineering, with the rest having degrees in a variety of business, science and social science disciplines.

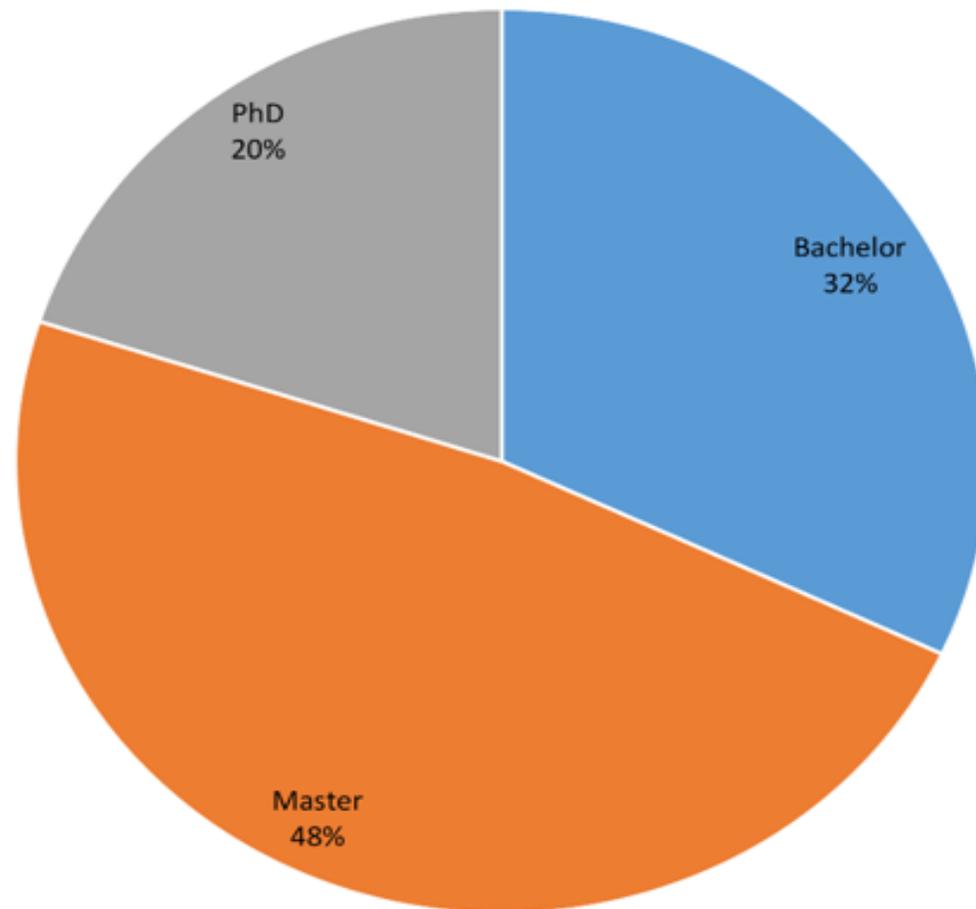
Educational Background of Participants



Participants

Most had a Master's degree

Educational Level of Participants



CURRICULUM

There are three phases to SSP:



CORE LECTURES

- 59 lectures were given by experts with different backgrounds from all over the world.
- The lectures covered the fundamentals of all major topics of space and focused on Applications (APP), Engineering (ENG), Management and Business (MGB), Policy, Economics and Law (PEL), Sciences (SCI), Humanities (HUM), and Human Performance in Space (HPS).



DEPARTMENTS

SPACE APPLICATIONS

SPACE HUMANITIES

SPACE ENGINEERING

SPACE MANAGEMENT AND BUSINESS

HUMAN PERFORMANCE IN SPACE

SPACE POLICY, ECONOMICS AND LAW

SPACE SCIENCES



TEAM PROJECTS

ARTIFICIAL GRAVITY

IMPLICATIONS OF NEW DISCOVERIES IN MARTIAN ENVIRONMENT

SPACE BIG DATA

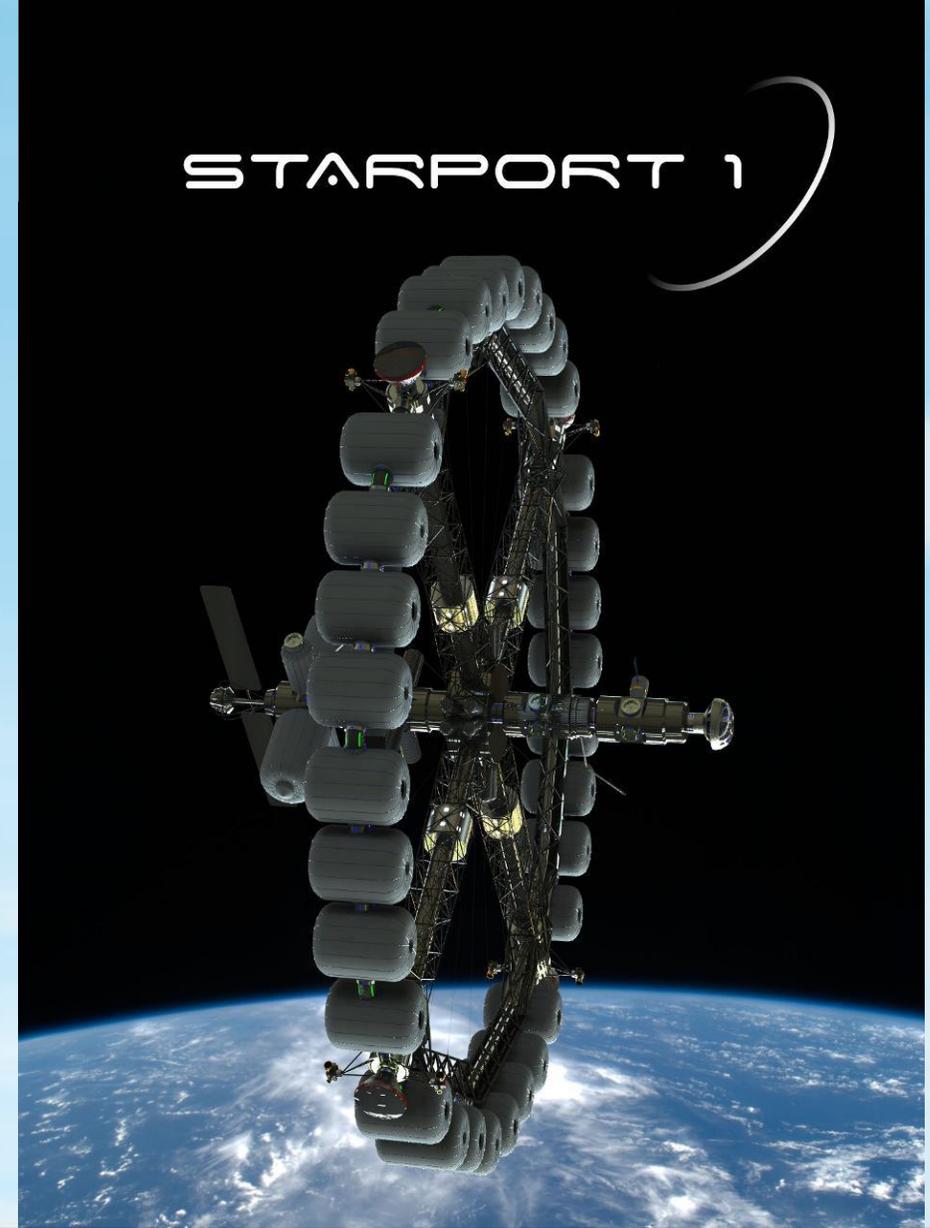


ARTIFICIAL GRAVITY

Chair: Remco Timmermans **Co-Chair:** Francois Spiero

TA: Jaroslaw Jaworsky

The aim of this project was to conduct a conceptual design study for a commercial space station on behalf of Axiom Space. This station contains a section with artificial gravity and another with a microgravity environment, both of which shall be fully operational by 2040. The station will allow people to live in an Earth-like environment, while enabling in-orbit manufacturing, scientific research and space tourism. Areas of analysis focused primarily on the engineering challenges, and legal implications.



STARPORT 1



IMPLICATIONS OF NEW DISCOVERIES IN MARTIAN ENVIRONMENT

Chair: Jacob Cohen **TA:** Josh Richards

The mission of the aMARTE Team was to review the most recent discoveries on the Martian environment, evaluate the different implications for human Mars exploration, and produce a comprehensive set of scientific and technological recommendations for future development. With the generous support of the NASA Mars Exploration Program, the aMARTE Team specifically investigated the findings on Mars related to flowing water, perchlorates, nitrates, methane and radiation; produced a significant number of recommendations for future human exploration of Mars; and produced scientific and technological directions.



SPACE BIG DATA

Chair: Barak Fishbain **Associate Chair:** Daniel Brack

TA: Sanja Šćepanović

Images of the Earth and stars, worldwide communication, weather prediction and route planning at the palm of your hand are just some of the examples of space big data (SBD) and its applications. The team's mission was to define SBD, map the activities of stakeholders, identify challenges they face, suggest potential solutions, and outline recommendations to promote growth of the SBD sector. After a study of activities and challenges of the stakeholders involved in SBD, core challenges that require coordination across the whole sector are identified: state of the SBD market, engineering, interoperability and openness versus privacy. Finally, potential solutions and recommendations are provided to serve as a starting point for building a roadmap to success for the SBD sector.



SPACE BIG DATA

OVERCOMING BARRIERS, CREATING VALUE

FINAL REPORT
SSP2016



WORKSHOPS

The workshops cover all seven disciplinary areas which the departments represent, providing participants with the opportunity to branch out and/or specialize further in a variety of topics of their choosing. This year there were 3 mandatory fundamental workshops and 19 elective workshops.



PROFESSIONAL VISITS

Israel Aerospace Industries MBT Space Division-

The prime contractor for
all Israeli space programs
and the largest satellite
manufacturer in Israel.



PROFESSIONAL VISITS

Moona –

Young Entrepreneurs
Mentoring Clinic- The space
incubator called Moona and
interacted with local kids to
inspire and coach them.



PROFESSIONAL VISITS

Wise Observatory-

Ramon Crater in the Negev Desert. The astronomical observatory is owned and operated by Tel-Aviv University, and is the only professional astronomical observatory in Israel.

Scientific Center for Technological Education -

Located in the middle of the Israeli Negev desert, the participants met with high school children currently building a satellite.

Ben-Gurion University of the Negev –

Participants investigated how remote sensing techniques can be connected with ground truth findings.

- Many more professional visits:
- Israel Oceanographic and Limnologic Research Institute
 - Gilat Satellite Networks Ltd.
 - Elbit Systems
 - Asher Space Research Institute
 - ORBIT Communication Systems Ltd.



SSP class of 2016 with ISU chancellor – Dr. Buzz Aldrin

First Space Selfie



PUBLIC EVENTS & OUTREACH

A variety of evening events and talks were given by space experts and distinguished guests during SSP that provided insights from their personal experience. They helped educate the participants and the public on the current state of the space industry, future of spaceflight, and the history of space exploration.



Opening Ceremony

In ISU tradition, the participants entered the ceremony behind their respective flags. Later, some distinguished speakers addressed the audience:

- ISU President Walter Peeters
- Technion President, Prof. Peretz Lavie
- Mayor of Haifa, Yona Yahav
- DG of the Ministry of STS, Peretz Vazan
- Rona Ramon, head of Ramon Foundation
- Special greeting from the ISS



"The visionary speakers in combination with talented student musicians from Technion presenting local culture, made the evening an unforgettable beginning to an unforgettable summer"



The Hubble Space Telescope: A Quarter Century of Science

Jeff Hoffman

The first public event at the Technion gathered both participants, staff, and the local community in a **crowded auditorium**.

Professor Hoffman of aeronautics and astronautics at MIT and NASA astronaut and astronomer, presented the initial technical problems the Hubble Space Telescope faced.



International Astronauts Panel

The SSP16 astronaut panel spanned several generations of the human space exploration era, with astronauts who have flown on the Space Shuttle, the International Space Station and potentially beyond.

The three astronauts on the panel were:

- NASA Astronaut **Jeff Hoffman**
- NASA Astronaut, ISU alumna **Jessica Meir**
- Italian ESA Astronaut **Paolo Nespoli**



Through a very successful webcast



SpaceUp Haifa

The first SpaceUp Unconference held in the Middle East!

The Technion Faculty of Aerospace Engineering opened its doors to anyone willing to share his or her vision about space. SpaceUp Haifa aimed at being a new open discussion and idea generation platform for the region's space community.



Israel In Space Panel

Discussing the current status of Israel's position in space as well as future goals, niches and leadership opportunities.

The panelists were:

- **Avi Blasberger**, Israel Space Agency Director General
- **Amnon Harari**, Director of Space Program Office, Defense R&D, Israel Ministry of Defense
- **Opher Doran**, Director General, MBT-Space, Israel Aerospace Industries
- **Prof. Pini Gurfil**, Director of Asher Space Research Institute, Technion
- **Ofer Lapid**, Space Entrepreneur, SpaceNest, and ISU Board of Trustees member



Distinguished Lecture by Dr. Buzz Aldrin

47 years later, Aldrin,

- ISU's Chancellor
- Apollo 11 moonwalk

shared his vision for establishing a permanent human presence on Mars.



Lego Robotic Competition

- The robotics competition saw participants, assisted by robotics experts, design and build autonomous robots to simulate planetary exploration.
- Watched by staff, participants and the public of all ages,
- Six teams competed in the robotics obstacle yard to collect 'stones' that simulated interesting geological formations.



Space Startup Competition

- Coming to the StartUp Nation, ISU conducted its first ever Space Startup Competition during SSP16.
- Over the course of four weeks, several activities were held for aspiring entrepreneurs including an idea match-making event, a startup weekend with workshops provided by volunteer mentors, and a final pitch competition.
- The winning SSP16 participant team of Kartik Kumar and Mitchell Scher received a **cash prize of \$5,000** provided by the Heinline Prize Trust for excellence in Space Commerce.



The Human Side of the Columbia Mission

In a moving presentation, individuals who were personally close to the Space Shuttle Columbia accident shared their experiences. **Rona Ramon** and **Jonathan Clark** both lost their spouses in the accident, and **Doug Hamilton** and **John Connolly** shared their experiences as NASA employees who served on the 2003 Space Shuttle Columbia accident response team.



"No eyes remained dry in the audience"



Rocket Launch

For weeks, five participant teams and one staff team labored to design and build a model rocket capable of carrying a fragile payload to the distance of 300 m and bringing it back safely.

Model Rockets were launched at Kibbutz Galed, with the general public present to watch some spectacular successes.



A night watchman's journey

The last evening lecture was given by **David Levy**, an internationally renowned Canadian astronomer who is celebrating 50 years of searching the sky for comets and asteroids. Dr. Levy has discovered 21 comets, eight of them using his own backyard telescopes. His discovery of Shoemaker at the Palomar Observatory in California, produced the most spectacular explosions ever witnessed in the solar system.



Closing Ceremony

The SSP16 closing ceremony at Madatech Haifa. Before the closing reception, the museum was open exclusively for ISU, and the participants were guided through science and space exhibits.

"With tears and smiles, the speech from the class speaker, the certificate ceremony, memorable entertainment and visionary speakers, the program ended with a hyperspectral range of feelings"



Other PUBLIC EVENTS & OUTREACH Events

- Space Entrepreneur Panel moderated by **Chris Stott**
- Space Education Panel moderated by **Donald James, NASA VP for Education**
- Arthur C. Clarke Panel: Where Space Meets Popular Culture moderated by **Chris Welch**
- Breakthrough Initiative with **Dr. Simon "Pete" Worden**





CULTURE NIGHTS

Wednesday nights at SSP16 were dedicated to the participants, allowing each country to share insights about their nation and culture. Highly relevant in today's globalized world, these nights are a way of understanding each other and forming friendships across borders.



SSP16 Social Events

SPORTS ACTIVITIES

Although space is the magnet that brings everyone together, it is not the only uniting factor at the SSP. International teams of participants and staff bonded over basketball, ping pong, dancing, Krav Maga, Matkot and alumni football/soccer tournaments. The city of Haifa and its surroundings afforded plenty of opportunities for group hiking, rafting, swimming and skydiving.

SPACE MASQUERADE

Space masquerade is an annual SSP gathering where the participants can let out their inner space geeks. It was held in conjunction with the ISU alumni conference, and participants could network with alumni from various backgrounds and locations.



Social Events

ISRAEL NATURE AND HERITAGE TOUR

For the first time in SSP's history, the local organizing team put together an optional two-day tour around Israel which gave the participants the opportunity to experience the best of the best of Israel's rich culture, history and nature.

The highly successful tour became a welcomed break in an intense program, and gave the participants a taste of Jerusalem, Masada, the Dead Sea and the Bedouin culture. The tour coincided with the observation of a meteor shower, which looked extra spectacular from the Judean desert and connected the participants with space in a unique way.



Social Media

- Utilizing a number of platforms such as Twitter, Facebook, Instagram, SSP blog and Youtube, information on the SSP and its activities were brought to people on an international scale.
- Special hashtags were used to measure the social media impact of the SSP activities and to publicize the collaborations.
- News articles and television interviews were carried out both a domestic and international scale that highlighted the international interest in the space sector.

"This year, the SSP run an effective break record social media campaign"



SPONSORS

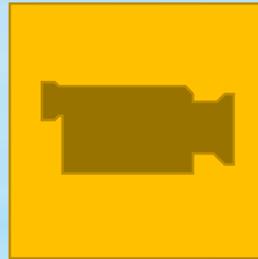
ISU SSP16 has been supported at the local level by the following organizations:

- Israel Space Agency (ISA) and Ministry of Science, Technology and Space of Israel
- City of Haifa
- Adelis Foundation
- Israel Aerospace Industries Ltd.
- Rafael Advanced Defense Systems Ltd.
- Elbit Systems Ltd.
- El Al Israel Airlines Ltd.
- ImageSat International



PARTICIPANTS RETROSPECTIVE

SSP16: The Summary of an OUT-OF-THIS-WORLD Summer in ISRAEL





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