

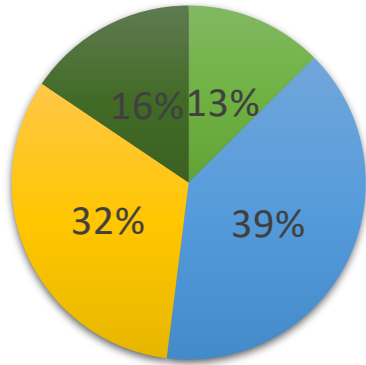


Webinar Series

Focused on Access to Space for All



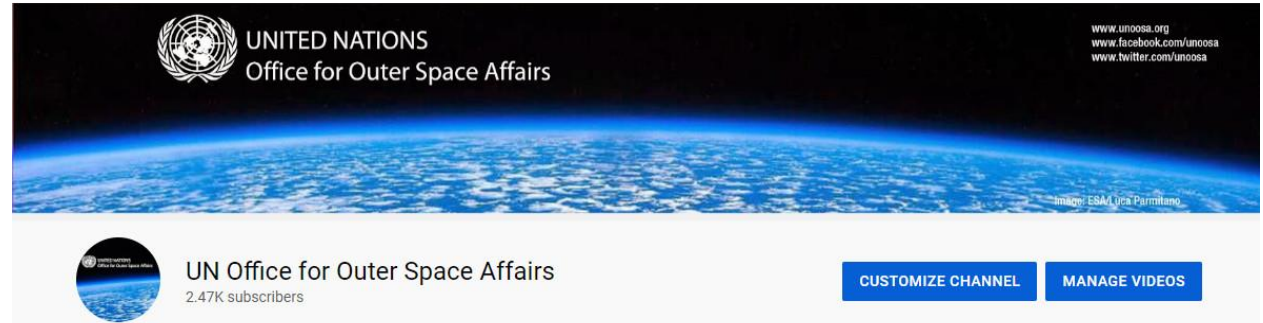
VIEWS ON YOUTUBE CHANNEL



- Hands-on opportunities
- KiboCUBE Academy
- Hypergravity/Microgravity Webinars
- Others

Link:

<https://www.youtube.com/c/UNOfficeforOuterSpaceAffairs>



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- **Achievable entry point** to acquire knowledge and skills through conducting various experiments in many different scientific fields
 - **Beneficial first step to start capacity-building** for space activities



Webinar Series

Conducting R&D in Hypergravity/Microgravity



In partnership with:



Gravity has (mainly) impact on:

- Weight
- Hydrostatic Pressure
- Convection
- Buoyancy
- Sedimentation

NB: Spaceflight holds more variables: e.g. isolation, radiation, atmosphere (pressure, gas composition), stress, training,


Space Biology and Altered Gravity

Why study biological effects of microgravity?

- All life on earth have evolved in the Earth's gravitational field. We have little knowledge of what happens to organisms in the apparent absence of this force.
 - Studies in microgravity will tell us how biological systems acclimate and adapt to this new environment
 - Studies in microgravity will also reveal how gravity has driven evolution and continues to influence biological process on Earth.




Why study biological effects of hypergravity?

- During space flight, living systems are not only exposed to microgravity, but also experience around 3 g during launch and 3+ g more landing.
- Chronic hypergravity models can be used complement and predict microgravity-associated changes (i.e., the shift from 2 g to 1 g may recapitulate aspects of the shift from 1 g or microgravity).




Access to Space for All

Series of webinars on conducting R&D in Hypergravity/Microgravity

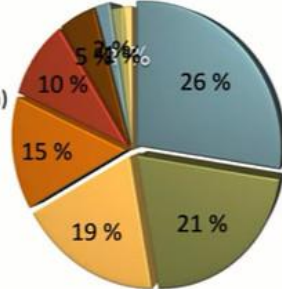

Bremen Drop Tower

RESEARCH AREAS

- Combustion
- Fundamental Physics
- Fluid Dynamics
- Astrophysics (Planet Formation)
- Materials Sciences
- Biology
- Hardware Tests
- Student Programs
- Chemistry

FACTS AND FIGURES

- start of operation: September 1990
- number of drops / catapult launches: over 9000 performed
- number of drop tower projects: over 230 assisted
- framework contractor of

BREMEN DROP TOWER

Link:

https://www.unoosa.org/oosa/en/ourwork/access2space4all/HMTrack_Webinars.html#Tag6

- 
- A satellite in space, viewed from a low angle, showing its solar panels and various instruments. The satellite is white and metallic, with a complex structure of panels and components. The background is a dark, starry space.
- CubeSats offer a **large variety of applications**
 - CubeSat development can be the first step for a country in **the acquisition of the skills and know-how needed to develop a space programme**
 - CubeSats are **affordable to develop and represent an achievable entry point** to space activities.



Webinar Series

KiboCUBE Academy

In partnership with:



KiboCUBE Academy
Season 2
Live Session #3

Introduction of
CubeSat Projects and
Online Tour of
Environmental Test
Facility

18 November 2021



KiboCUBE Academy
Season 2
On-demand
Pre-Recorded Lecture#8

Subsystem Lecture for
CubeSat:
Power Control System

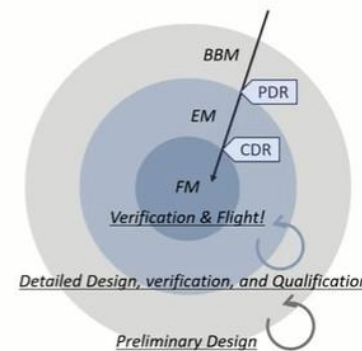


1. Introduction to CubeSat System Engineering

1.6. Satellite System Design

- Iterative design refinement and verification process
- Satellite system sizing and budget control through trade-offs
 - Mass Budget (Mass Property)
 - Power Budget (Power consumption, generation, and storage)
 - Size Budget
 - Communication Budget
 - Data Storage Budget
 - Computational Budget
 - Operation Time Budget
 - Financial Budget
 - Schedule Budget

Satellite system design is an art!



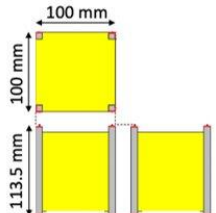
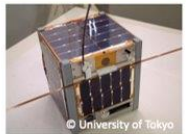
2. Introduction to CubeSat Systems

CubeSat Standards

- A 1U CubeSat is a 10 cm cube with a mass of up to 1.33kg.

Some standards are available:

- CubeSat Design Specification rev.13
- California Polytechnic State University (2014/2/20)
(<https://www.cubesat.org/>)
- CubeSat System Interface Definition version 1.0
- UNISEC Europe (2017/8/24)
(<http://unisec-europe.eu/wordpress/wp-content/uploads/CubeSat-Subsystem-Interface-Standard-V2.0.pdf>)
- JEM* Payload Accommodation Handbook Vol.8 D (Japanese)
- JAXA (2020/5/25)
(<https://iss.jaxa.jp/kibouser/provide/j-ssod/#sw-library>)
(<https://iss.jaxa.jp/kibouser/library/item/jx-esp-8d.pdf>)
- JEM Payload Accommodation Handbook Vol.8 C (English)
- JAXA (2018/11)
(https://iss.jaxa.jp/kibouser/library/item/jx-esp-8c_en.pdf)
rev. D (English) is to be released soon.
- * Japanese Experiment Module (JEM) = Kibo



Link:

https://www.unoosa.org/oosa/en/ourwork/access2space4all/SatDevTrack_Webinars.html#Tag1





Interview Series

AccSpace4All x Sustainable Development Goals



SPACE4SDGS

SUSTAINABLE DEVELOPMENT GOALS



Bartolomeo partner & awardee:

https://www.unoosa.org/documents/pdf/Access2Space4All/AccSpace4AllxSDGsInterview/AccSpace4All_x_SDGs_Interview_ClimCam_final.pdf





Interview Series

Stories of Awardees



DropTES Awardee:

Universidad Catolica Boliviana

https://www.unoosa.org/documents/pdf/psa/hsti/DropTES/2020_Interview_BolivianTeam_DropTES.pdf



The Bolivian team winners of the DropTES research fellowship: "We are creating a new 3D printing technique for space exploration"

Interview conducted on 10 September 2020

Institution:



UNIVERSIDAD CATÓLICA BOLIVIANA LA PAZ

Centro de investigación, desarrollo e innovación en Ingeniería Mecatrónica

Team leader:

MSc. Fabio Diaz Palacios

Team members:

Eng. Miguel Clavijo Quispe

Eng. Khalil Nallar Camacho

Eng. Jhon Ordoñez Ingali

MSc. Gabriel Rojas Silva

Eng. Guillermo Sahonero Alvarez

Background

The United Nations Office for Outer Space Affairs, in partnership with the Center of Applied Space Technology and Microgravity (ZARM) and the German Aerospace Center (DLR), offer the Drop Tower Experiment Series (DropTES) as one of the opportunities under UNOOSA's Access to Space 4 All Initiative. DropTES allows selected teams to advance their research work by performing experiments in microgravity conditions at the ZARM facilities in the Bremen Drop Tower in Germany. This tower is a ground-based laboratory with a 146 meters high drop tube that enables short microgravity experiments in a variety of fields, such as fluid physics, combustion, thermodynamics, material science and biotechnology.

KiboCUBE Awardee:

Mauritius Research and Innovation Council

https://www.unoosa.org/documents/pdf/psa/access2space4all/KiboCUBE/3rdRound/Interview_Article_MRIC_20210811_FINAL.pdf



Mauritius's Big Step to becoming a Spacefaring Nation:

The story of MIR-SAT 1

Interview conducted on 11 August 2021

Institution:



Interviewee: Vickram Bissonauth, Faraaz Shamutally and Ziyaad Soreefan (Mauritius Research Innovation Council)

Background:

The United Nations Office for Outer Space Affairs (UNOOSA), in partnership with Japan Aerospace Exploration Agency (JAXA) offers the UN/Japan Cooperation Programme on CubeSat Deployment from the International Space Station (ISS) Japanese Experiment Module (Kibo) "KiboCUBE". The programme aims to provide educational or research institutions from developing countries with the opportunity to deploy CubeSats from the International Space Station Japanese Experiment Module "Kibo". The collaboration between UNOOSA and JAXA initiated in 2015 and has been the cornerstone of the UNOOSA Access to Space for All Initiative. Thanks to KiboCUBE, three countries Kenya, Guatemala and Mauritius have deployed their satellites into space.

Mauritius Research and Innovation Council (MRIC) was selected as the 3rd round awardee of KiboCUBE in 2018. The first satellite of the Republic of Mauritius, MIR-SAT 1 was successfully deployed into space on 22 June 2021 and is now orbiting the Earth.



Team MRIC (from left; Mr. Faraaz Shamutally, Mr. Ziyaad Soreefan, Dr. Vickram Bissonauth, Mr. Koushul Narrain and Mr. Kiran Taloree) ©MRIC

PNST Selected Student:

Fatima Duran from El Salvador

https://www.unoosa.org/documents/pdf/psa/bsti/fellowship/2022/Interview_Article_PNST2021_Fatima_Duran.pdf



How satellite technology has opened new opportunities:

From El Salvador to the world

Interview conducted on 25 August 2021

Institution:



Interviewee: Fatima Duran, Master's Student at Kyushu Institute of Technology from the Republic of El Salvador

Background:

The United Nations Office for Outer Space Affairs (UNOOSA), in partnership with the Government of Japan and the Kyushu Institute of Technology (Kyutech) offers the UN/Japan Long-term Fellowship Programme Post-graduate student on Nano-Satellite Technologies (PNST).

The programme provides 3 masters and doctoral students from developing countries the opportunity to enroll in the Kyutech Space Engineering International Course (SEIC) to study nano-satellite systems. The chosen candidates receive a grant from the Ministry of Education, Culture, Sports, Science and Technology of Japan for the duration of their fellowship, covering housing, food, local transportation, and other expenses. In addition, each candidate is provided an economy class air ticket between an international airport in the country of his/her nationality and Narita or Fukuoka International Airport. Fees for matriculation, tuition and entrance examination are covered by Kyutech.



Fatima on her graduation day as an aerospace engineer from Pusan National University, South Korea ©Fatima Duran

Fatima is a first-year master student in the programme since fall of 2020. Prior to receiving the PNST fellowship, she obtained her bachelor's degree in aerospace engineering at Pusan University of South Korea and an associate degree in aeronautical maintenance technician in Universidad Don Bosco, El Salvador. She is also the National Point of Contact of the Space Generation Advisory Council (SGAC) of El Salvador and an active member of the El Salvador Aerospace Institute.

In this interview, we spoke with her about her experience at Kyutech.