

# SMALL SATELLITE DEVELOPER WORKSHOP 2013

8-13 JULY, 2013,  
INDIAN INSTITUTE OF INFORMATION TECHNOLOGY, DESIGN & MANUFACTURING,  
KANCHEEPURAM, INDIA

DHRUVA SPACE | NATIONAL INSTITUTE OF AMATEUR RADIO | IIIT D & M



FEW OF THE PARTICIPANTS WHO  
RECEIVED THE BERLIN SPACE  
TECHNOLOGY SCHOLARSHIP TO  
ATTEND THE WORKSHOP.

## A stage to Learn, Build, Share and Inspire

Small Satellite Developer Workshop 2013 was organized by Dhruva Space, a Bangalore based Small Satellite and High Altitude Ballooning Start-up, in association with National Institute of Amateur Radio, Hyderabad. The workshop was hosted at the campus of the Indian Institute of Information Technology, Design and Manufacturing, Kancheepuram, between 8-13 July, 2013. There were 25 participants with varied backgrounds but with a common interest in Small Satellite Technology.

The workshop was conducted to provide a basic understanding of Small Satellite development and usage of ballooning for commercial applications. The lecture sessions was combined with hands-on hardware development sessions. The participants fabricated and tested a Software Defined Receiver in the presence of research engineers from the industry giving them a practical exposure. Sessions by Small Satellite experts with engineering models on display helped participants

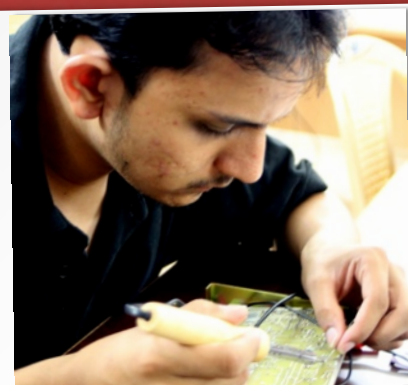
to grasp the challenges in designing and developing the subsystems of the small satellites. To understand space based applications Amateur Radio workshop was conducted to give participants a live example of usage of communications during disaster management. The addressing of satellite experts and small satellite companies across the globe provided a holistic purview of the current technological situation which was in-turn used during the team design project.



INTERACTION WITH EXPERTS

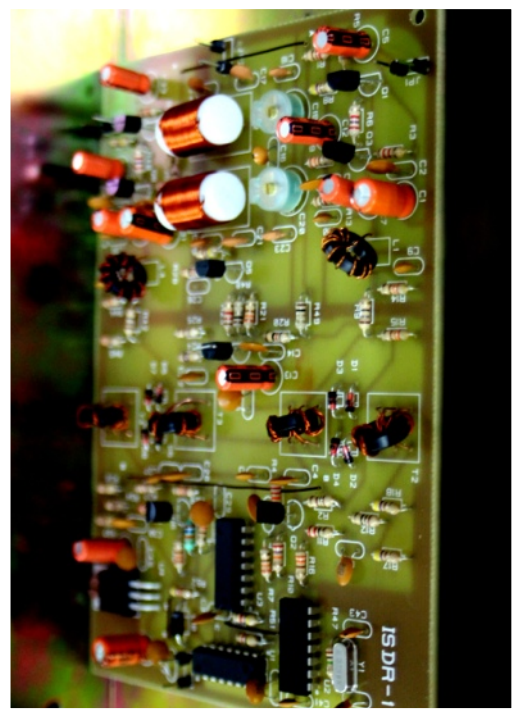


TEAM BASED PROJECTS



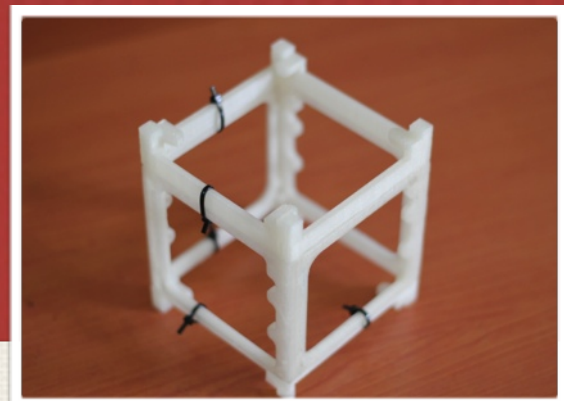
HANDS ON TRAINING

# GETTING 'HANDS ON' IN SPACE



RESEARCH ENGINEERS OF **MICRONOVA IMPEX**, BANGALORE, PROVIDED THE PARTICIPANTS A HARDWARE REALIZATION EXPERIENCE WITH THE DEVELOPMENT OF A SOFTWARE DEFINED RECEIVER (SDR).

THE PARTICIPANTS REALIZED THE HARDWARE OVER TWO DAYS, EVENTUALLY TESTING THE FABRICATION OF THE FABRICATED SDR BOARDS.



**CYCLOID SYSTEMS**, A BANGALORE BASED 3D PRINTING START-UP PRINTED A 1U CUBESAT THAT WAS USED A VERY EFFECTIVELY AS A TEACHING AID AT THE SMALL SATELLITE DEVELOPER WORKSHOP.

THIS IS THE FIRST TIME THAT A CUBESAT HAS BEEN 3D PRINTED IN INDIA AND PROVED THAT 3D PRINTING CAN BE EFFECTIVELY USED IN THE PROCESS OF SATELLITE DEVELOPMENT.



# Testimonials of participants.

Yashodhan says, "This was a unique experience, giving a practical approach to various activities every day. Interactive discussions with mentors abroad and space scientists from Indian organizations touching all aspects of small satellite design. This has given new dimensions to thinking from a novel perspective. I really enjoyed the design and fabrication of SDR (Software Defined Radio) and the guidance from organizers during the group project. A good initiative for development of the small satellite industry in India."

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## THE VARIETY OF THE PARTICIPANTS WITHIN THE WORKSHOP BROUGHT DIFFERENT VANTAGE POINTS IN LEARNING A CONCEPT.

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Shyam says, "This was a nice opportunity for students to interact with professionals in the space and satellite industries around the world. The hands-on sessions with hardware was new and provided much more exposure than the usual lecturing in such themed workshops. I find this an excellent platform for like-minded people to come together and brainstorm."

Alisha tell us, "The contacts to the space professionals via the interactive sessions was made easier by this platform. A lateral approach to design processes of small satellites, engineering models of nano-satellites exhibited during the workshop helped in understanding the design of the satellite simple. This was the first time I had a hands-on experience with electronic hardware which is not usual for computer science students. Anomalies to be taken care of in satellite design was explained during the workshop shall help us in our own satellite project which is currently underway."



YASHODHAN  
VIVEK

A POSTGRADUATE AND RESEARCHER IN SATELLITE COMMUNICATION. HE HAS OVER 3 YEARS OF EXPERIENCE IN SMALL SATELLITE DESIGNS AND EXTENSIVE SPACE RESEARCH PROGRAMS.



SYAM SUJITH

HE IS PURSUING MASTERS DEGREE IN REMOTE SENSING AND WIRELESS SENSOR NETWORKS AT AMRITA UNIVERSITY WITH PREVIOUS EXPERIENCE AT NATIONAL AEROSPACE LABORATORIES ON RADAR STUDIES, IMAGE & SIGNAL PROCESSING. HE IS INTERESTED IN SATELLITE TRACKING AND GROUND BASED COMMUNICATION.



ALISHA KOTHARI

AN UNDERGRADUATE STUDENT AT NATIONAL INSTITUTE OF TECHNOLOGY, BHOPAL WITH A MAJOR IN COMPUTER SCIENCE. SHE IS A PART OF THE AZAD-1, THE FIRST STUDENT NANO-SATELLITE PROJECT AT HER UNIVERSITY

# GETTING 'HANDS ON' IN SPACE



**RAM MOHAN SURI**, DIRECTOR OF NATIONAL INSTITUTE OF AMATEUR RADIO, HYDERABAD, CONDUCTED AN EXTENSIVE SESSION ON BASICS OF AMATEUR RADIO WITH DEMONSTRATION OF RADIOS IN PRACTICAL SITUATIONS SUCH AS DISASTER MANAGEMENT.

THE PARTICIPANTS TRACKED A SATELLITE USING A RADIO TO RECORD SOUND CODED DATA AND CONSECUTIVELY DECODED THE DATA TO GET A SATELLITE IMAGE.



**PROF LOGANATHAN**, A FORMER ISRO SCIENTIST AND CURRENT PROJECT DIRECTOR OF SRMSAT AND STUDSAT SHARED HIS EXPERIENCES OF BUILDING SMALL SATELLITES WITH STUDENTS GROUP.

THE PARTICIPANTS COULD TOUCH, FEEL AND EXPERIENCE THE SMALL SATELLITE HARDWARE WHICH WAS SHOWCASED DURING THE SESSION.



## More testimonials to listen...

Aarthi says, "This is a great forum to integrate my knowledge of electronics, instrumentation and space technology. The workshop has the right combination of lectures, interactions with international experts and exposure to hardware which makes this the perfect platform to start a space project."

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TO LEARN ABOUT SMALL SATELLITES BY USING THEIR ENGINEERING MODELS IS A VERY EFFECTIVE APPROACH TO UNDERSTAND SUBSYSTEM DEPENDENCIES.

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Vishal says, "The Small Satellite Developer Workshop is a first of its kind in India which provided a great exposure to such niche technology. It laid a foundation for excellent networking with professionals. I realize that the small satellite developers are highly inter-disciplinary. I wish there would be more workshops that will be conducted by the organizers in the future. It has inspired me to work on space system designs with various organizations across the globe."

Manisha says, "The workshop gave me a good idea on the assembling of a CubeSat and optimizing all the onboard systems for better functionality. My main benefit from the program was the knowledge of marketing in the space industry. The completion of the SDR was my first experience working fabricating electronics. I would definitely recommend young students to join this program as it gives the whole concept of designing, launching and marketing of small sats."



AARTHI RAMESH

A BACHELOR OF ELECTRONICS AND COMMUNICATION ENGINEERING WITH A CURRENT FOCUS ON PURSUING INTENSIVE ASTRONOMICAL RESEARCH. SHE HAS PREVIOUS EXPERIENCE OF WORKING AT THE RAMAN RESEARCH INSTITUTE, BANGALORE.



VISHAL

AN UNDERGRADUATE STUDENT, CURRENTLY IN THE PRE-FINAL YEAR WITH A FOCUS ON MECHANICAL ENGINEERING.. HIS INTEREST IN SPACE TECHNOLOGY IS MAINLY IN THE DOMAIN OF ORBITAL MECHANICS.



MANISHA KUSHWAHA

AN UNDERGRADUATE IN AEROSPACE ENGINEERING FROM MOSCOW AVIATION INSTITUTE, RUSSIA WHO IS ABOUT TO BEGIN THE ERASMUS MUNDUS SPACEMASTER PROGRAM IN EUROPE.

# Global partners of Dhruva Space interact with the participants of the Small Satellite Developer Workshop.

## **Peter Platzer**

CEO,  
NanoSatisfi

The high energy physicist turned Harvard Grad turned entrepreneur talked about ArduSat, an Open Source, Arduino based NanoSatellite, based on the CubeSat standard. It contains a number of Arduino boards and Sensors. With the goal of 'democratize space', ArduSat will provide general public open access to space.

## **Tom Segert**

Director of Business Development,  
Berlin Space Technologies

The German entrepreneur talked about the design of the LEOS small satellite platform of Berlin Space Technologies and the lessons learned from the TUBSAT (TM) microsatellites of the Technical University of Berlin.

## **Jan Hakenberg**

Research Scientist,  
Nanyang Technological University

The Small Satellite Professional who is currently working as a Research Scientist at Nanyang Technological University shared his experiences on the software development for the Singaporean satellite. He provided an extensive overview of the both the On-Board as well as the Ground Station software.

## **Lars Alminde**

Managing Director,  
Gom Space

The Danish entrepreneur talked about the company's heritage in Space derived from of Aalborg University Satellite Program. He described the clientele, projects underway and the future missions in pipeline.

## ONLINE SPEAKERS



PETER PLATZER



TOM SEGERT



JAN HAKENBERG



LARS ALMINDE

THE ONLINE INTERACTIONS WITH THESE SPACE LEADERS INFORMED PARTICIPANTS HAPPENINGS IN THE SMALL SATELLITE ARENA AT THE WORLD STAGE



Participants interact with Small Satellite Experts across the world in the Small Satellite Developer Workshop

# TEAM DESIGN PROJECT



An opportunity to work towards a space project in team.

SPACE PROJECTS ARE MOSTLY DONE WITH BIGGER TEAMS. THE GOAL OF THE TEAM DESIGN PROJECT WAS TO CREATE AN ENVIRONMENT WHICH EMULATES A TYPICAL SPACE MISSION.

The participants of the Small Satellite Developer Workshop were divided into two separate teams, one designing a small satellite and the other designing a ballooning mission. The only constraint given to the participants was to make the nature of their missions commercial which would allow them to think deeper into payloads that would be worthy on flying on a platform which would provide a service or a data product to a user group. Each of the groups contained the adequate number of specialists for distributing subsystems between themselves to realize the mission.

The high altitude balloon group proposed a commercial mission of using tethered ballooning for surveillance

using Commercial Off The Shelf (COTS) cameras such as Go Pro. The team proposed the end user at the state governments that want to monitor mining activities.

The small satellites group proposed a hyperspectral imaging based data products based on a nano-satellite platform that shall render data on effective usage of agricultural land by predicting the crop index, fertility, harvest volume, etc. The proposed end user was the central agriculture department.

Tom Segert, Director of Business Development, Berlin Space Technologies reviewed the presentations of teams and provided an excellent feedback to the participants for improvement.



## Partners

