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OBJECTIVES

The idea of Student Satellite Club is to encourage DBCE Students to build their own satellite and earth station and get hands-on experience in developing different systems for the same. This project will also help them to reduce the gap between industry and academia.

This project will also provide a good platform to faculty members to showcase their technical expertise which can be further tap with consultancy work. Establishing Satellite earth station and satellite making based research is an important aspect of showing research strength to the outside world. In order to develop practical hands on communication, it is essential to study the operation of satellite experiments under realistic conditions. The main objectives of this research proposal are multi-folds as follows:

- • To develop the basic infrastructure for the earth station and student satellite.
- • To integrate simulation, theoretical, and experimental study.
- • To develop mechanical, electrical and power system for the satellite.
- • To impart training to faculty members and students to have hands on training in running earth station and developing satellite system.
- • To develop remote sensing sub systems
- • To develop software module in tracking satellite and analysing the data.
- • To develop telemetry-communication system
- • To develop the visualization tools/modules for satellite system management and analysing.

Source: earth.google.com

Welcome to the New Members

Committee:

Principal Investigators:

Dr. Varsha Turkar, Head ETC, Don Bosco College of Engineering

Prof. Mohini Naik, Assistant Professor ETC, Don Bosco College of Engineering

Prof. Sweta Morajkar, Assistant Professor COMP, Don Bosco College of Engineering

Prof. Ramnath Prabhu, Assistant Professor MECH, Don Bosco College of Engineering

Congratulations to the new students for your selection in student satellite club!!

No	Programme	Name of the student	Designation
1		Neha Joshi	Member
2		Andrea Peixoto	Member
3	ETC	Jefin Sam John	Member
4		Rea Dsouza	Member
5		Oysturn Vas	Member
6	COMP	Alston Dias	Member
7		Lemuel De Cunha	Member
8		Ayisha Shaik	Member
9	MECH	Mohammad Ikram	Member
10	CIVIL	Ravindra Gurav	Member

5 Days Short Term Training Program(STTP) on "5G Wireless Communications and Antenna Design using MATLAB and Simulink"

With an objective of providing an exposure to fundamentals of MATLAB and Simulink for Computation, Signal Processing, Hardware Interfacing, Antenna design and design of 5G Wireless Technologies, a 5 day online short term training programme titled "5G Wireless Communication and Antenna Design using MATLAB and Simulink" was organized on 11 th , 12 th , 17 th , 18 th and 25 th August 2020, by DBCE Student satellite Club-PARIKRAMA in association with IEEE Students branch, technically sponsored by IEEE Bombay Section WIE (Women in Engineering) Affinity Group.

The short-term training was attended by researchers, academicians, industry professionals, and students not only from India but also from all around the world. A total of 817 participants registered, out of which 184 were International participants. The sessions were organized via online platform and the resource persons were: Mr. Suraj Gawande, Senior Application Engineer, Design Tech systems Pvt. Ltd. and Mr. Uvaraj Natarajan, Senior Application Engineer, Wireless Communications at Math Works India Pvt. Ltd.
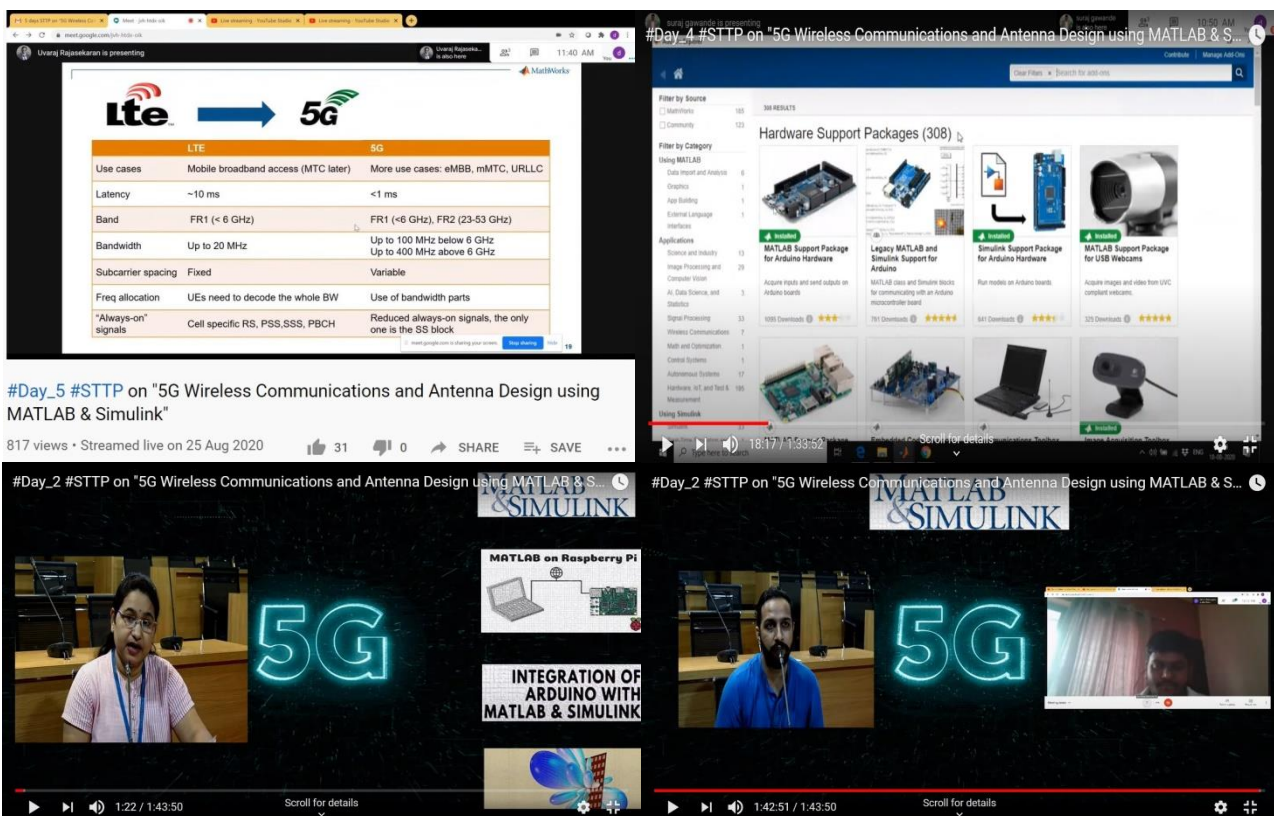
STUDENT'S CORNER

Workshops/Seminars/ Trainings

Workshop on Roadmap to 5G Antenna

Antenna Research Group & Parikrama-student satellite club, conducted workshop on "Roadmap to 5G Antenna "for the second year ETC students, on 25th January 2020. With regards to this, Prof. Mohini N. Naik, Asst. Professor of ETC Engineering, DBCE, took sessions from basics of electromagnetic waves, to 5G antenna design. Session 1 started with basics of electromagnetics, spectrum and applications of each frequency, relation between frequency and dimensions of the designed systems. In Session 2, Prof. Mohini Naik explained various antenna aspects, basics of 1G, 2G, 3G & 4G antenna and introduced 5G antenna design and requirements. At the end of the session, students were given the task of completing mini projects based on the topics provided to them.

Workshop on Ground station development and HAM radio in association with Goa Radio Amateur Society (GRAS)

Student Satellite club, Parikrama in collaboration with Goa Radio Amateur Society (GRAS) Organized hands on workshop on Ground station development and HAM radio. The workshop was held on 7th March 2020 at the Don Bosco College of Engineering campus at Fatorda, Goa. This event was open only for student satellite club members. Prof. Mohini Naik, Principal Investigator & Prof. Sweta Morajkar, CO-PI were the faculty coordinators for the workshop.

The resource person for the workshop was 4 member team from Goa Radio Amateur Society (GRAS). Mr. Amey pandit, Embedded system design engineer & HAM radio operator with call sign VU2YQ, Mr. Mahindra Kannavar, Electronics & Instrumentation Engineer and HAM radio operator (VU2ZMK). Mr. Flavio Raposo is a retired Chemistry Professor from Don Bosco Panajim & HAM radio operator (VU2WPR) and Mr. Vishal Naik, HAM radio operator (VU3BBH)

The main objective of this workshop was to give the students a hands-on experience to receive the satellite data using Software defined radio (SDR).

Mr. Amey pandit took over the session by showing HAM radio Video and its importance. He also explained the how to become a HAM radio operator. He also explained the radio Trans receiver   designed by the team to transmit/receive the signal to the satellite. In the next session, Mr. Mahindra Kannavar, gave a demonstration on walkie talkie phones and explained the difference between HAM & walkie talkie phones.

Mr. Flavio Raposo & Mr. Vishal Naik both being the HAM radio operator gave a brief demo on Software defined radio and signal reception using SDR.Mr.Amey Pandit, showed the Q 10 Satellite reception using simple dish tv antenna.

The last session of the day was wrapped up by taking the feedback of the participants. Vote of thanks was given by Project Manager Ms. Krupashri Koli. As a token of appreciation, Mementos were handed over to Mr. Amey pandit, Mr. Mahindra Kannavar, Mr. Flavio Raposo & Mr. Vishal Naik from Team Goa Radio Amateur Society (GRAS) by, Prof. Mohini Naik, Principal Investigator of Student Satellite club, Parikrama.

PROJECTS

TRACKING OF SATELLITES

NORAD ID: 41783 ℹ
Int'l Code: 2016-059A ℹ
Perigee: 666.9 km ℹ
Apogee: 714.4 km ℹ
Inclination: 98.1 ° ℹ
Period: 98.4 minutes ℹ
Semi major axis: 7061 km ℹ
RCS: Unknown ℹ
Launch date: September 26, 2016
Source: India (IND)
Launch site: SRIHARIKOTA (SRI)

Uplink (MHz):
Downlink (MHz): 437.455
Beacon (MHz): 145.980
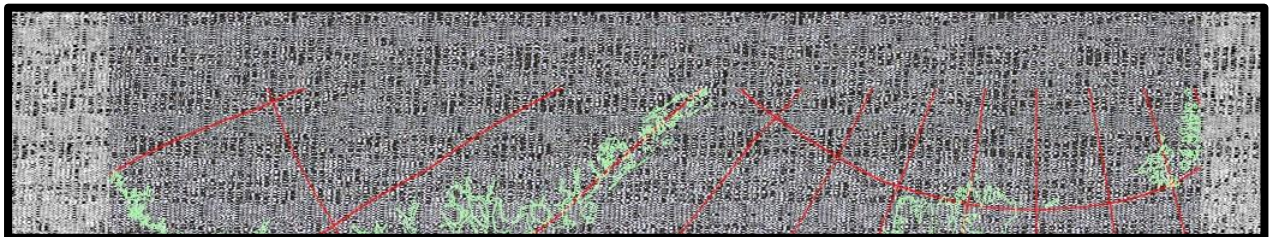Mode: 1200bps AFSK CW
Call sign: PRATHAM
Status: Inactive


Image received at the 1st Attempt

Best Image received

TOOLS USED

- GPredict (http://gpredict.oz9aec.net/)
- N2YO (https://www.n2yo.com)
- Websdr(http://websdr.org/)
- WXtoImg (https://wxtoimgrestored.xyz/)
- APTDecoder

All of the satellites operate on different frequencies, and are thus difficult to track on ground without some complicated mapping and forecasting tools. GPredict uses the Internet to communicate with various databases spread across the globe, where data about the orbits of numerous satellites is constantly updated. This information, called the Kepler lists, is then used by GPredict to find the current location of any satellite, and also to forecast the exact time (approximate to a few seconds) and trajectory at which a given satellite will pass over a certain location. GPredict monitoring NOAA weather satellites, with their trajectories in polar plot.
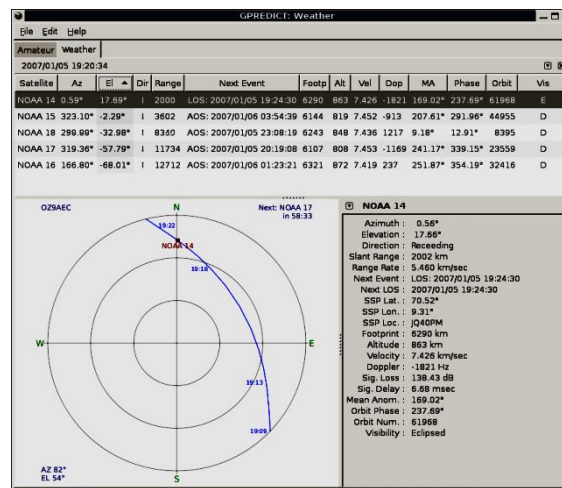
N2YO: is an platform that may be used to predict the pass of an orbiting artificial satellite over a given point on Earth. It provides real time tracking and pass predictions with orbital paths and footprints overlaid on Google Maps. It features an alerting system that automatically notifies users via SMS and/or email before International Space Station crosses the local sky.

WebSDR :Software Defined Radios are expensive for individual use, and thus a very generous group of people from around the world contribute their computers to form a web of SDRs. These SDRs are publicly available free of cost, but do not give quality data, due to distortion by compression and digitization. They basically work by providing an easy to use software interface to calibrate and record the downlink data from any satellite. We have used Web SDR to obtain the data shown in this document.

WXtoImg / APTDecoder: Every satellite in the sky transmits data via radio. The data received by an SDR is audio by default, and sometimes is actually audible. We require to use a Decoderto make sense of the data we record.

Previous attempts involved using an alternate technique, where recording the audio was done separately and later giving it to the decoder.

This however did not yield quite a positive result, which might be due to the fact that audio recordings by certain audio encoders normally try to filter out most of the frequencies that are not within a 6kHz range, which means a loss in quality. Great improvement in quality can be seen when used APTDecoder in live decoding mode, which meant that audio would be directly be channeled to the application rather than being recorded and then decoded by the app. It is concluded from the findings that it would be preferable to use APTDecoder for the Web SDR setup, and keep the decoder to its decoding live, while the recording occurs simultaneously.

This Project was done by COMP students lead Yash Diniz, Tanvi Shetye and Sakshi Kadam under the guidance of Prof. Sweta Morajkar.

Ground Station Development: Wire Antenna

Wire antenna has been designed and fabricated by the ETC students lead by Jefin Sam and Andrea Peixoto under the guidance of Vaishabh Jalmi, Musab Shaikh and Prof. Mohini Naik. This kind of antenna is required for tracking the real satellite data with the help of SDR.

DESIGN OF 3D SATELLITE MODEL
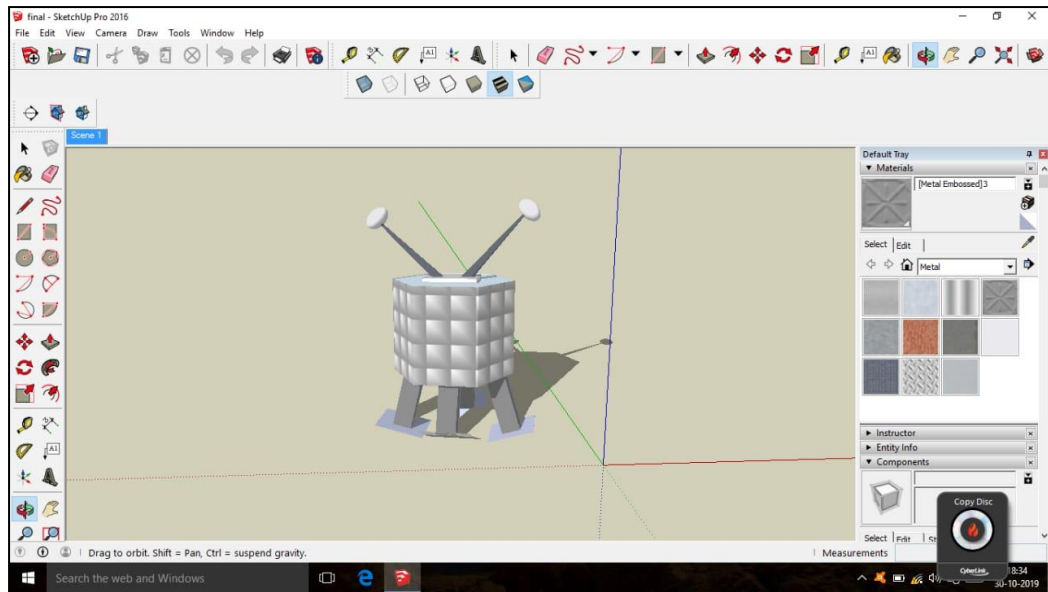
Design of 3D satellite model was done by Mechanical First year student Mr. Lemuel De Cunha using sketup 3D Design software.

EXPERIMENTATION WITH SDR

SDR has a tuning range of 25 MHz to 1750 Mhz. It can be easily connected through the USB and PC software like Seeder and SDR sharp can be used to receive and decode data. It can also be used along with Raspberry Pi. The software package used along with the SDR dongle helps to decode data received via antenna. Different kinds of experiments were carried out using the SDR dongle and antenna set received with the SDR kit.

Community Outreach in association with Atal Tinkering Lab

➢ **Talk on Recent Advancement in wireless Communication**

L.D. Samant Memorial high school, Porvorim Goa organized talk on Recent Advancement in wireless Communication for the students of std. VIII, IX & X on 15/02/2020. In regards to this, Headmaster of the school, Mhalsekant Deshpande invited Prof. Mohini N. Naik, Asst. Professor of ETC Engineering, DBCE, to brief students about wireless communication. Students were given a brief introduction on wireless communication and its applications. Students were eager to know about ISS (international space station) and astronauts living in the ISS.

➢ **Talk on Space Technology**

Government high school, kalay sanguem Goa organized talk on Space Technology, for the students of std. VIII, IX & X on 15/02/2020. Goa Samagra Shiksha Abhiyan under the Directorate of Education, Goa has implemented National Skills Qualifications Framework (NSQF) course in the school namely Electronics & Hardware. In regards to this, Headmaster of the school, Alpa Dessai invited Prof. Mohini N. Naik, Asst. Professor of ETC Engineering, DBCE, to brief students about Space technology and its recent trends.

Upcoming Projects

➢ Tracking satellite data using complete ground station developed by the members of the satellite club.
➢ Analyzing and interpretation of the data received.
➢ Preparation of HAM Radio exam and license.
➢ Setting up of the entire ground station in the campus.