



R&D Cell, CTCT & IT

NEWS LETTER



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“If you want to change the world, love your family.”

Training Vs Covid-19

ASI/C Bijoy Bhushan

India is facing the novel corona virus (Covid19) pandemic as the rest of the world. Since the lockdown announced on 25th March 2020, the teaching activities are also suspended. Medical fraternity is on the forefront in fighting the pandemic at the same time medical teachers have added responsibility of teaching the medical students. As per government guidelines educational institutes are closed and online teaching is the only means to continue teaching -learning (T-L).

This institute tackled the problem at an initial stage itself and started its online training by registering through and user friendly interface of Cisco Webex learning tool and individual Ids and password were generated for each faculty and student. Teams were made as per courses. Faculties were made to co-ordinate so that they were able to schedule classes well on time and share relevant information. The faculty which was supposed to take the class, scheduled it by pre-assigning the scheduled timings. The teaching roster was followed similar to offline classes. The faculty used power point presentation, drawings, white board and videos as means of delivering lecture. The mode of delivering content online was directed towards cognitive (power point presentation, digital white board), psychomotor (recorded videos and live videos) domains.

India at present is facing the worst pandemic of the novel coronavirus. Health care workers are in the frontline and working at their full capacity. Subsequently, academic activities are suspended but learning can't be stopped. Therefore, this is the first time we at institute level have initiated online teaching -learning activities. As it is said if you want to work you will find ways otherwise excuses. Thus, we searched for online platforms, but due to security issues many available options like zoom etc were avoided and we zeroed on Cisco Webex, it's a friendly application and has many interactive features. The trainees on a particular team are able to access classes scheduled and therefore they know their classes for that day. The faculty used various means of delivering lecture; power point presentation was most common, followed by videos and white board. Cognitive and psychomotor domains were covered by various means of delivering content.

As per feedback received, majority of trainees were satisfied with the teacher's knowledge of subject and their art of teaching. The mode of teaching is new but almost all the teachers were able to conduct classes comfortably. Apart from scheduled training the trainees were sensitized regarding preparedness in pandemic and infection prevention- control through e-classes, thus e learning provides an alternative platform for at home teaching but for which more skill labs will be required.

E-classes are immensely helpful in these times of lockdown and restrictions. The teaching -learning activities are conducted successfully. The students believe offline classes are better but they are comfortable with e -classes also. The network issues are a major hindrance in smooth conduction of classes.

Optical Inter satellite Communication

ASI/T Prem Kumar

Satellite cross links generally require narrower bandwidths for increased power concentration. We can increase the power concentration by increasing the cross link frequency with the same size antenna. But the source technology and the modulation hardware required at these higher frequency bands are still in the development stage. Use of optical frequencies will help to overcome this problem with the availability of feasible light sources and the existence of efficient optical modulation communications links with optical beams are presently being given serious considerations in inter-satellite links. And establishing an optical cross link requires first the initial acquisition and cracking of the beacon by the transmitting satellite followed by a pointing of the LASER beam after which data can be modulated and transmitted.

Communication links between space crafts is an important element of space infrastructure, particularly where such links allow a major reduction in the number of earth stations needed to service the system. An example of an inter orbit link for relaying data from LEO space craft to ground is shown in the figure below.

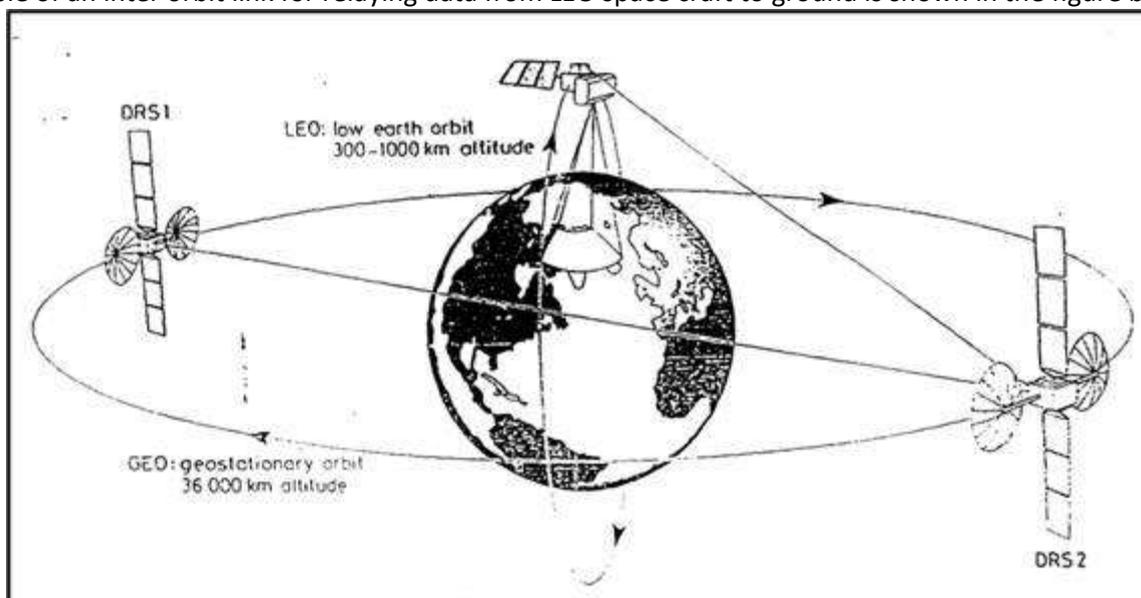


Fig. 1:-Inter orbit link for relaying data from LEO space craft to ground.

The above figure represents a link between a low earth orbiting (LEO) space craft and a geostationary (GEO) space craft for the purpose of relaying data from the LEO space craft back to the ground in real time. The link from the GEO Satellite to ground is implemented using microwaves because of the need to communicate under all weather conditions. However, the inter orbit link (IOL) can employ either microwave or optical technology.

The European Space Agency (ESA) has programmed underway to place Satellites carrying optical terminals in GEO orbit within the next decade. The first is the ARTEMIS technology demonstration satellite which carries both microwave and SILEX (Semiconductor Laser Intro satellite Link Experiment) optical inter orbit communications terminal. SILEX employs direct detection and GaAlAs diode laser technology; the optical antenna is a 25cm diameter reflecting telescope. The SILEX GEO terminal is capable of receiving data modulated on to an incoming laser beam at a bit rate of 50 Mbps and is equipped with a high power beacon for initial link acquisition together with a low divergence (and un-modulated) beam which is tracked by the communicating partner. ARTEMIS will be followed by the operational European data relay system (EDRS) which is planned to have data relay Satellites (DRS). These will also carry SILEX optical data relay terminals. Once these elements of Europe's space Infrastructure are in place, there will be a need for optical communications terminals on LEO satellites which are capable of transmitting data to the GEO terminals. A wide range of LEO space craft is expected to fly within the next decade including earth observation and science, manned and military recon-

naissance system. The LEO terminal is referred to as a user terminal since it enables real time transfer of LEO instrument data back to the ground to a user access to the DRS s LEO instruments generate data over a range of bit rates extending of Mbps depending upon the function of the instrument. A significant proportion has data rates falling in the region around and below 2 Mbps. and the data would normally be transmitted via an S-brand microwave.

ESA initiated a development programmed in 1992 for LEO optical IOL terminal targeted at the segment of the user community. This is known as SMALL OPTICAL USER TERMINALS (SOUT) with features of low mass, small size and compatibility with SILEX. The program is in two phases. Phase 1 was to produce a terminal flight configuration and perform detailed subsystem design and modelling. Phase 2 which started in September 1993 is to build an elegant bread board of the complete terminal. The link from LEO to ground via the GEO terminal is known as the return inter orbit link (RIOL). The SOUT RIOL data rate is specified as any data rate up to 2 Mbps with bit error ratio (BER) of better than 10^{-6} . The forward inter-orbit link (FIOL) from ground to LEO was a nominal data rate of 34 K although some missions may not require data transmissions in this directions. Hence the link is highly asymmetric with respect to data rate. The LEO terminal is mounted on the anti-earth faces of the LEO satellite and must have a clear line of sight to the GEO terminal over a large part of the LEO orbit. This implies that there must be adequate height above the platform to prevent obstruction of the line of sight by the platform solar arrays, antenna and other apertures. On the other hand the terminal must be able to be accommodated inside the launcher fairing. Since these constraints vary greatly with different LEO platforms the SOUT configurations has been designed to be adaptable to a wide range of platforms.

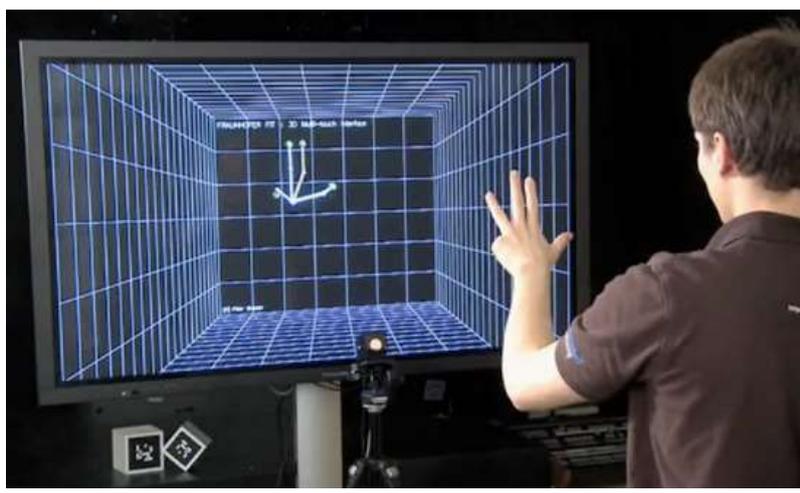
The in-orbit life time required for a LEO mission is typically 5 years and adequate reliability has to be built into each sub-system by provision of redundancy improved in recent years. And GaAlAs devices are available with a projected mean time to failure of 1000 hours at 100 MW output power. The terminal design which has been produced to meet these requirements includes a number of novel features principally, a periscope coarse pointing mechanism (CPA) small refractive telescope, fiber coupled lasers and receivers, fiber based point ahead mechanism (PAA), anti-vibration mount (soft mount) and combined acquisition and tracking sensor (ATDU). This combination has enabled a unique terminal design to be produced which is small and lightweight these features are described in the next sections.

Touch less Touchscreen Technology

ASI/T Sohan Yadav

It was the touch screens which initially created great furore. Gone are the days when you have to fiddle with the touch screens and end scratching up. Touch screen displays are ubiquitous worldwide. Frequent touching a touchscreen display with a pointing device such as a finger can result in the gradual de-sensitization of the touchscreen to input and can ultimately lead to failure of the touchscreen. To avoid this simple user interface for Touch less control of electrically operated equipment is being developed. Elliptic Labs innovative technology lets you control your gadgets like Computers, MP3 players or mobile phones without touching them. A simple user interfaces for Touch less control of electrically operated equipment. Unlike other systems which depend on distance to the sensor or sensor selection this system depends on hand and or finger motions, a hand wave in a certain direction, or a flick of the hand in one area, or holding the hand in one area or pointing with one finger for example. The device is based on optical pattern recognition using a solid state optical matrix sensor with a lens to detect hand motions. This sensor is then connected to a digital image processor, which interprets the patterns of motion and outputs the results as signals to control fixtures, appliances, machinery, or any device controllable through electrical signals.

The touch less touch screen sounds like it would be nice and easy, however after closer examination it looks like it could be quite a workout. With the touch less touch screen your hand doesn't have to come in contact with the screen at all, it works by detecting your hand movements in front of it. This is a pretty unique and interesting invention, until you break out in a sweat. You probably won't see this screen in stores any time soon. Everybody loves a touch screen and when you get a gadget with touch screen the experience is really exhilarating. When the I-phone was introduced, everyone felt the same. But gradually, the exhilaration started fading. While using the phone with the fingertip or with the stylus the screen started getting lots of finger prints and scratches. When we use a screen protector; still dirty marks over such beautiful glossy screen is a strict no-no. Same thing happens with I-pod touch. . Most of the time we have to wipe the screen to get a better unobtrusive view of the screen



Simply point your finger in the air towards the device and move it accordingly to control the navigation in the device. They term this as "Touch less human/machine user interface for 3D navigation".

Today's thoughts are again around user interface. Efforts are being put to better the technology day-in and day-out. The Touch less touch screen user interface can be used effectively in computers, cell phones, webcams and laptops. May be few years down the line, our body can be transformed into a virtual mouse, virtual keyboard and what not? Our body may be turned in to an input device!

Visual Positioning System (VPS)

HC/RO Paramjeet Singh

The process of identifying the position and orientation of a device relative to some reference point is referred to as localization. Various techniques approach localization in different ways. Some rely on measuring the delay of radio signals from multiple dedicated satellites to determine a precise location. However, in dense urban environments it can be incredibly hard to pinpoint a geographic location due to low visibility to the sky and signals reflecting off of buildings. This can result in highly inaccurate placements on the map meaning your location could appear on the wrong side of the street or even a few blocks away. GPS has another technical shortcoming; it can only determine the location of the device, not the orientation.

What is VPS?

Visual Positioning System (VPS) is the newly developed feature for Google Maps. VPS will use the camera of the user's smartphone to identify their surroundings, and thereby visually display a blown-up 3D direction such as lit-up arrows and precise steps, in the screen of the smart phones.

What makes Visual Navigation a Game changer?

- At times, when the standard GPS technology is not enough, this new visual system can offer the users ample support to fix their navigation concerns.
- VPS can be a great aid to the visually-impaired; the close-up visual assistance can be a life-changing assistance to the visually-impaired to make their navigation a lot easier.
- The system not just helps with routing directions but makes the best use of Augmented Reality so as to retrieve supplementary information by taking clues of nearby signboards and shops.
- The technology can really come handy in Urban Areas with Tall Buildings where, the GPS is prone to the phenomena of GPS drift.

The Future with the VPS:

- VPS is poised to supplement existing location data models to further the advances in navigation, marketing, and even robotics in the future.
- VPS is capable of determining indoor and outdoor location through ad-hoc visual markers.
- Distinguishing features such as signage, buildings, and walls are identified by scanning geo-located photos, enabling Unprecedented Accuracy in location data.
- Augmented Robotics- Autonomous robots, from drones to dogs to cars, could access VPS services and improve their navigation ability. VPS data could eventually eliminate the need for expensive sensors in robotics.
- Augmented Marketing- The system can capitalize the immersive potential of AR to create compelling marketing content in the digital platforms.

Technical Quiz

R&D Team

1. Bluetooth Technology supports
 - a) Piconet
 - b) Ad hoc piconet
 - c) Scatter net
 - d) **All of the above**

2. Which of the following wireless technology is used for exchanging data between a variety of fixed and mobile devices over a very short diameter?
 - a) Mobile technology
 - b) **Bluetooth technology**
 - c) Ad hoc computing
 - d) None of the above

3. In Bluetooth which of the following device decides hopping sequence?
 - a) **Master**
 - b) Parked
 - c) Standby
 - d) Slave

4. In which of the following the total available bandwidth is split into many channels of smaller bandwidth plus guard spaces between the channels?
 - a) **FHSS**
 - b) DSSS
 - c) Both a and b
 - d) None of the above

5. In which of the following a single data stream is split across several separate narrowband channels at different frequencies to reduce interference and crosstalk.
 - a) **OFDM**
 - b) GSM
 - c) GPRS
 - d) UMTS

6. Which of the following uses high-frequency radio waves instead of cables for connecting the devices in LAN?
- a) Wired LAN
 - b) Wireless LAN**
 - c) Fiber made LAN
 - d) None of the above
7. Most WLANs are based upon the standard—
- a) IEEE 802.2
 - b) IEEE 802.11**
 - c) IEEE 802.5
 - d) IEEE 802.15
8. Which of the following is/are the advantages of a wireless LAN?
- a) Flexibility
 - b) Ease of use
 - c) Robustness
 - d) All of the above**
9. Disadvantages of WLANs include —
- a) Interference and noise
 - b) Slower than wired
 - c) Greater care is needed for encryption
 - d) All of the above**
10. In piconet devices connected with the master is called
- a) Slaves**
 - b) Parked
 - c) Standby
 - d) None of the above

Technical Terms

R&D Team

3D Touch

3D Touch is a pressure-sensitive feature introduced by Apple on its 2015 iPhone 6S and iPhone 6S Plus smartphones. 3D Touch uses capacitive sensors integrated into the smartphone's display to sense three degrees of pressure in a user's touch and respond differently based on the amount of pressure exerted.

ActiveSync

ActiveSync is Windows Mobile software that allows you to synchronize Windows Mobile and other Windows CE-based devices with a Windows-based PC or Exchange Server. If your PC is running Windows Vista, synchronization is managed through the Windows Mobile Device Center. For earlier versions of Windows, you can download ActiveSync. The latest version of ActiveSync allows you to synchronize Microsoft Outlook information, Microsoft Office documents, pictures, music, videos and applications to and from your device.

AirDrop

A file sharing feature from Apple available on mobile devices running the iOS 7 (and later) mobile operation system as well as laptops and desktops running Mac OS X 10.7 Lion and later. Photos and videos can be shared with AirDrop, as well as notes, URLs, Passbook passes, contact cards, iTunes Radio stations, app listings and more.

AirPort

AirPort is a WLAN networking device by Apple Computer. It is based on Wi-Fi standards (IEEE 802.11b) and is compatible with other 802.11b devices. Similar devices from Apple Computer that are based on the IEEE 802.11g specification are called AirPort Extreme.

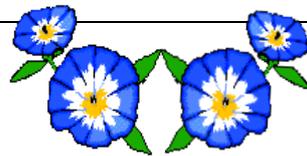
AirWatch

An enterprise mobility management (EMM) and mobile device management (MDM) provider that offers solutions for handling the management of mobile devices, applications and mobile content in the enterprise.

Aloha A protocol for satellite and terrestrial radio transmissions. In pure Aloha, a user can transmit at any time but risks collisions with other users' messages. "Slotted Aloha" reduces the chance of collisions by dividing the channel into time slots and requiring that the user send only at the beginning of a time slot. Aloha was the basis for Ethernet, a local area network protocol.
n acronym that stands for distributed denial of service – a form of cyber-attack.

Acknowledgement

We are highly thankful for reading out this compilation and hope it will be useful for you in our day to day professional and personal life. We would like to hear your interest areas, suggestions from you to make this newsletter more informative and interesting. Your views will definitely help us to create this newsletter as an effective medium to reach you with latest development in the fields of communication and technology.



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Answers to the Quiz

1	2	3	4	5	6	7	8	9	10
D	B	A	A	A	B	B	D	D	A