(DEEMED TO BE UNIVERSITY) KL

NAAC ACCREDITED A++ GRADE

Recognised as CATEGORY 1 UNIVERSITY By UGC, Statutory Body of MHRD

Department of Electronics & Communication Engineering

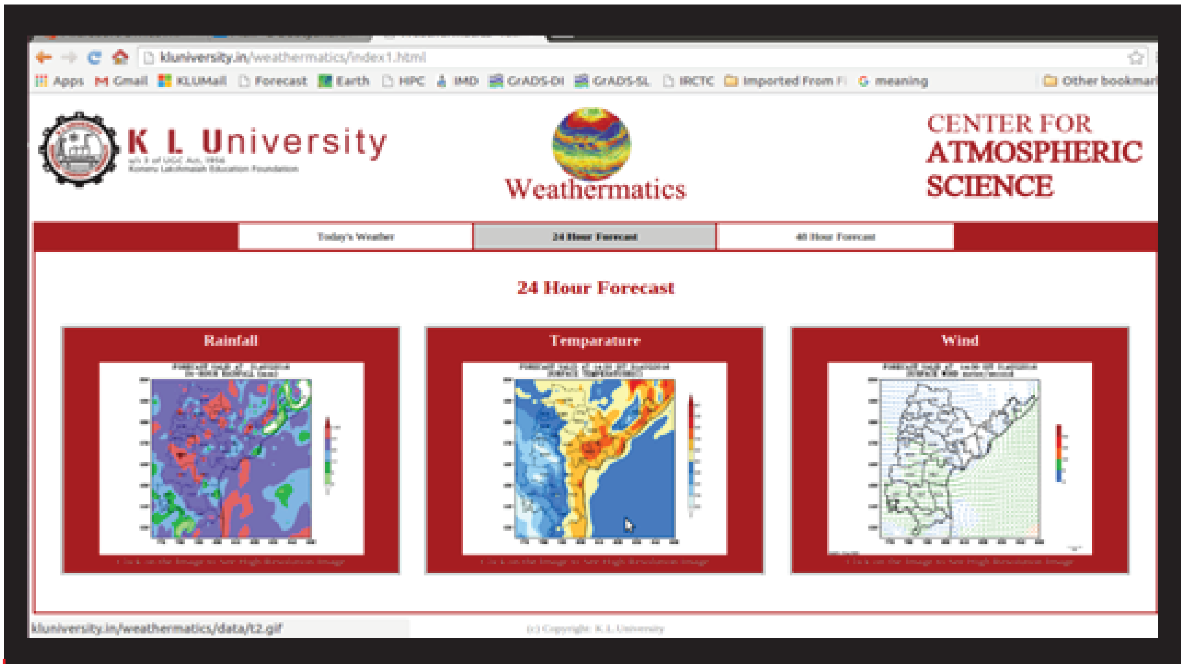
STAR LAB CONSULTANCY

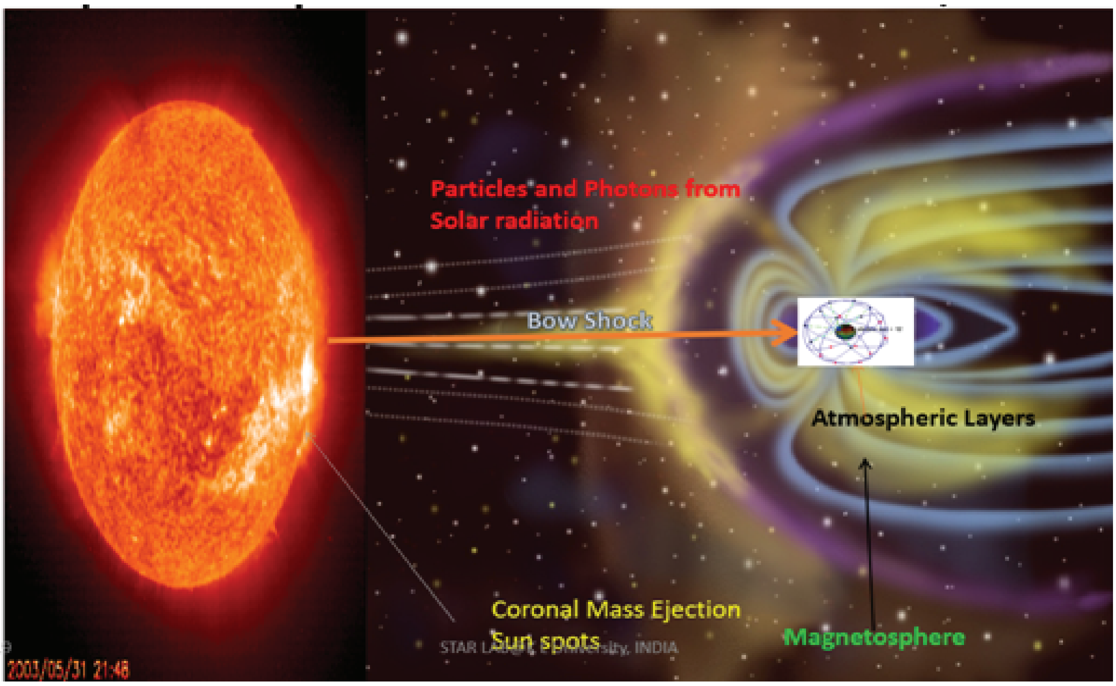
Name of the Research Center:

Space Technology and Atmospheric Sciences Research (STAR) Lab

About the research center

This Laboratory has mainly focused on the investigations on Lower atmospheric studies using satellite data and Modelling and Forecasting of the Ionospheric effects on Global Navigation Satellite System (GNSS) Signals





Consultancy (Will provide on)

1.Atmospheric weather reports like Temperature, Rain fall predictions, Thunder storms predictions. Heat wave alerts etc.
2.Ionospheric space weather alerts about the GPS signal delays and scintillation effects on positioning and navigation services of GNSS systems.

Details of the Equipment

1.Name
2.Technical details at glance
3.Applications (Where it can be used?)
4.HD ImagesEquipment 1: Dual Frequency Global Navigation Satellite System (GNSS) Receivers-GPS Station 6, Novtel -2 Nos
Technical Details:NovAtel's GPStation-6 technology combines a rugged enclosure with an ultra-low phase noise OCXO and advanced OEM628 receiver, providing a modernized GNSS Ionospheric Scintillation and TEC Monitor (GISTM) receiver. With the 120-channel multi-constellation, multi-frequency OEM628 measurement engine at its core,the GPStation-6 takes advantage of NovAtel's industry leading signal tracking and positioningperformance.

Applications:L1, L2, L2C, L5, and SBAS signal tracking

- GPS, Galileo, GLONASS, BeiDou
- 50 Hz data output, Amplitude and phase scintillation indices output and Code TEC and Carrier TEC output


Equipment 2: Indian Regional Navigation System (IRNSS)/GPS/SBAS Receiver-3 Nos

ISRO SAC and ACCORD Software and Systems Pvt. Ltd
Technical Details:

•Multi-constellation, multi-frequency GNSS receiver
•Dual Frequency corrections provides real-time
•ionospheric corrections for further accuracy enhancements
•Includes Multipath Mitigation
•Anti-Jam & Anti-Spoof capability
•Receiver Autonomous Integrity Monitoring (RAIM)
•Carrier phase measurements output
•Support RTCM corrections
•Supports DGNSS input version 2.3
•TEC related measures with S4 index, time series of signals phase and amplitude
 @ 50 Hz / 100 Hz
•External 10 MHz Oscillator input to meet unique timing applications
•Includes Ultra low noise OCXO (Optional)
•External 1-PPS reference input for precise time transfer
•High measurement data throughput
•Support for RINEX output
•NMEA 0183 format version 4.10
•Flexible and rugged communication ports
•Accord's proprietary compact binary data output
•TCP/IP or UDP connectivity
•Support's NTP/PTP (Optional)
•Standard on board logging

•Windows™ based Graphical User Interface (GUI)
Applications:
Accord's Rigel-A110 is an indigenously designed and developed multi constellation rugged Global Navigation Satellite System (GNSS) receiver capable of taking all current & future GNSS signals including GPS, GLONASS, GALILEO, BEIDOU, NavIC, QZSS and SBAS. Rigel-A110 accompanies with a rugged All-In-View GNSS antenna capable of receiving signals in L1, L2, L5 and S bands. It is software upgradable to track upcoming signals as they become available and to provide customer performance required for user application.

Equipment 3:
Sudden Ionospheric Disturbance Space Weather Monitor
Technical Details:
Our space weather monitors measure the effects on Earth of solar flares by tracking changes in very low frequency (VLF) radio transmissions as they bounce off Earth's ionosphere. The VLF radio waves come from transmitters set up by various nations to communicate with their submarines. Signal strength of these VLF waves changes as the Sun affects Earth's ionosphere, adds ionization, and thus alters where the waves bounce. Our monitors track these changes in signal strength.The Sun affects the Earth through two mechanisms. Thefirst is energy. Whenever the Sun erupts with a flare, it isusually in the form of X-ray or extreme ultraviolet (EUV)energy. These X-ray and EUV waves travel at the speed oflight, taking only 8 minutes to reach us here at Earth, anddramatically affect the Earth's ionosphere.
Applications:
In addition to the daily fluctuations, activity on the Sun can cause dramatic sudden changes to the ionosphere. When energy from a solar flare reaches the Earth, the ionosphere becomes suddenly more ionized, thus changing the density and location of layers. With the increased ionization, the VLF signals now bounce from the lower, D layer. Hence the term "Sudden Ionospheric Disturbance" to describe the changes we are monitoring. The strength of the received radio signal changes according to how much ionization has occurred, at what level of the ionosphere the VLF wave "bounces" from, and how much additional ionization the wave must penetrate on its way to or from a bounce.


Equipment 4: MET4/4A Meteorological Sensor
Paroscientific, Inc.Digiquartz® Pressure Instrumentation, Parascientific Inc., USA

Equipment 4: MET4/4A Meteorological Sensor
Paroscientific, Inc.Digiquartz® Pressure Instrumentation, Parascientific Inc., USA


Technical Details:
The MET4 and MET4A are precision meteorological measurement systems housed in rugged, weather-resistant enclosures. An internal Digiquartz pressure transducer, precision temperature/humidity probe, and microprocessor-based electronics provide the measurement and communication capabilities. Measurement data is accessed via RS-232 or RS-485 serial ports. An external status panel monitors power status and RS-232/RS-485 communication. The MET4/MET4A features the DigiPort high-performance barometric pressure port. It is designed to dramatically reduce barometric pressure measurement errors in the presence of wind. The air temperature/humidity probe is housed within a solar radiation shield. The MET4/MET4A is designed for easy and convenient mounting to masts, tubing, and other structures and surfaces.
Applications:
Barometric Pressure: The outputs from the Digiquartz barometer are two square wave signals whose period is proportional to applied pressure and internal transducer temperature.
Pressure Measurements: Pressure measurements are by far the most common. Pressure measurements are fullytemperature-compensated, and therefore require an internal temperature measurement.
Internal Sensor Temperature Measurements: Internal sensor temperature is normally only used for temperature compensation of pressure, but can be requested independently for diagnostic purposes.
Air temperature and relative humidity: Air temperature and relative humidity measurements are provided by a single precision probe.

Software 1: Bernese GNSS Software Univerisity of Berne, Switzerland v.5

Version: v.5 Applications:

The Bernese GNSS Software is a scientific, high-precision, multi-GNSS data processing software developed at the Astronomical Institute of the University of Bern (AIUB). It is, e.g., used by CODE (Center for Orbit Determination in Europe) for its international (IGS) and European (EUREF/EPN) activities. The software is in a permanent process of development and improvement.The Bernese GNSS Software is a scientific software package meeting highest quality standards for geodetic and further applications based on Global Navigation Satellite Systems (GNSS).It is useful for estimation of clock corrections from GLONASS data(inter-frequency code biases), troposphere modeling, ionosphere modeling: higher order ionosphere correction, Etc.

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2.Sivavaraprasad G, D.Venkata Ratnam, and Ostuka. Y, "Multicomponent Analysis of Ionospheric Scintillation Effects using Synchrosqueezing Technique for Monitoring and Mitigating their Impact on GNSS Signals" Journal of Navigation (Royal Institute of Navigation, UK), 2018 (Accepted, In press).

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