ELECTRONICS AND COMMUNICATION ENGINEERING

Report of the Industrial visit to

National Atmospheric Research Laboratory (NARL), Gadanki on 08.02.2019

64 students of Third Year ECE visited **National Atmospheric Research Laboratory (NARL), Gadanki on 08.02.2019**

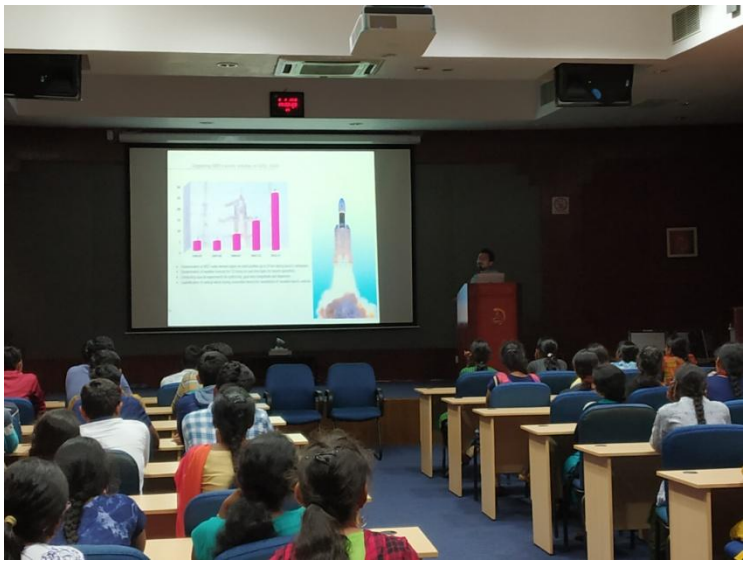
The following faculty accompanied the Students for the Industrial Visit,

- Mr. N.Thirumalesh , Associate Professor, ECE
- Mr. E.Chiranjeevi, Assistant Professor, ECE
- Mr. K.Saiman, Associate Professor, ECE
- Mr. Syed Abdul Rahim, Associate Professor, ECE
- Mrs. D. Vijaya Lakshmi, Assistant Professor, ECE
- Mrs. V. Manjula, Receptionist

The following are the Highlights of the visit

- Dr. Ravi Kiran given Power Point presentation about Introduction to NARL and Overview of NARL activities and Video.
- Students Visited Automatic Weather station and know about the Balloon launch facility, The Resource Person explained about the balloon functioning, timing of the launch every day and how the data used by ISRO.
- Students visited High performance computer lab, Data Center, LIDAR (laser Radar), VHF (MST) Radar.
- In Data Center Laboratory, Dr.Krishna Sumanth.T explained about Software IT solutions.
- In High Performance Computer Lab, Dr.T.Harish Varma explained about Weather forecasting.

LIDAR



The LiDAR instrument fires rapid pulses of laser light at a surface, some at up to 150,000 pulses per second. A sensor on the instrument measures the amount of time it takes for each pulse to bounce back. Light moves at a constant and known speed so the LiDAR instrument can calculate the distance between itself and the target with high accuracy. By repeating this in quick succession the insturment builds up a complex 'map' of the surface it is measuring. With airborne LiDAR other data must be collected to ensure accuracy. As the sensor is moving height, location and orientation of the instrument must be included to determine the position of the laser pulse at the time of sending and the time of return. This extra information is crucial to the data's integrity. With ground based LiDAR a single GPS location can be added for each location where the instrument is set up.

VHF (MST) Radar

The MST radar located at Gadanki is an excellent system used for atmospheric probing in the regions of Mesosphere, Stratosphere and Troposphere (MST) covering up to a height of 100 Km. It is also used for coherent backscatter study of the ionospheric irregularities above 90 km. MST radar is a state-of-the-art instrument capable of providing estimates of atmospheric parameters with very high resolution on a continuous basis, which is essential for the study of different dynamical process in the atmosphere. Radar operates at 53 MHz with a peak power of 2.5 MW. The phased antenna array consists of two orthogonal sets, one for each polarization of 1024 three element Yagi-Uda antennas arranged in a 32 x 32 matrix over an area of 130 m x 130 m. The two sets are co-located with pairs of crossed Yagis mounted on the same set of poles. The array is aligned along the geomagnetic axes to enable the radar beam to be transverse to the Earth's magnetic field for ionospheric backscatter application. The array of either of the polarizations is illuminated using 32 transmitters of varying power, each feeding a linear sub-array of 32 antennas.

Automatic Weather Station

The automatic weather station consisting of 5 sensors and tipping bucket rain guage is installed at NARL. The sensors measure pressure, temperature, humidity, wind speed and wind direction. Except the pressure sensor and the rain gauge, the other sensors are mounted on a 3-m tower. Temperature compensated piezo-resistive

pressure sensor is used to measure the pressure with a resolution of 0.1 mb. For humidity measurement, a thin film capacitance sensor is used which provides an accuracy of ± 3%. RTD type sensor is used to measure temperature with a resolution of 0.1o C. 3-cup rotor type sensor is used to measure wind speed with an accuracy of ± 1%. Potentiometer type sensor is used to measure the wind direction with a resolution of < 1o. A tipping bucket rain gauge provides rain rate information with a resolution of 0.5 mm.