NUST
Defining futures

EMERGING TECHNOLOGY RESEARCH LABORATORY

Emerging Technologies Lab (EmTech Lab) is designed to cater current and future applied research required in interdisciplinary domain focusing on the energy sector. EmTech Lab was established in 2017 with funding from USAID. EmTech Lab is equipped with renewable energy related modeling software with a focus on wind energy, cutting edge experimental testing facilities such as wind tunnel, and additive manufacturing tools to address the problems related to emerging technologies in energy sector. The research in the laboratory will be concerned with questions related to industrial applications based on energy systems with a major focus on Harnessing Renewable Energy for Sustainable Development. A shift in energy trends from centralized fossil fuel-based systems to increasingly decentralized renewable energy systems requires combined theoretical and experimental investigations. EmTech Lab aims to develop new knowledge and applications in energy systems.

LAB MISSION

To resolve issues and challenges in the energy sector by exploring innovative, creative, and imaginative ways to fuel applied research, teaching, and learning with emerging technologies.

RESEARCH PORTFOLIO

Aero-thermal aspects of turbomachinery, flow visualization and image processing, computational and experimental fluid dynamics, gas turbines, thermal hydraulics, wind power, additive manufacturing (3D printing etc.), power engineering and engineering thermophysics.

RESEARCH EQUIPMENT

Equipment	Description	Specification
Wind Sentry Anemometer and Vane **Wind monitoring system along with Tripod**	For determination and datalogging of true wind direction and speed, prevailing wind speed and direction and vector speed and direction.	Wind Speed: 0-50 m/s. Azimuth: 360° mechanical, 352° electrical (8° open). Anemometer: 1.1 m/s Vane: 1.3 m/s at 10° Compatible with the LLAC4 4-channel Low Level AC Conversion Module.
Open Circuit Wind Tunnel	To test scale models of various mechanical components of airborne machinery and related objects.	Dimensions: 500 x 500 cm Contraction Ratios: 9:1 Airspeed Range: 2-60m/s 3-Component Sting Balance, NI DAQ
Open Channel Flow Monitor	To monitor the flowrates	OCF 5.0-A1 Open Channel Flow Monitor
Coriolis Flow Meter	To monitor working temperature, pressure, density and flowrate of fluid.	Micro Motion F-Series F050S
Data Logger for (Temperature and Pressure)	To measures and datalogging of up to 16 gas pressures and 32 channels for temperature measurement in various applications.	Incorporate up to 16 gas pressures inputs and 32 channels for temperature measurement.
ZX 300 Wind On-shore wind Lidar	Onshore wind measurements from a vertical profiling Lidar which remotely measures the wind from 10 to 200+ meters above ground.	10-200m (Lidar measurement) 0 - 10 m (onboard met weather station) < 1 m/s to 80 m/s Power Requirement: 69 W
3D Printer	Additive manufacturing tool for creation of a physical object from a three-dimensional digital model.	Supporting Material: ABS, PET. Nozzle: 0.4 mm. Bed Dimensions: 500x 500x500 mm
PXI-NI (Data logging & Control system)	It is used for processor-intensive, modular instrumentation, and data acquisition applications.	Modules: PXIe-8840 NI PXIe-6363, X Series DAQ, PXIe-4300, PXIe-4353, PXIe-1078
PCB Plotter	The system is suitable for all application areas including multilayer and RF – in FR4 18/18 Cu material it can achieve PCB track widths up to 100 µm.	Max. material size and layout area (X/Y/Z) 229 mm x 305 mm x 35/22 mm (9" x 12" x 1.4/0.9"). Highest available speed (100,000 rpm) Highest resolution (0.5 µm)