

# List of Ongoing STC Projects as of December, 2024

Sr No.	Research Title
1.	16 bit 5MS/s analog to digital converter
2.	A Lagrangian framework to define the spatio-temporal requirements of measurement of ocean surface currents from space-borne sensors
3.	A Machine Learning Approach to Estimate Atomic and Molecular Properties Accurately for Space Applications
4.	A multivariate data assimilation framework to improve drought predictions
5.	A Self-Supervised, Visual-Analytical Approach for Automatic Detection of Cyclonic Events in Satellite Observations
6.	Accuracy estimation of INSAT-3D and INSAT-3DR ozone, temperature and water vapor measurements : Application for AIR-Sea Interaction studies
7.	Advancing technology CAD simulations on superlattice structures for MWIR and SWIR sensors
8.	Affordable Sub-millimeter/THz Components Using 3D Printed Dielectric Integrated Guides
9.	An Integrated GNSS-NavIC/LiDAR system for localization and Mapping in outdoor, indoor and GNSS denied environments
10.	Analysis of variable stiffness composite honeycomb sandwich structures with embedded delamination
11.	Assessment of Groundwater Storage Zones integrating GRACE Satellite Data, Hydrogeological investigations and Geophysical Surveys with the Emphasis on Managed Aquifer Recharge
12.	Characterization and Modeling of High Voltage N/P LDMOS FETs for 180nm SCL Process
13.	Compliant Mechanism Design Framework for Space Applications
14.	Computer Tomography (CT) Based Algorithm for Non-Destructive Quality Assessment of Joints of the components used in Space applications
15.	Deployment Mechanisms for 12m Diameter Spacecraft Antennas
16.	Design and development of efficient tool-path strategies of precision high-speed machining of monolithic thin-walled structures for construction of light-weight satellites and spacecrafts
17.	Design and development of freeform mirrors and diffracto-freeform grating for compact spectrograph applications
18.	Design and development of Moving Magnet Type Pressure Wave Generator for 4 K Spaceworthy Stirling Type Pulse Tube Cryocooler
19.	Design and fabrication of application specific metamaterial-based absorber surfaces for visible and IR region
20.	Design and Fabrication of Superconducting Tunnel Junctions For SIS Mixers
21.	Design and Implementation of an efficient power management IC in sub-micron Technology for Space Application
22.	Design of a 1kSps Delta-Sigma Analog-to-Digital Converter with greater than 18 bits resolution
23.	Design of AI based models and Simulator Tools for Landing and Navigation of Planetary Missions
24.	Design of Ridge and Gap Waveguide based Millimeter-Wave Slotted Antenna Array
25.	Design of SET Tolerant High-Speed Transceiver for Chip to Chip Backplane Interconnect (HBI)

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26.	Design, development and fabrication of carbon allotrope based composite for space applications using additive manufacturing
27.	Designing and Implementation of optimum Navigational Signals
28.	Determining the origin of the Simlipal Volcanics: meteoritic Impact vs effusive volcanism
29.	Development of a novel photonic platform for high-dimensional quantum-key-distribution
30.	Development of acoustic materials for controlling vibration-induced damage in space structures
31.	Development of efficient algorithms and a co-located system of low-cost GNSS receiver and corner reflector to improve SAR calibration and InSAR activities
32.	Development of Forest Phenology Analysis using Time Series PhenoCams and Satellite Data in Western Himalayan Region Time Series PhenoCams and Satellite Data in Western Himalayan Region
33.	Development of High Performance GNSS-INS Integration Scheme for Accurate Navigation and it's Implementation in Embedded Platform
34.	Development of low loss Ni-Zn ferrite for S band Circulator
35.	Development of Nano-polishing technology for Nickel plated and CVD SiC Hybrid Mirrors
36.	Development of reduced graphene oxide nanocomposites based gas sensor to monitor CO2 traces in the crew module of human space program
37.	Development of Signal Processing Chip for GNSS Anti-jamming functionality
38.	Development of single photon emitter
39.	Development of therapeutic strategies to mitigate oxidative stress and cytoskeletal damage in astronauts for the Gaganyaan space mission
40.	Disentangling anthropogenic impacts on global water storage derived from GRACE and SWOT missions
41.	Energy efficient & wide-range 15Mb/s-1.5Gb/s Transceiver – Phase II
42.	Ensemble approach for fodder crop mapping using Sentinel and RISAT 1 a data in the Nashik region
43.	Establishing a coupled Indian Land Data Assimilation System (ILDAS) for identifying hydrologic extremes
44.	Fabrication and modelling of a Hybrid composite antenna reflector
45.	Fault Exclusion Algorithm for A Kalman Filter-Based GPS-NavIC Integrity Monitor
46.	GaN-Based CMOS Digital Circuits
47.	Generation and Characterisation of Entangled Microwave Photon states using a Josephson Parametric Convertor
48.	Graphene van der Waals heterostructure based field effect transistor for gas emission monitoring
49.	Identification of reusable economic indicators using enhanced satellite imagery and multimodal multi-tasking deep learning method
50.	Impact of Satellite observations in a coupled system for predicting storm tides and its coastal inundation.

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51.	Improved Protocols, Techniques and Algorithms for Inter-Planetary Networks (TAN) Phase II
52.	Improvement of temporal resolution (~weekly to daily) of Sentinel-1 based high spatial resolution surface soil moisture estimates
53.	Improving the spatial resolution of GRACE TWS for India using remote sensing datasets and modeling approach
54.	Indigenous Sensor-based Real-Time Flood Warning Smart System
55.	Integrated Quantum Detector At Room Temperature (IQDART)
56.	Integrating satellite and UAV remote sensing for Land Surface Temperature (LST) and soil moisture estimations to map crop water stress in an agriculture-dominated Critical Zone Observatory (CZO)
57.	Interlinked seasonal evolution of supraglacial lakes and ice velocity changes of glaciers in Greenland
58.	Investigation of color centers in atomically thin hexagonal boron nitride as a source of quantum emitters
59.	Landslide monitoring, forecasting and mitigation system
60.	Large Area flexible metasurface based photonic devices
61.	Low Pressure Systems (LPSs) and their nonlinear interaction with other scales in atmosphere through the lens of Scale Energetics
62.	Metasurface Based Beam-Steering Antennas and Polarization Converters for mm-wave Satellite Communication
63.	Microgravity Driven Regulation of Ageing Related Biomarkers and miRNAs in Astrocyte
64.	Microwave photonic devices for Space Applications
65.	Mixed signal ASIC for NavIC receiver
66.	Multiscale Analysis of higher-resolution Coastal Ocean Circulation Features along the Indian Coast
67.	Near-Future Forecasting of Transient Weather Phenomena Using Dynamic Mode Decomposition
68.	Numerical and experimental investigations on fixed matrix regenerator towards the development of 30 - 4.2 K class miniature pulse tube cryocoolers for space applications
69.	Ocean Remote-sensing Information Mining and Change Monitoring Using Artificial Intelligence
70.	Physics-based AI-ML models for predicting crop yield at different space-time scales
71.	Plasmonic metamaterials based filters for photonic applications in space
72.	Quality Assessment of Remote Sensing Images: A Subjective Study and No Reference Algorithms
73.	Quantum Resistant Cryptographic Protocols for Cloud computing
74.	Rad-Hard by Design (RHBD) Memories IP development
75.	Radiation Hardened Digital-Intensive Multi-Phase Synchronous DC-DC Buck Voltage Regulator
76.	RF System-on-chip solution of Tri-band for the IRNSS using CMOS/BiCMOS process.
77.	RTE-modelled fully-3D satellite-based atmospheric microphysical tomography for cloud-aerosol-trace gas estimation
78.	Sea-level changes during the Late Quaternary period and Environmental Impact Assessment along with West Coast of Maharashtra, India: Implications to Climate Change

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79.	Serpentoid robots for unmanned exploration of Moon and Mars
80.	Smart Metasurface-based Reconfigurable Partially Reflecting Surface for 2-40 GHz
81.	Smoke characterization of Flaming and smouldering materials in micro-gravity
82.	Study of atmospheric Carbon dioxide (CO <sub>2</sub> ) and Methane (CH <sub>4</sub> ) variabilities using satellite data and Atmospheric Chemistry Transport Model over the Indian sub-continent
83.	Super-compatible shape memory alloy slender structures for space applications
84.	Survival and stability of probiotics under simulated gastric fluid, simulated intestinal fluid and simulated microgravity conditions
85.	Trends in the Glacier Recessions from Kanchenjunga National Park (India and Nepal): Studies based on Spatio-temporal variability and Paleoclimate signatures
86.	Understanding Photosynthetic Electron Transport Chain and Certain Biochemical Responses in Plants and Cyanobacteria Under Simulated Microgravity: A Step Towards Sustainable Life in Space
87.	Unsupervised Semantic Segmentation of High Resolution Satellite Images
88.	Vibration Isolation using Bandgap Metamaterials
89.	Wind and Sea-swell spectral data assimilation to improve wind and wave prediction using satellite data