

**Completed Projects under Space Technology Cells  
(From 2008 – July 2023)**

**IISc Bangalore**

<b>Sl. No.</b>	<b>Title of the Project</b>
1.	Development of a surface EMG device for analysis of human muscle dynamics
2.	Prediction of stream flow at river basin scale under climate change scenarios
3.	Studies on Cowl/ramp interactions at hypersonic mach numbers
4.	Shock tube studies on pyrolysis, combustion and ignition delay of fuels
5.	Effect of temperature on atomization in Gas centered coaxial injection systems
6.	Experimental investigation of shape memory effect in noble metallic nanowires
7.	Measurement of convective surface heat transfer rates for a missile shaped body with forward facing cavity flying at hypersonic Mach number
8.	Flood assessment using satellite images
9.	Plastic crystal composite electrolytes for rechargeable lithium batteries
10.	Root zone soil moisture retrieval by assimilation of near surface measurements
11.	Nano size ZnO synthesis by microwave heating techniques for optoelectronic and gas sensing applications
12.	Measuring displacement and strain field using digital image correlation
13.	Prediction of properties of single walled and multi walled carbon nanotubes and nanocomposites
14.	EM analysis of integration and packaging issues with RF MEMS switches
15.	Application of stable isotope technique in rain water sample to understand tropical convective system
16.	Development of a fluid structure interaction strategy for incompressible fluids

Sl. No.	Title of the Project
17.	Prediction of micro vibrations in a space craft
18.	Design, development, fabrication and characterization of MEMS based flow sensor
19.	Catalytic performance of iridium supported on carbon nanotubes in hydrazine fuel decomposition for space applications
20.	Nonlinear optimal guidance and control of reusable launch vehicle in descent phase
21.	Hyper spectral image processing for agriculture data
22.	Methodology for assessing and quantifying stability of humans while standing and during gait on stable and unstable platforms
23.	Studies on thin film coatings for multi junction solar cells
24.	Establishment of shock tube facility for the study of thermal protection system materials for re-entry applications
25.	Mapping of shear/suture zones in southern India with remote sensing and geological applications.
26.	Development of Plasma Accelerators for Space Propulsion
27.	Development of MEMS based static pressure sensors for hypersonic shock tunnels
28.	Pulsation characteristics of sprays discharging from gas-centered coaxial atomizers
29.	Development and characterization of catalyst for Hydroxyl Ammonium Nitrate (HAN) monopropellant
30.	Wireless Structural Health Monitoring of Impact Damage and Vibration in Spacecraft Structures
31.	Multi-temporal Time Series Analysis of Satellite Image
32.	Study of Jet Impingement Aeroacoustics Using Acoustic Holography
33.	Microfabrication and packaging of high-resolution accelerometers
34.	Large deformation analysis of fiber-reinforced elastomers
35.	Development of efficient high-resolution multi-domain combined compact schemes for simulation of fluid flows
36.	Studies on the development of sol gel based protective coatings on thermal control surfaces of spacecrafts

Sl. No.	Title of the Project
37.	Inverter Output Filter for AC motor Devices
38.	Low Voltage actuated digital microfluid chips using nanostructured SiO <sub>2</sub> films
39.	Thermo-acoustic pulse tube refrigerators operating down to 100K
40.	Using satellite telemetry to track a migratory marine turtle
41.	Assimilation of remote sensing data for modeling the land surface fluxes at watershed scale using a distributed hydrological model
42.	Novel and Parallelized Computational Schemes for Wrinkled Membranes and Unfurling Inflatable Structure
43.	Generation of modulated microwave signals using integrated optical techniques
44.	Hydrated mineral evolution on earth and other planetary objects: An insitu crystallographic approach combined with spectroscopic studies
45.	Organic Materials for Solar Cells
46.	Ab Initio Analytical Study of the Effect of Strain on Silicon Nanoelectronics
47.	Boron based highly luminous and low voltage Display Materials
48.	Understanding the effect of an elevated stressor hormone associated with space mission on neural function using live neuronal cultures
49.	Probabilistic seismic hazard evaluation of Karnataka state considering local site effects and revisit of source characterization based on remote sensing data
50.	Numerical Simulations of vapor Growth in the Evaporator of a capillary pumped loop
51.	Multifunctional Carbon Nanotubes (CNTS) material for optical mirror Applications in space
52.	Experimental analysis of Bubble Dynamics and Temperature Field in a Dual Compensation Chamber Loop Heat Pipe
53.	A Compact Atomic Force Microscope for operation in space
54.	Pyrolysis & ignition delay studies on fuels of interest to ISRO
55.	Online Trajectory optimization for optimal and Robust Guidance of Launch vehicles

Sl. No.	Title of the Project
56.	Performance evaluation of pulse tube cryocooler through dynamic pressure-mass flow measurements
57.	Model-Independent prognostics method for automated contingency management of spacecraft subsystems
58.	Design and building of a batch reactor for screening catalytic decomposition of various monopropellants
59.	Infrared transparent chalcogenide glasses: Materials to see beyond visible
60.	Palladium functionalized one-dimensional (1D) carbon nanotubes and silicon nanowires for hydrogen gas sensing
61.	Measurements of deformation fields through image analysis for complex constitutive materials
62.	Studies on tuning of the Kalman filter statistics and the gains
63.	Development, fabrication and characterization of low cost MEMS based digitally compensated pressure sensor
64.	Validation of discrete, linear state-space systems
65.	Feasibility study fabrication/design plan for energy scavenging using polymer piezoelectric on a stretchable membrane
66.	Probabilistic behaviour of modal properties of an airframe
67.	Effect of cryotreatment on the mechanical properties of metals
68.	Experimental investigation of high enthalpy test gas with inorganic nanomaterials in a shock tube
69.	Enhancing surface plasmon resonance sensitivity using metamaterials
70.	Thermoelectric characterisation of PbTe-SB & PbSe-Sb multilayer thin films
71.	Where is the grass green? Quantifying historical declines and mapping existing grasslands in India
72.	Optical investigation of nano-structured 3D plasmonic crystals
73.	A Setup for the study of resistance fluctuations in magnetic tunnel junctions
74.	Defluoridation of drinking water using activated alumina as an adsorbent
75.	Effect of geometrical and flow parameters on drop size distributions for sprays from gas-centered swirl coaxial atomizers
76.	Acceleration responses at different body segments and selected body orientations to spacecraft takeoff and impact

Sl. No.	Title of the Project
	landing
77.	Physics of machining advanced composites
78.	Nanoscale chemoresistive gas sensor
79.	High Temperature Superconductor Based Liquid Level Probe For LOX System
80.	DHM Based Precision Assembly Simulation of MMIC Packages
81.	Dynamics of sharks and migratory cycle in west coast of India
82.	The Advection-Condensation Model and Water Vapour in the Atmosphere
83.	Paleo-geographic reconstruction: Development of a new GIS based methodology
84.	Utilizing ionic liquid electrolytes to synthesize polymer electrolytes for lithium-ion Batteries
85.	Robust and efficient signal processing techniques for multicomponent FM signal parameter estimation
86.	Source of Black carbon of particulate fraction in Himalayan Snow using stable isotope analyses
87.	Organic and Metal-Organic Hybrid Assemblies For Sensing
88.	Understanding Aeroacoustic Scattering of Supersonic Shrouded Jets
89.	Classical and quantum low density parity check codes, construction and performance bounds
90.	Amorphous silicon carbide thin films by pulsed DC magnetron sputtering for micro electro mechanical systems applications
91.	Seismic vulnerability assessment using high resolution remote sensing data for disaster management.
92.	Synthesis and electro-optical studies of core/shell semiconductor nanocrystals for energy applications
93.	Urban revolution: Urbanisation pattern and environmental sustainability analysis of major cities
94.	Estimation of soil hydraulic properties in a catchment using agro hydrological models and microwave remote sensing
95.	Major, trace element and chromium isotopic study of the lunar impact crater India

Sl. No.	Title of the Project
96.	Processing of novel metallic thermal interface materials using liquid phase sintering followed by accumulative roll bonding
97.	Self healing circuits implementing open fault repair in circuits using micro-particle automations
98.	Development of a versatile optofluidic microscope for initiating Indian space research programs in biomedicine and telepathology
99.	Development and characterization of composite coatings based on nanoporous aluminium alloy surfaces
100.	Study of tribological properties of polytetrafluoro-ethylene at cryogenic temperatures
101.	Novel techniques to map and monitor forest degradation in the Nilgiri Biosphere Reserve
102.	Investigation of spatial and temporal dynamics of vegetation in semi arid ecosystems
103.	Development, realization and characterization of nanoparticle based radiation detectors for space applications
104.	Studies of integration of GPS and INS for varying coupling architectures using stochastic filters
105.	Preparation of carbon nitrides for space applications
106.	A Novel liquid droplet based bistable MEMS switch
107.	Sensor integrated wireless mote for compressed sensing and health monitoring
108.	Modeling primary atomization of liquid jets using the level set method
109.	Understanding the fine scale duration characteristics of tropical rainfall
110.	Development and performance evaluation of PCM coupled heat pipe
111.	Unified correlations for bubble dynamics and bubble visualization within the evaporator of loop heat pipe and performance studies of LHP
112.	Combustion studies of composite propellants containing nano burn rate catalysts
113.	Development of Eco-friendly High-performance Piezoceramic actuator materials
114.	Development of Low cost colloidal HgCdTe Quantum Dot photodetectors and their utility in the monolithic infrared focal plane arrays

Sl. No.	Title of the Project
115.	Synthesis, growth and studies of magnetocaloric materials
116.	A setup for the study of thermal properties of nanoscale devices of ultrathin layered materials
117.	Numerical simulations of vapor growth in the evaporator of a capillary pumped loop
118.	Generation of BPSK/QPSK modulated microwave signals using optical techniques
119.	Movement strategies for commensalism: coexistence of meso-carnivores in human-dominated landscapes
120.	Investigating the origin of the Indian Ocean Geoid low
121.	Development of whole-Earth models for understanding core-mantle interaction
122.	Investigation of vegetation changes in the arid Trans-Himalayan ecosystem of northern India
123.	Towards Ultrafast Investigation of Laser Initiated Decomposition Mechanisms, Kinetics and Dynamics of Metalized Energetic Materials
124.	Local and global extinction of shear stabilized turbulent premixed and partially premixed flames in high speed flows
125.	Theoretical and computational study of frictional effects in viscoelastic and generalized elastic contacts
126.	3-D Die Level Packaging for hybrid systems
127.	Developing wafer scale plasmonic devices to improve near and mid-IR detection in harsh environments
128.	High resolution image restoration and enhancement using GPU
129.	Conjugated Polymer Nanocomposites for Organic Solar Cells
130.	Development of optimization based image processing software system for Indian forest resource assessment using Radar Satellite (RISAT) images
131.	Effect of impurities and alloying on the growth of intermetallics, Kirkendall pores and diffusion mechanism in Cu-Sn system to flip-chip bonding
132.	Engineering length and rigidity of M13 filamentous bacteriophages.
133.	Electrical and optical studies of vertically stacked hetero-structures made of atomically thick two-dimensional materials.

Sl. No.	Title of the Project
134.	A platform for supporting capture, structure and reuse of design knowledge applied to the domain of spacecraft mechanisms.
135.	Generic re-entry configuration with double aero-spikes at the nose.
136.	Geochemical and isotopic study of Jarosite and its implications for aqueous alteration in planetary surface environments.
137.	Micromechanical analysis for damage modeling of unidirectional composite laminae.
138.	Modeling of evapotranspiration from remote sensing
139.	Quantification of cure residual stresses in polymer composites
140.	Fine-scale structure of outgoing longwave radiation with an emphasis on the northward propagating Boreal Summer ISO
141.	Contact induced deformation of anodized aluminium alloy surfaces
142.	Development of high emissivity coating for thermal protection systems and study of their interaction with shock heated test gases
143.	Development of magnetorheological (MR) fluid for application of PSLV/GSLV
144.	New synthesis route to prepare infrared transmitting bulk chalcogenide glasses and glass-ceramics
145.	Development of new high temperature, high strength and high heat flux copper based materials for space application
146.	Integrated guidance and control of a lunar module for optimal soft-landing
147.	Sustainable synthesis of Li-Fe-P-O quaternary cathodes for Li-ion batteries with tailored morphology (SuperLion)
148.	Performance evaluation of MEMS based space qualified pressure transducers under extreme environment for inter-planetary mission
149.	Solution processability of transition metal dichalcogenides and related applications
150.	Development of a 3-D Riesz Scanner
151.	Physics of compact objects and underlying Supernovae
152.	Fabrication of novel dielectric and ferroelectric ceramic polymer composite fabrics for space applications



Sl. No.	Title of the Project
153.	Investigation of thermoelectric and mechanical properties of La <sub>3</sub> Te <sub>4</sub> system
154.	Development of Low Power Consuming Synthesis Strategy for High-performance Ecofriendly Piezoceramic Sensor/Actuator
155.	Synthesis of Nanoparticles Decorated Carbon Nanotubes for Thermal Control Coating Applications
156.	Sn-whiskering: Mechanism and Suppression
157.	A-SiC/cSi heterojunction photo detectors with low noise for space applications
158.	An optical system for characterization of multiaxis dynamics of MEMS devices
159.	Sensor nodes with integrated electronics on flexible substrates for wireless sensor networks
160.	Design and development of environmentally benign strategies for selective decomposition of hydrazine and its derivatives to hydrogen gas and/or safer products
161.	Inferring ecological feedbacks from spatial patterns and remote sensing data
162.	Novel polymer sheathed ammonia borane based hydrogen storage systems
163.	Evaporation from Novel Porous Wick Structures including leaf like ones
164.	Mechanical Design and Microfabrication of Electro-thermally Actuated Compliant Bistable RF MEMS Switches
165.	Aeroacoustic sound sources in Mach 1.3 merging twin jets
166.	Exploiting strong thermoelectric effect in 2D transition metal dichalcogenides for IR sensing applications
167.	Quantum-noise limited displacement detection of nanoelectromechanical systems (NEMS) based on two-dimensional crystals
168.	Investigation of vegetation changes in the rangelands of peninsular India
169.	Arrays of high responsivity III-nitride solar blind UV detectors
170.	Agile Light Sources through Spectral Processing of High Power Super-continuum Lasers
171.	Satellite Image Denoising in Hardware
172.	Petrographic, Geochemical, Isotopic and Remote Sensing study of the Dhala impact crater, India

Sl. No.	Title of the Project
173.	Auto-ignition of H <sub>2</sub> jet in a scramjet combustor flow
174.	Ecological ecosystem characterization by analyzing high resolution satellite imagery using contemporary processing methods
175.	Hydrogen gas sensor on plastic substrates
176.	A geometric-mechanics approach for precise control of deployable structures: A case study with tendon-driven elastic arms
177.	Development of fatigue testing machine for cryogenic temperatures
178.	Design and development of an integral cold generation and transportation system
179.	Exploring biofuel prospects in West Coast of India
180.	Optimizing Interconnects for 3-D Packaging of Hybrid Systems
181.	Lithium-Sulfur Batteries with Ionic Liquid Based Polymer Electrolytes and High Capacity Sulfur Cathodes
182.	First principles based exploration of atomically thin layered material for next generation Li-ion battery
183.	Non-mechanical beam steering using dielectric meta-surface mirror
184.	Onboard passive micro vibration isolation in spacecraft
185.	Synthetic and spectroscopic studies of novel semiconductor materials for light harvesting and opto-electronics
186.	Synthesis, Structural, Magnetic and Electrical Characterization of Pure and Doped Spinel LiFe <sub>5</sub> O <sub>8</sub> Crystals for Space Applications
187.	New topological and magnetic phases of pyrochlore iridate thin films and heterostructures
188.	Development of Giant Electrostrain Piezoceramics
189.	Piezotronics and sensing with ultrathin MoS <sub>2</sub> membranes
190.	Passive Mixing Enhancement Technique for Sonic Jets in Supersonic Cross-Flow
191.	Quantum Dots Containing optical fibers for temperature sensing applications in Indian Space Research programs
192.	Development of Dendrite-Growth Resistant Li-Ion Conducting Materials for Solid State Batteries

Sl. No.	Title of the Project
193.	Tailored Thin-film Li-ion and Na-ion Micro-Batteries
194.	Bacterial growth induced self-healing and smart consolidation of structural mass
195.	Economics of constellation of communication satellites: Accounting for uncertainties
196.	Vortex Phenomena over delta and double delta wings
197.	Development of Patterned Quartz Substrates for realization of SAW filters Using Micro Machining Technology
198.	Satellite Image Restoration in Multiplicative Noise Conditions
199.	Development of graphene oxide-polymer composite thin film capacitors with high energy storage density
200.	Thermo assisted same-material self-pierce riveting of aluminium alloys
201.	Ternary Blend Organic Solar Cells
202.	Development of High Frequency AC Power Distribution System for Satellite Application
203.	Development of a Software for the evaluation of the surface charging of spacecraft at the geosynchronous orbits
204.	Development of far-infrared transmitting Te based chalcogenide glasses for space applications
205.	Advanced Guidance and Control of a Spacecraft for Station- keeping in Halo Orbit at Sun-Earth L1 Lagrangian Point
206.	Capillary-fed Evaporative Microthruster for Micro/Nano Satellites (CAFEMS)
207.	Wall pressure spectrum beneath a turbulent boundary layer: measurement and semi-empirical modelling
208.	Satellite Image Super-Resolution using Deep Neural Networks
209.	Printed, high performance microsupercapacitor arrays
210.	Oxygen reduction reaction catalyst development for fuel cells using in situ Spectroscopy
211.	Multispectral and UAV image fusion by image Super-resolution using General Adversarial Network (GAN) Deep learning archit
212.	Leak Detection Tapes for Hydrogen Pipelines

Sl. No.	Title of the Project
213.	Shear banding dynamics in structural alloys under impact loading
214.	Synthesis of smart multifunctional nano-composites for corrosion sensing, proprotection and inhibition of metallic structures
215.	Development of Fast Response Cryogenic Temperature Sensors using Graphene nanocomposites for Aerospace Applications
216.	Tetrazole-based metal-organic hybrid and covalent assemblies as CO <sub>2</sub> absorbents
217.	Nano-scale sensors for wall-shear-stress measurements through induced heat transfer in hypersonic flows
218.	Acoustic emission characterization of friction stir welded joints in aluminium alloy AA2219 used for aerospace applications
219.	Experimental investigation of supercritical injection and mixing of propellants at liquid rocket engine relevant conditions
220.	Edge-aware interpolation for terrestrial 3-D maps
221.	Fast equalization of batter stack by soft-switched multi-cell to multi-cell balancing
222.	Quality assessment of pansharpened images
223.	Design of high performance piezoceramics using relaxor ferroelectrics
224.	Photosynthetic stress detection through phase-stabilized Fourier transform spectrometers with single cell detection sensitivity
225.	Optimization of the production and separation of Dimetheyl ether for its use as green propellant
226.	Estimation of vulnerable soil-carbon and hotspots of carbon-efflux across different land-use in India: Development of soil respiration model using satellite remote sensing and in situ measurements
227.	Superresolution of hyperspectral remote sensing images
228.	High precision satellite image denoising in hardware
229.	Development of graphene-CNT-BN based hybrid polymer composites as efficient thermal interface materials
230.	Mechanics and materials related reliability of advanced microelectronic devices: Effect of sample length-scale on microstructural evolution and mechanical behaviour of Pb-free Sn-rich miniaturized solder joints
231.	Optimization of heat treatment and characterization of superalloys

<b>Sl. No.</b>	<b>Title of the Project</b>
232.	Exploration of NaSICON frameworks as cathodes for Ca-batteries using first-principles
233.	Investigation of sloshing induced pressure fall in LH2 and LOX tanks of cryogenic propulsion stage (C25) during flight
234.	Optimization of a ternary green propellant composition for space thrusters
235.	Highly sensitive IR detection using photogating by electrically defined quantum dot
236.	On the transfer of thermally unstable energetic molecules to gas phase using electrospray
237.	Research and development of MoS <sub>2</sub> Quantum Dots based non-contact temperature sensor for applications in Indian Space Research programs

### IIT Bombay

<b>Sl. No.</b>	<b>Title of the Project</b>
1.	Analysis of Hyperspectral Remote Sensing Images and Application to Agriculture
2.	Development of Novel magnetic Nanocomposite films for a Magneto-Optical Sensor- Phase –I
3.	Identification of Chaos in slosh and sliding remote control of slosh using 2 DOF slosh rig
4.	Generation of 3D Microscopic Hydro-phobic Geometries on Metallic Surfaces using Excimer (UV) Lasers
5.	Assessment of Turbulence Models in Hypersonic Reacting Three-Dimensional Flow Around Re-entry Flight Vehicles
6.	Investigation of Rarefied Gas Flow Through Closed Ducts as Applied to Outer Space Vehicles and Micro channels
7.	Development of Kerosene based nano-fluid for enhancement of internal flow convective heat transfer
8.	Transonic buffeting of expendable and reusable launch vehicles
9.	Fast Sign-of-Laplacian-based Image Matching
10.	Compact Ku-Band On Chip VCO for satellite Communication
11.	IITB Student Satellite project (ISSP)

Sl. No.	Title of the Project
12.	Hybrid Control and Fault Detection during Re-entry of reusable Launch Vehicles
13.	Singularity Avoidance Algorithms in Variable Speed CMGs
14.	Development of High Resolution Schemes for Flow Computations on Space Vehicle Configurations using Unstructured Grids
15.	Study of shock-turbulent boundary layer interaction in high-speed air intake - Phase II
16.	Estimation of viscous drag on a scramjet engine in a shock tunnel through wall-heating rate measurements
17.	Decentralized Control of Multi-satellite Formation Flying
18.	Rapid Development and Manufacturing of Machined Aerospace Components
19.	Assessing Impacts of Global and Local Changes on River Basin Scale Hydrology
20.	Estimation of Sea Surface Nitrate-nitrogen from SST and chlorophyll-a- in using OCM and Thermal Sensors : an investigation of new production around Mumbai coast
21.	Near Real-Time Detection and Assessment of Disbonds in Honeycomb Composite Sandwich Structures using Ultrasonic Guided Waves
22.	Development of a Direct Simulation Monte Carlo Code for High Speed High Knudsen Number Flows
23.	Development of Magnetic Nanocomposite Films and A Prototype Magneto-Optical Sensor
24.	On chip Ku/K band quadrature oscillator and PLL
25.	Microwave Remote Sensing and SAR Tutor with Virtual Laboratory
26.	A 14GHz Phase Locked Loop and Millimetre-Wave Circuits in Standard 90nm CMOS Technology
27.	Investigation of novel multi-functional materials from the full Haussler family
28.	Development of a six-component accelerometer balance for use in shock tunnels
29.	Application of imaging spectroscopy and thermal remote sensing techniques in delineating palaeo-channel related calcretes; an investigation in parts of Rajasthan and Gujarat for carnotite exploration”
30.	Effect of Terrain Relief and Vegetation Cover on Interferometric SAR Derived Digital Elevation Models

Sl. No.	Title of the Project
31.	Controllability Issues in Satellites
32.	Ignition delay studies of fuels using a shock tube
33.	Synthesis and Combustion of Methylcubane
34.	Design and fabrication of 3D Micro-textured Hydrophobic Geometries on Metallic Surfaces – part II
35.	Dual Band Dual Polarized Multilayered Broadband Microstrip Antenna Array for Satellite Communication
36.	High strain rate deformation of aerospace Al alloys experimental studies and development of constitutive relationships
37.	Materials for thermoelectric power generation in space
38.	High Gain Agile Antennas and Feed Arrays for Multibeam Antennas
39.	Signal processing for Performance Improvement of Multi-object Tracking Radar
40.	Calibration of Polarimetric SAR systems and Software Development
41.	Spacecraft Orientation Maneuvers Under Control and State Constraints
42.	Micro structural origin of Residual Stresses in AA7075
43.	Design and Development of Low Cost Green Anechoic Chamber
44.	Novel route towards fabrication of Borides-Carbon Nanotube (CNT) Bulk Composites with Higher Volume Fraction of Uniformly Distributed/dispersed CNTs
45.	Development of Invisible Watermarks For Vector GIS Data Layers
46.	Heat flux prediction in shock - boundary layer interaction and multi-jet interaction with reversed flow
47.	Evaluation and mapping of flooding along Paradip coast due to storms and tides using Numerical modelling and Geo-Spatial Techniques
48.	Transfer Learning Driven Rapid Change Detection for Disaster Management
49.	Micromechanics of textile composites
50.	Numerical Simulation of Arc Plasma in Arc-Heated Wind Tunnel

Sl. No.	Title of the Project
51.	Investigation of the effect of surface roughness on the heat transfer rates of a typical reentry capsule.
52.	Novel Absorber Materials for Multi-junction Solar PV Application using Non-toxic and Earth Abundant Element
53.	A self-consistent predictive quantum transport simulator for quantum dot IR photo detectors
54.	Fractional NPLL and ADC for IRNSS User Receiver
55.	Development of Mild and Efficiency Nitration Reactions: Synthesis of High Energy Materials Relevant to Rocket Propellants
56.	Development of Ohmic Contact and Schottky Contact on Gallium Nitride (GaN) HEMT
57.	Optimization of Hot Workability and Control of Microsturcture in Cu-Cr-Ti-Zr Alloy: An approach through Thermo-Mechanical Simulation
58.	Simulation, design and development of a solid state hydrogen storage system
59.	Spacecraft orientation manoeuvres under control and state constraints- Phase 2
60.	Synthesis and Combustion of Novel Energetic Compounds
61.	Simulation of interaction of rocket engine exhaust with lunar dust using DSMC
62.	Development of Pulse Doppler Processing algorithms for MOTR
63.	Sparse Signal Recovery Techniques for Atmospheric Radar
64.	Development of a 3D transient, non-isothermal, multiphase model of a PEM Fuel Cell
65.	Experimental and Numerical Studies on Pulse Detonation Rocket Engines (PDRE)
66.	Polarimetric Synthetic Aperture Radar (SAR) data analysis for Earth Observation applications
67.	A Comprehensive Mapping of Flood Risk in Changing Climate : An Application to Jagatsinghpur District, Orissa
68.	Growth and Characterization of AlGaN/GaN Heterostructure by Plasma Assisted Molecular Beam Epitaxy Technique for High Mobility
69.	Microstructural modeling of aerospace titanium alloys during hot working



Sl. No.	Title of the Project
70.	Experimental Measurements and Theoretical modeling of Deformed Microstructures and Work Hardening Responses in Selected Aluminum Alloys
71.	Investigation of flow separation mitigation techniques under hypersonic shock wave boundary layer interactions for scramjet engine applications
72.	Development of a Structural Health Monitoring System for Condition Assessment of Large Composite Sandwich Panels Using Ultrasonic Guided Wave Technique
73.	Discrete mechanics and optimal control applied to reentry vehicles
74.	Understanding the interaction between transportation systems and landuse in Mumbai Metropolitan Region using satellite data
75.	Microstructural engineering in Niobium alloys for enhanced performance and Materials Science
76.	Mapping flood risk in data poor regions enforcing combined geomorphic and socio-economic indicators: An application to Jagatsinghpur District, Odisha
77.	Multi-Disciplinary Design Optimization Study of LTA Systems for Venus Exploration
78.	Delayed cracking in maraging steel weldments: Material characterization and FE modeling Principle
79.	Physio-chemical conditions of formation of bole beds within Deccan basalt for Martian analogue
80.	A flood warning system for entire India-optimal utilization of satellite-based data and development of a computationally efficient flood-inundation model
81.	Comprehensive Simulation Engine for Type-II Superlattice based Barrier Infrared Photodetectors
82.	Modeling and Validation of Evapotranspiration from India Space Borne Thermal Sensors
83.	Effect of Acoustics on the Characteristics of Swirl Coaxial Atomizer
84.	Development of a 3D-DSMC code for simulation of rocket engine exhaust with lunar dust
85.	Ignition Modelling of Semi Cryogenic Engine

## IIT Kanpur

Sl. No.	Title of the Project
1.	Identification and control of combustion instability in bluff body stabilized diffusion flames
2.	Study of spray combustion in a swirl stabilized dump combustor
3.	Measurement of 3-D unsteady velocity field of impinging transient supersonic jets using time resolved PIV to identify noise producing large structures and developing a strategy to control those using micro-jets and water injection
4.	Development of DR based 3D CT system
5.	Corrosion protection of Mg-Li alloys
6.	Fabrication of micro channel (<500 Microns) on aerospace materials
7.	Development of Zirconium di-boride and hafnium di-boride based Ultra High temperature composites (UHTC) for Applications in space vehicles
8.	Development of Ultrafine High Strength in situ composite for aerospace Applications
9.	Carbon-Carbon Composites for Structural Applications using Carbon Nanotube Coated Carbon Fiber and Synthetic Resin (Phenol-Formaldehyde)
10.	Development of High Speed Schlieren System to Visualize the Shock Structure During Start-Up of GSLV MK-III
11.	Toughened Ceramics:ZrO <sub>2</sub> Stabilized With Nano Ceramics
12.	Development of Carbon Nanotube Coated Backing Structure/Bipolar Plate (Exfoliated Carbon Nanostructured Reinforced Phenolic Nanocomposites) for the PEM Fuel Cells: Performance Evaluation
13.	Starting flow characteristics of S200 solid motor in ground test conditions: near and far field acoustics and near field velocity measurements
14.	Developing biomedical technologies to counter the deleterious effects of microgravity on the rod and cone photo-receptor network of the retina
15.	Doped oxides as anodes for hydrogen generation via water electrolysis
16.	Satellite Formation Keeping Control
17.	Development of Carbon Nanostructure Reinforced Bipolar Plates made of Phenolic Resin and Carbon Fiber for the PEM

SI. No.	Title of the Project
	Fuel Cells: Performance Evaluation
18.	Study of High Entropy Alloys for Enhanced Ductility: Preparation and Consolidation
19.	Total Variation and Compressive Sensing for L1 Regularization Based Image and Video Restoration
20.	Model based tomographic subsurface soil characterization
21.	CNT Reinforced Composites for Structural Applications
22.	Excimer laser micromachining for miniaturized hybrid microwave integrated circuits (MHMIC)
23.	Modeling of a electro-dynamic shaker for predicting its mechanical response due to electrical input variables
24.	Development of Brazing Alloys and Techniques for Ti-based Alloys
25.	Role of Particle Size of Ytria Stabilized Zirconia On the Wear Resistance of the PLASMA Sprayed Aluminum Oxide Coatings
26.	Numerical Characterization of strut-ramp injector for supersonic combustion using Large Eddy Simulation (LES)
27.	Development of a Multi-scale, Multi-physics Particle-based Flow Solver for Flow-field Prediction in Transitional Flow Regime
28.	Free Space Optical Communication with Acousto-Optic-Modulator based Transmitter
29.	Satellite stereo triplet image matching for digital elevation model generation
30.	Plasma Exposure Damage of Ultra High Temperature Ceramics
31.	Effect of Heat Treatment on the Mechanical Properties of Thermo mechanically Processed Russian grade 12X21H5T Duplex-Steel
32.	Phase-II Expanded Proposal on Design of Active Flexible and Re-configurable Parabolic Antenna using SMA based Smart Actuators
33.	Experimental Studies on Kerosene Gel-propellant Spray loaded with nano-Aluminum Particle
34.	Si/Ge nanowire anodes and non-native nanostructured cathodes for advanced Li ion batteries
35.	Highly Stable Nanoparticles-Nafion Nanocomposite via Click Chemistry for Fuel Cell Applications.

Sl. No.	Title of the Project
36.	Microwave Metamaterial Absorbers
37.	Powder Metallurgical Processing Of Diamond-Based High Composites With Transition Metal Additives
38.	Novel strategies for source node localization in mobile AD-HOC sensor networks
39.	Powder Metallurgical Processing of Cu-Sn and Tungsten Heavy Alloys and their Composites
40.	Kinetics of Microstructure Evolution in Brazing Joints of 0.07C-16Cr-6Ni Steel and Silver Obtained with a Ag-Cu-Sn Filler Metal
41.	Development of Brazing Filler Alloys for Dissimilar Metal (Ti based Alloys with Steels) Brazing (ISRO Applications)
42.	Effect of crystallographic texture and microstructure on mechanical properties of light weight aluminum-lithium alloys
43.	Feasibility study on "Development of High Temperature and Ultra High Temperature Composites for TPS Applications"
44.	Ultrasensitive Thermal Spectrometer with Molecular Size and Mass Sensitivity
45.	Application of Meta-material Mushroom Structure for Realization of Planar Single / Triple Pass – band Filter for Significant Size Reduction
46.	HEMT modeling for broad temperature and frequency ranges
47.	Microwave Active Remote Sensing of Buried Objects
48.	Surface texturing to enhance adhesion interface between dissimilar materials using (ECMM) (Phase-1)
49.	Physical Metallurgy of Mg-Li Alloys and Coatings
50.	Feasibility study of Photonic bandgap structures for space applications.
51.	Design of a Smart Inflated Torus and Antenna Membrane
52.	Comprehensive Two & Three Dimensional Modeling of Water Permeation across Proton Exchange Membrane in Fuel Cell integrated with Electro- Osmotic Pump.
53.	Stress Concentration Factors (SCFs) in Curved Plates for Space Applications
54.	Development of Novel Plasmonic Devices for Next Generation Chip-scale Technology based on Nanophotonics

Sl. No.	Title of the Project
55.	Development of integrated heat pipe based passive thermal Management platforms with vibration isolation capability
56.	Vibration Control of Cryo-coolers for Satellite Applications
57.	Growth and aging of tissues under microgravity environment
58.	Laser Assisted Fabrication of Functionally and Microstructurally Graded Thermal Protection Systems (TPSs) for Reusable Launch Vehicles (RLVs).
59.	Numerical investigations on surface gravity waves and internal tides
60.	Three dimensional transient analysis of side load for current and future booster nozzles during start-up and shut down.
61.	Design & Development of Supercapacitor using heavily Nitrogen Doped Graphene
62.	High throughput surface characterization using coherent optical imaging
63.	Surface grooving of Cu/Ni based alloys using Jet Electrolytic dissolution for enhancement of heat transfer rate.
64.	Fabricating of Porous Copper with Carbon Nanotube Reinforcement for Loop Heat Pipe Application.
65.	Mechanical Behaviour and Processing Maps of Suction Cast High Entropy Alloys.
66.	Synthesizing and Characterizing Sulfur High Energy Cathode Material for Lithium Ion Cells
67.	GO <sub>2</sub> / GCH <sub>4</sub> Combustion Studies in High Pressure Rocket Combustors
68.	Underlay Cognitive Radio based Satellite-Terrestrial Non- Cooperative /Cooperative Communication for Efficient Resource Utilization: Protocol Design and Performance Analysis.
69.	Space-Time Trellis /Turbo coding based robust satellite image processing and communication.
70.	Control of transition in Dual-Bell nozzle using film cooling.
71.	Design and Development of active flexible and Reconfigurable Parabolic Antenna using SMA based smart actuator
72.	Development of Friction Stir Welding and Processing Technology for AA2195 structural application.
73.	Numerical simulations of liquid-sheet breakup in gas-centered swirl coaxial atomizers.
74.	Development of a Gas Sensor to detect leakage of Helium gas from Inflatable Space Structures.

Sl. No.	Title of the Project
75.	RTE-tomography based cloud and ocean monitoring.
76.	Design and Development of GaN Based Compact DC-DC Converter.
77.	Application-Aware Image Quality Evaluation.
78.	Surface texturing to enhance adhesion interface between dissimilar materials using ECMM (Electrochemical Micromachining) (Phase-2)
79.	Numerical investigation of a kerosene-fuelled scramjet combustor using RANS based flamelet model.
80.	Accelerated computational algorithms for accurate simulations of acoustic and electromagnetic scattering from open surfaces
81.	Development of high power density polymer electrolyte membrane fuel cell (PEMFC) for space applications: Biomass-derived multidoped carbon/multihelix carbon nanotubes (MHCN) as catalyst support/Pt.-free catalyst.
82.	Interdiffusion and Diffusional Interactions in High Entropy Alloy Systems.
83.	Characterization and Modeling of Radiation hardened CMOS transistors for space applications.
84.	Shape Memory Alloys actuated Mechanically Active Reconfigurable light weight PEEK material based parabolic reflector for active control on RF patterns for High Frequency Micro / Nano Spacecraft Applications.
85.	Integration of spectral and spatial information for hyperspectral image classification
86.	Detectability of Critical Delamination in Composite Space Components: Vibration-based Approach.
87.	Design of polymer nanocomposites based wideband microwave absorbers for stealth and electromagnetic shielding applications.
88.	Modeling and Simulation of LOX- CH <sub>4</sub> (semi-cryogenic) Combustion.
89.	Development of High Entropy Metal Diboride for Ultrahigh Temperature Application.
90.	Development of ultra-small bimetallic oxide nanoclusters (e.g. NiCo <sub>2</sub> O <sub>4</sub> , MnCo <sub>2</sub> O <sub>4</sub> , NiMoO <sub>4</sub> , CoMoO <sub>4</sub> , and MnMoO <sub>4</sub> ) for high performance non-aqueous/aqueous asymmetric electrochemical super capacitor.
91.	Development of Controlled Expansion (CE) Al-Si alloys by packed rolling
92.	Microstructural and Mechanical Characterization of High- Silicon Stainless Steel.
93.	Gigahertz and Terahertz antenna on photonic crystal substrate

Sl. No.	Title of the Project
94.	PDK Development and modeling support for ISRO's GaN HEMT Technology.
95.	Development of novel thermoelectric power generator for waste heat recovery in space.
96.	Impact Melt Cover on Central Peaks of Lunar Impact Craters: Evaluating its Implications for Deriving Sub-Surface Mineralogy using data from Chandrayaan-1 & other recent lunar missions
97.	Optical characterization of wetlands from Earth Observations.
98.	Parallel Electro-Magnetic Solver for Microwave, Infrared, and Optical applications (MIO-PEMS)
99.	Numerical Study of Flow-Thermal Response of a High-Speed Vehicle with Ablative/Non-ablative Thermal Protection System.
100.	Microstructure and Texture Analysis of Hot Forged Ti-6Al-4V Alloy.
101.	Integrating Lithium Oxychloride Based Solid State Electrolytes with Carbon Encapsulated Si/Ge Anodes and Li-Excess NMC Cathodes for Advanced Lithium Ion Batteries.
102.	Molecular size and mass sensitive Ultrasensitive Thermal Spectrometer Application.
103.	Stabilization of a 3D Platform for Space Applications Against Rolling and Pitching Excitations
104.	Characterization and Modeling of Membranes for Inflatable Space Structures
105.	Numerical and Experimental Framework for Laser Based Additive Manufacturing of High-Performance Aerospace Parts of Inconel 718 and Ti Alloys.
106.	Development of Product Based on High Entropy Alloys for Space Technology Applications
107.	Experimental and numerical investigation of aerospoke nozzles for effective propulsion systems
108.	Conformal, Transparent and Lightweight Microwave Absorbers for Ground and Space Applications
109.	Development of Evaluation of Multiscale CNT/polymer composites
110.	Synthesis and Characterization Al-B and Al-B4C alloys as Fuel in Solid Propellant
111.	Hydrogen Storage and Delivery System Based on inexpensive Industrially Scalable Hybrids
112.	Investigation of optical properties of metallic thin films mirrors by low energy plasma (ion) irradiation for space applications

<b>Sl. No.</b>	<b>Title of the Project</b>
113.	Investigation of near and far field acoustics due to the jet impingement on the flame deflector during rocket lift-off
114.	Development of Reconfigurable flat-panel Metasurface Antenna-Phase I
115.	Brazing of Ultra High Temperature HfB <sub>2</sub> -ZrB <sub>2</sub> Based Ceramics
116.	Development of solid electrolyte for sodium-sulfur battery.
117.	Experimental Investigation of Leading Edge Bluntness on Heat Transfer Rate and Flow Unsteadiness in Shock-Induced Boundary Layer Separation in a Scramjet Intake
118.	Biomechanical Aspects of Plant and Root Growth in Microgravity Environments
119.	Forward Error Control (FEC) Schemes for High Data Rate Optical Communications

### IIT Kharagpur

<b>Sl. No.</b>	<b>Title of the Project</b>
1.	Feasibility study of experimentation platforms in satellites
2.	Linking KCSTC to SAC, ISRO through EDUSAT
3.	Maritime location based service
4.	Ka band propagation experiments over Indian tropical region for improvement of Ka band satellite communication
5.	Studies on the construction and performance evaluation of multiplexed binary offset carrier spreading modulation for improved satellite radio navigation signal and system design
6.	Studies on fade mitigation control for microwave satellite signal propagation
7.	Handset normalization and reduction of noise and distortion for voice authentication
8.	Design and Development of Hydrostatic Journal Bearings for Cryogenic Rocket Engine Turbopump
9.	FPGA-based design and development of H-264 codec



SI. No.	Title of the Project
10.	Development of Advanced Polymeric Materials for Improved Electrical /ESD properties Using Nano Additives for Space Application
11.	Feasibility Study of Microwave Imaging for Material Resource Exploitation in Planetary Missions
12.	Development of RF MEMS Capacitive Shunt Switch in Application as Phase Shifters for Satellite Communication Systems
13.	Study of CDMA codes for satellite navigation
14.	Analysis and Development of Conceptual Design Methodologies for Air Collection and Enrichment System of Air Breathing Propulsion- Phase II
15.	Development of a MEMS based Array for bio-medical diagnostics
16.	Nano-fluid Based Coolant and Combustion Fuel System
17.	Design of radiation hardened data converters
18.	Silicon Carbide as high temperature MEMS and MOSFET devices
19.	Error resilient Scheme for Satellite TV system
20.	Design, Simulation and Development of MM-Wave Six Port Receiver
21.	Design of Planar Compact High performance RF/Microwave Filters for Satellite Applications
22.	Design of an Integrated Code for Authentication and Error Correction
23.	Test Simulator for satellite based AIS
24.	Multiple Access array antenna system at S band using digital beam forming techniques
25.	Enhancement of Transport Layer performance for Inter Planetary Network
26.	Study on Improvement of adhesion of EPDM based nanocomposites in Solid Rocket Motor Thermal Insulation applications
27.	Interplanetary Satellite Orbit Determination using Ground based observations
28.	Synthesis of satellite footprint patterns from planar array antennas by combination of Particle Swarm Optimization and Fast Fourier transform

SI. No.	Title of the Project
29.	Analysis of Different Conducting and Dielectric Structures as EMI Sensors
30.	Design & Development of High-Speed Miniaturized RF MEMS Switched Capacitor
31.	Reliability modeling, Analysis and Prediction of 21 NA (Absolute) Pressure Transducers
32.	Use of hyperspectral remote sensing imagery for mineral identification and mineral potential mapping
33.	Testing and Characterization of In-house developed MEMS capacitive accelerometer
34.	Design and Analysis of a Light Weight Cryptographic System on FPGAs
35.	Thermal - aware Task Scheduling for signal- Processor and Multi- Processor Embedded Systems
36.	Pre project-Energy Efficient Routing
37.	Analysis and Design of Wideband Compact Rectangular Patch Antenna Embedded on Cylindrical pin Structure
38.	Theoretical and Experiment Analysis of Evaporation in the Grooves of a Micro Heat Pipe
39.	Design and Development of Application tool for InSAR to Determine Ground Surface Movement
40.	Studies on Retro-Directive Array for Space Applications
41.	Model Based Error Concealments
42.	Studies on new modulation techniques for satellite navigation
43.	Design and implementation of scalable parameterized stream cipher well suited for both software and hardware
44.	GPU based multi-temporal implementation of image change detection algorithms and their verification
45.	Probabilistic estimation of soil moisture from RISAT1 data along with uncertainty quantification
46.	Design of fault tolerant VLSI systems for applications in satellite communication
47.	Secure key management in wireless AD HOC networks
48.	Development of compositionally modulated thermal barrier coating by hybrid technologies
49.	Development of shape memory polymer nanocomposites (SMPN) for space deployable material

SI. No.	Title of the Project
50.	Hands free gesture control for immersive image navigation
51.	Study on different aspects of secured quantum communication
52.	Suitability of free space optical communication link for on board data handling (OBDH) in satellite
53.	Design and fabrication of closed loop MEMS Capacitive Accelerometer
54.	Real time detection of face/core debond initiation and interfacial delamination propagation morphology in sandwich composite panels using fiber optic bragg grating sensors
55.	Feasibility of Design and Development of L & S Band Dual Polarized shared/common Aperture Microstrip Antenna
56.	Microgravity Slosh Analysis
57.	Development of constitutive equations for CNT epoxy nanocomposites
58.	Design and efficient implementation of advanced encryption and decryption techniques for use in spacecraft communications
59.	Reduction of false acceptance/rejection for non cooperative speakers in automatic speaker recognition system
60.	Implementing a scalable video transcoder based on motion compensated temporal filtering
61.	Thermo hydraulic simulation of LOX booster turbo pump for semi cryogenic rocket engine
62.	Protocol development for interplanetary delay tolerant network
63.	Development of Earth Simulator for time domain GPR Applications
64.	Retrieving temperature and salinity profiles in the Bay of Bengal using satellite observations
65.	Droplet-based cooling of Electronic hot spots
66.	Development of Substrate Integrated Waveguide (SIW) based Passive Devices for Satellite Transponder.
67.	Experimental evaluation of forming limit diagram and forming behavior for differently heat treated Inconel -718 material
68.	Damage assessment of composite structures using swarm based optimization technique from changes of vibrational response

Sl. No.	Title of the Project
69.	Theoretical and Experimental Studies on Cooling of Liquid Nitrogen by Helium Injection
70.	Modeling and Simulation of Shrinkage and Warpage of Autoclave Molded composite components
71.	Design, Implementation and performance evaluation of Algorithms for compression of Hyper-spectral data products
72.	Design and Implementation a 250 MSPS, 8 BIT ADC in Sub-Micron Technology for Space Application
73.	Design of Dual/Tri-Band Circularly-Polarized Antennas with Reduced Ground Plane Size
74.	Microencapsulation of Phase Change Material Using Fluidic Method
75.	Geodynamic Modeling and Tectonic Reconstruction of a Fossil Subduction Zone in the Context of Nagaland Ophiolite Complex – Field vis a vis Remote Sensing convergence
76.	Deep Learning for Automated Discovery in Hyper spectral images
77.	Reliability Assessment of L40 Stage Assembly and Integration Process
78.	Advanced High Strength Conjugated Polymer based Conductive Fibers as a Smart Textile Materials for Space Applications
79.	Exploring the MEMS based Flexible Pressure Sensors for Electronic Skin Applications
80.	Indigenous Authenticated Encryption for Satellite Communication
81.	Development of a high-efficiency, high power-density 5KW modular DC-DC Power supply for space applications
82.	Polarimetric Analysis of SAR Images for Segmentation, Classification and Recognition of Objects
83.	Design and development of perforated plate heat exchangers for cooling of gaseous helium by using liquid hydrogen
84.	Assessment and implementation of complex image co-registration and phase unwrapping and Wavelet Based Phase Noise Reduction for interferometric SAR processing
85.	Design and Development of Closed-Loop MEMS Capacitive Accelerometer
86.	Exploration of vertical soil moisture profile by assimilating the surface soil moisture data retrieved from remotely sensed SAR data
87.	Shoreline change Analysis along Andaman and Nicobar Islands: Implication for Coral Conservation
88.	Targeted Evaporative Cooling of Hot Spots using Patterned Surfaces

<b>Sl. No.</b>	<b>Title of the Project</b>
89.	Development of forest health monitoring model based on Hyperion Data for Geo-Environmental Impact management in the Iron ore Mining Belts of Saranda Forest, Jharkhand
90.	Theoretical and Experimental Studies on flow characteristics during Change-over of flow from Start-up tank to run tank during liquid Rocket Engine Testing
91.	Hands-free Gesture Control for Immersive Image navigation (Phase-II)
92.	Establishment of Quantum Communication Link for Space Application
93.	Development of novel multi-oxide in-situ thermal barrier coating for high temperature oxidation resistance using thermal spray and self-propagating high-temperature synthesis (SHS) technique
94.	Uncertainty quantification on Textile Composites (3D)
95.	Two Phase Mechanically Pumped Fluid Loop (MPFL) with micro channel based evaporator for application to high power communication spacecraft, interplanetary mission and human space mission
96.	Thermo-Structural analysis of 16" diameter, 130m long Liquid Oxygen pipeline during chilldown process
97.	Studies on establishment of collapse factor for pressurizing cryogenic liquid at different operable conditions for Ground tests of Cryogenic rocket engines
98.	A Kalman Filter-Based Multi-Constellation GNSS Integrity Monitor
99.	Development of Multi-stage Deep Drawing Set-up and Estimation of Formability of Cu-(0.5-0.8%)Cr-0.05%Ti-0.05%Zr alloy Sheets for Space Applications
100.	Design and implementation of Fault Attack Resilient Encryption for Secure Communication
101.	Development of software tool for multi-and hyperspectral data processing of earth science data for integration of spatio-spectral information for mineral identification and mapping using Deep learning neural network and Graph-cut based method

### IIT Madras

<b>Sl. No.</b>	<b>Title of the Project</b>
1.	Enhancement of atomization in effervescent atomizers using ultrasonics
2.	Numerical predictions of evaporation rate constants of kerosene droplets at elevated pressure and temperatures in high pressure semi-cryogenic rockets

SI. No.	Title of the Project
3.	Study of composite laminates under biaxial stress field
4.	Measurement of elemental species for space exploration applications by using laser-induced breakdown spectroscopy technique
5.	Numerical computation studies on air breathing propulsion system
6.	Stress-state dependent ductile fracture model
7.	Processing of preceramic polymers in the quaternary Si-B-C-N system for ultra-high temperature applications beyond 2000°C
8.	Technology development of proportional solenoid valve for space applications
9.	Experimental studies on high speed air intakes
10.	Development of mixed refrigerant cascade refrigerators operating with non-flammable refrigerants for cooling space simulation chambers
11.	Friction stir spot welding of aluminum alloy 2014
12.	Experimental studies on non-linear effects of piezoelectric materials
13.	Detection of non-linearities in atmospheric weather data and statistical forecasting using multivariate techniques
14.	Buckling control of cylindrical/conical shells for aerospace applications using PZT actuators
15.	Estimation of anisotropic conductivity of plates using the inverse heat transfer method
16.	Detection and classification of algal blooms in Indian coastal waters using Ocean Colour Monitor (OCM) Data
17.	CFD prediction of vortex formation and suppression during the draining of liquid from toroidal tanks
18.	Phased array inspection of friction stir welded (FSW) components
19.	Near nozzle spray structure in semi-cryogenic sprays
20.	Large eddy simulation of multiple round jets
21.	Characterization of metallic materials for biaxial loading

SI. No.	Title of the Project
22.	Non-precious metal catalyst for oxygen reduction reaction in Polymer Electrolyte Membrane Fuel Cells (PEMFC) with improved durability and activity
23.	Modeling, Analysis, Design and Implementation of 2KW Battery Discharge Regulator
24.	Synthesis and multi-scale property evaluation of multi-walled carbon nanotube reinforced aluminium composites having improved dispersion
25.	Computation of strain and curvature from digital image correlation data
26.	Development of an experimental facility for the estimation of anisotropic conductivity of plates using the inverse heat transfer method
27.	Rare-earth silicate environmental barrier coatings for SiC based high temperature materials
28.	Numerical simulation of suppression of residual flames and cooling of solid rocket motors using water injection
29.	Development of Bi-metallic joining technique and realization of Bi-metallic adaptors for launch vehicles
30.	Experimental studies on high speed air intakes with Moving Cowls
31.	Development of Electro spray Based MEMS Microthruster
32.	The high energy Particle detector Project
33.	Synthesis and Thermo-mechanical processing effects on the Microstructure and Mechanical properties of Ti-Al-Ni-Cr-Co-Fe based multi component/High entropy alloys
34.	Development of atmospheric correction algorithm for Ocean Color Monitor (OCM2) Sensor for optically Complex Oceanic Waters
35.	Development of a laser assisted scribing technique to generate gridded strips of a parabolic antenna
36.	Wide-band Frequency Selective Surfaces(FSS) for quasi optical network
37.	Processing and characterization of advanced metallic thermal protection materials for reusable launch vehicle applications
38.	Hybrid rockets for sounding rocket applications using hydrogen peroxide as oxidizer
39.	Numerical Modelling of Arcjet

SI. No.	Title of the Project
40.	Optimization of hot workability and control of microstructure in Ni – base superalloys used in rocket engine applications
41.	Contact stress parameter evaluation using digital photoelasticity
42.	Spatial disaggregation and inverse modeling of quality field level irrigation water distribution and efficiency across a command area using an integrated thermal remote sensing and crop growth modelling approach
43.	Design, Fabrication and testing of programmable high voltage power supply for space applications
44.	Flow characterization studies and performance analysis of an annular aerospike nozzle
45.	Development of the multiscale modelling framework for the fracture studies of textile composites
46.	Mixed mode translaminar fracture of fibre reinforced composites – Experiments and Simulations
47.	Simulation of mixing layer in stratified medium
48.	Identification of mesoscale eddies in the Bay of Bengal using Lagrangian Coherent Structures
49.	Effect of Thermo-mechanical processing on the microstructure, texture and anisotropy evolution in various Ti alloy being used in various launch vehicle programmes of ISRO
50.	Condition Monitoring of Aerospace Structural Materials adopting Multi-Fusion Sensor System
51.	CFD Studies on Jet Deflector Duct of Future Launch Pad for Advanced Launch Vehicles of ISRO
52.	Weld repair of XH43 and XH67 superalloys castings
53.	3D Numerical Modeling of Arcjet Thrusters
54.	Development and Characterization of 3D Graphene Foam as a Thermal Insulator for Space Applications
55.	Development Of Paraffin Based Gas Generator System For Hot Flow Scale Model Tests Simulating Clustered Semi Cryo Engines
56.	Lattice Boltzmann Simulations of Sloshing Dynamics
57.	Heat and Mass Transfer Across Liquid vapor Interface in a Pressurized Cryogenic Tank with and without sloshing
58.	Design and Development of Five Axis Magnetic Field Assisted Fluid jet Polishing machine for Nano-surface Generation on Optical, Metallic, CFRP Composites & Hybrid Materials (with composite backup structure)



Sl. No.	Title of the Project
59.	Probing interstellar and atmospheric anions through Velocity Map Mapping
60.	Assessment of Sea Surface Solar Radiation and Pco2 Fluxes In Coastal and Estuarine Waters Using OCM-2/OCM-2 Data
61.	Development Of Zr,la,b And C Containing Single Source Proceramic Polymer For High Temperature Applications
62.	Evaluation Of Pyrolysis Behavior, Pyrolysis Kinetics And Product Analysis Of Thermal Protection System (tps) Materials
63.	16 bit 5MS/S analog to digital converter
64.	Experimental Investigation of Ageing Related issues in composite solid propellants
65.	Development of Silicon Bicmos Technology for RF Applications
66.	Development of Rotocraft UAV for Operation in Martian Atmosphere
67.	Development Of Large Area (100cm2) Organic-inorganic Hybrid Perovskite Solar Cells
68.	Design And Development Of An Advanced Carbon Fiber 3d Printable Printer
69.	A Non-linear Viscoelastic Constitutive Model For Solid Propellants And Studies On Effects Of Voids
70.	Energy - Efficient & Wide - Range 15mb/s-1.5gb/s Serdes
71.	Design And Development Of SPDT RF MEMS Switches For Ku Band Applications
72.	Development Of A Mixed Refrigerant J-t Cryocooler
73.	Numerical Study Of Performance Of Inducer And Pump Used In Cryogenic Engines Under Cavitating And Non-cavitating Conditions
74.	Estimation of thermal load due to mixing in 10T Vertical Mixer
75.	Experimental study of Combustion in Space Environment
76.	Miniaturized wideband analog phase modulator using phase looked loop
77.	Relation between pathogenic bio-aerosal and biotic strees of crop – A case study for yellow rust fungus of wheat
78.	Feasibility studies and preliminary aerodynamic design of autorotation based venus descent system

<b>Sl. No.</b>	<b>Title of the Project</b>
79.	Development of Solid Propellant based low temperature gas generator for inflatable aerodynamic decelerator
80.	Meso-microporous core-shell carbon based materials and electroactive diluent for long cycle life and high energy density Li-S batteries
81.	Polymer derived Zr-B-C based Rare Earth Containing High Temperature Resistant Coatings for Space Applications
82.	Analysis of passive recirculation system for LOX feed line of Semicryo stage
83.	Smoke Characterization of Flaming and Smouldering materials in Micro-Gravity
84.	Modelling of process parameters for 3D printing
85.	Synthesis and Characterization of Hexagonal Boron Nitride Ceramic Aerogels as Thermal Insulation Layer for Future Space Missions

**Savitribai Phule Pune University  
(Formerly University of Pune)**

<b>Sl. No.</b>	<b>Title of the Project</b>
1.	Gas Sensing applications of Metallophthalocyanines
2.	Synthesis of undoped and Cd, Al, In, B doped nanostructures of ZnO by intermittent chemical spray pyrolysis for optoelectronic and gas sensing applications
3.	Application of GIS-RS in Mapping and Conservation of Threatened Medicinal Plant Species from Northern Western Ghats of India
4.	Studies on preparation and photo catalytic applications of Nanocrystalline TiO <sub>2</sub> and its nanocomposites
5.	Development and characterization of thin film solid electrolyte cells as voltage source, temperature, pressure and gas sensor
6.	Visual & Photographic observations of meteor showers
7.	Design, Development and Realization of Gasifier Cookstoves
8.	Developing an environmental magnetic model for assessment of the anthropogenic particulate loading in the urban

Sl. No.	Title of the Project
	environments: A case study from the Pune Metropolitan regions Maharashtra.
9.	Application of remotely sensed data for the evaluation of impervious surface growth and its effect on surface runoff in two rapidly urbanizing watersheds of Western Maharashtra, India.
10.	Modelling spatial patterns in fresh water reservoirs with special reference to plankton, molluscs and fishes using Physico-Chemical characteristics of water and remote sensing techniques (Panshet and Varasgaon reservoirs, district Pune)
11.	Deposition of layered transition metal chalcogenides thin films by SILAR method for their tribological applications.
12.	Synthesis and Applications of composites of TiO <sub>2</sub> with Carbon Nanotubes and Metal Chalcogenides
13.	Chemical Deposition of CuInSe <sub>2</sub> , CdS and ZnO thin films for Solar Cell Applications.
14.	Use of Geographical Information System to study tuberculosis epidemiology and the factors affecting case detection in a rural population in Pune district, Maharashtra
15.	A comparative study of telecommunication technology: Its impact and relevance on Urban, Rural and Tribal community of Maharashtra.
16.	Study of Biodiversity of some invertebrate of Sawanga (Vithoba) Lake Region, Dist Amravati, Maharashtra.
17.	Impact of low and high radiation doses on the nutritional quality, functional properties and shelf life of various foods.
18.	Study of the direct radiative forcing of atmospheric aerosols over different environments.
19.	Study of Si quantum dots for solar cell applications
20.	Studies on structural, optical and electrical properties of transparent conducting thin film (TCO).
21.	Novel electrochemical approach to prepare CuInGaSe <sub>2</sub> based solar cells using non-aqueous bath.
22.	Design and development of an odor tracking system.
23.	Study of interferometric data and its applications for subsidence monitoring.
24.	Identification of critical areas of conservation concern using RS-GIS technique from northern Western Ghats of India.
25.	Development of high performance Polycarbonate/Graphite nanocomposites with low percolation for EMI shielding application.

Sl. No.	Title of the Project
26.	Synthesis and characterization of Copper Chromite for propellant.
27.	Preparation of Barium Magnesium Tantalate (BMT) and Barium Zinc Tantalate (BZT) with and without dopants for microwave dielectric application.
28.	Biodegradation of Ammonium Perchlorate by phytoremediation approaches.
29.	Enhancing rural development through improved communication: case study western India
30.	Measurement of plasma temperature and identification of species during re-entry of Space Shuttle, using plasma emission spectroscopy
31.	Splitting of carbon dioxide into oxygen and carbon moiety using biomimetics of biological catalysts involved in photosynthesis
32.	Preparation of Co <sub>3</sub> O <sub>4</sub> films by using electrochemical and spray pyrolysis deposition methods for gas sensing applications
33.	Development of transition metal oxide nanoparticle films for solar radiation protection and solar cells.
34.	Real time human detection using covariance matrix as human descriptor
35.	Sensor-less XY planar flexural scanning mechanism for precision application
36.	Metallic surface plasmon phenomenon as a biosensor for the identification of biomolecules
37.	Hazardous Nitrous Oxide gas leakage detection and monitoring system using wireless sensor network
38.	Impact of Flood Hazards on settlement of Pune Region
39.	Digital elevation model (DEM) fusion
40.	Development of conducting polyaniline-ZnO nano particle composite paint coating for corrosion protection
41.	Naphthoquinone containing metal polypyridyl complexes for solar cells: Computational and experimental Study
42.	Halophilic bacterial diversity of marine ecosystems from west coast of India
43.	Development of microwave excess noise generator heads using gas discharge of reactive & non-reactive gases
44.	Development of graphite fiber reinforced aluminium (7075) in the tolled sheet form

Sl. No.	Title of the Project
45.	Studies on nano porous metal oxides via anodization and their applications in super capacitors
46.	Multifunctional conducting polymer transition metal composite nanostructures based sensor device for detection of NO <sub>2</sub> , H <sub>2</sub> S and NH <sub>3</sub>
47.	Feasibility study on indigenous development of electrochemical based gas sensors and transmitter
48.	Development of F.C. observatory - an autonomous robotic telescope
49.	Study of Precipitation characteristics using disdrometer and satellite datasets over Pune
50.	Optimization of low voltage DC micro-grid with intelligent solar PV utilization for a computer laboratory
51.	Development of Flexible and High Temperature Aerogels
52.	Processing of natural biopolymers –wild and domestic silk varieties of northern Western Ghats: Fabrication of biopolymer film based technological substrate for advanced optical structures
53.	Interaction of plasma with Thermal Protecting System (TPS) material during re-entry of space vehicles
54.	Stabilization of Zirconia in tetragonal and cubic structure using various dopants for electronic applications
55.	Remote sensing applications in coastal geomorphology, changes in morphology in parts of west coast of Maharashtra, India
56.	Occurrence and distribution of fluoride in groundwater of terekhol river basin, Sindhudurg district, Maharashtra: A remote sensing and GIS based study
57.	Space Radiation from the Optically Transparent Planer Microstrip Antenna Integrated with the Solar Panels of Small Satellites
58.	Design feasibility of PLL frequency synthesizer for Ku band
59.	Studies on biodiversity of poly-extremophilic bacteria for their probable use as test organisms in space research
60.	Fabrication of magnetoelectric energy harvesters by utilizing piezoelectric-macro fiber composite (MFC) and magnetostrictive Nickel/Metglas/Magnetic oxide materials
61.	Design, fabrication and testing of a compact and robust Monochromator
62.	Development of coating/manufacturing technology for friction stir coating/welding tool for welding of 3 mm thick stainless steel sheets

Sl. No.	Title of the Project
63.	Development of Nuclear Batteries using Radioactive Sources
64.	Drilling techniques/technology for drilling of miniature size holes of diameter less than 10 microns in super alloys for a depth of 1.0 mm
65.	Valve-less linear compressor driven stirling cycle cryocooler for space applications
66.	Converting energy derivable from low energy sources into electrical power for autonomous sensors applications
67.	Development of high current density thermal-field (T-f) cathodes
68.	Studies on glare reduction techniques for indoor illumination systems
69.	Bioleaching to Electronic Wastes (E-wastes)
70.	Study of cloud parameters observed by Ceilometer with the Satellite retrieved and Mesoscale Model generated, cloud parameters
71.	Astrobiology experiments on Effect of impact and space related stress on micro-organisms isolated from rocks: Implications for origin of life and Lithopanspermia
72.	Wear corrosion and impact toughness of the high nitrogen martensitic stainless steel (XD15NW) (16 Cr, 0.20N, 0.42C, 1.8 Mo, 0.35V, balance Fe (in wt%))
73.	Miniaturized Microstrip Antenna Designs for 3U Cubesat covering UHF, L-and S-band frequency spectrum and their interference study for earth observations
74.	Development of solders for use in cryogenic applications
75.	Selective capture and conversion of CO <sub>2</sub> to methanol from direct air using MOFs supported polyamines
76.	Conducting Polymer supported bimetallic nanostructures for fuel cell and hydrogen storage applications
77.	QPSK demodulator based on wideband acquisition technique
78.	Development of Prequal engineering model of "SEAPS" (300 KHz to 30 MHz) RF Front end electronics and data acquisition system for low frequency space science studies
79.	Investigations of ZnSe: Te quantum dot scintillators for charge particle detection in space radiation environment
80.	Development of image processing algorithms for blur reduction and noise elimination in satellite imagery
81.	Ontology enabled disaster management web service using data integration

SI. No.	Title of the Project
82.	Development of sequestration and biotransformation strategies for the treatment of ammonium perchlorate
83.	Development of Nano-material smart coating for anti-reflection and thermal control of space structures
84.	Characterization of AISI 321 stainless steel at low temperatures
85.	Design and development of work function measurement set up and its use to measure work function of thrusters
86.	Development of aluminium nitride and alumina based ceramics for high temperature electrical insulation
87.	Development of an NDT technique for through thickness measurement of non uniform residual stresses in metallic materials
88.	Data driven modeling of morphology and formation of impact craters in Basalt : A case study of Lonar
89.	Ab initio study of thermal properties of transition metal ceramics for thermal barrier coating
90.	Process Development and Optimization of Novel Electro Discharge Machining variants for machining of super alloys (Titanium Ti6Al4V, Inconel 600/718, Haynes 25, Molybdenum, Columbium 103)