



Karunya INSTITUTE OF TECHNOLOGY AND SCIENCES

(Declared as Deemed to be University under Sec.3 of the UGC Act, 1956)

MoE, UGC & AICTE Approved

NAAC A++ Accredited

SDG 11 - Sustainable Cities and Communities

11 SUSTAINABLE CITIES AND COMMUNITIES



Karunya Institute of Technology and Sciences (KITS) is dedicated to promoting sustainable urban development, aligning its eco-friendly campus initiatives with SDG 11: Sustainable Cities and Communities. Through projects and practices that reduce environmental impacts, foster community collaboration, and encourage inclusive education, KITS support resilient, sustainable communities. Located in the biodiversity-rich foothills of the Western Ghats, KITS prioritizes the conservation of natural resources through scientific research and sustainable development.

11.1 Research on Sustainable Cities and Communities

KITS has emerged as a research-driven institution addressing multiple dimensions of urban sustainability, pollution control, smart city innovation, climate resilience, and community well-being. In the academic period 2023–2024, the institution produced over 90 Scopus-indexed publications aligned with SDG 11. These include research on air pollution mitigation, sustainable infrastructure, flood modeling, IoT-based transportation management, and climate–urban interaction studies, collectively contributing to a cumulative CiteScore exceeding 1200. Key publications appeared in reputed international journals such as *Chemosphere*, *Science of the Total Environment*, *Water, Air, and Soil Pollution*, *Environment, Development and Sustainability*, and *Construction Innovation*.

KITS researchers have collaborated with national and international institutions, including ISRO, CSIR-NEERI, NITs, King Saud University, and the University of Sfax, strengthening the global research network on sustainable city systems.

Research domains emphasize:

- Smart City and IoT Innovations – AI-enabled traffic management, road safety, and waste systems.
- Urban Climate and Air Quality Studies – Black carbon exposure, aerosol variability, and clean air policies.
- Flood and Resource Management – GIS-based mapping and sustainable water management models.
- Sustainable Infrastructure and Digital Twins – Green IoT devices and smart construction approaches.

Sl.No	Title	Authors	Year	Scopus Source Title
1	Waste management beyond the COVID-19 pandemic: Bibliometric and text mining analyses	Ranjbari, M. Shams Esfandabadi, Z. Gautam, S. Ferraris, A. Scagnelli, S.D.	2023	Gondwana Research
2	Air Quality Improvement and Optimisation Using Machine Learning Technique	Veeranjaneyulu, R. Boopathi, S. Kumari, R.K. Vidyarthi, A. Isaac, J.S. Jaiganesh, V.	2023	Proceedings of the 2nd IEEE International Conference on Advances in Computing, Communication and

				Applied Informatics, ACCAI 2023
3	Black Carbon Emissions from Traffic Contribute Sustainability to Air Pollution in Urban Cities of India	Hussain, A.J. Sankar, T.K. Vithanage, M. Ambade, B. Gautam, S.	2023	Water, Air, and Soil Pollution
4	Abundance, distribution and composition of microplastics in sediment and fish species from an Urban River of Bangladesh	Khan, M.B. Urmy, S.Y. Setu, S. Kanta, A.H. Gautam, S. Eti, S.A. Rahman, M.M. Sultana, N. Mahmud, S. Baten, M.A.	2023	Science of the Total Environment
5	Burning of Municipal Solid Waste: An Invitation for Aerosol Black Carbon and PM2.5 Over Mid-Sized City in India	Mahato, D.K. Sankar, T.K. Ambade, B. Mohammad, F. Soleiman, A.A. Gautam, S.	2023	Aerosol Science and Engineering
6	Street dust in the largest urban agglomeration: pollution characteristics, source apportionment and health risk assessment of potentially toxic trace elements	Khan, M.B. Setu, S. Sultana, N. Gautam, S. Begum, B.A. Salam, M.A. Jolly, Y.N. Akter, S. Rahman, M.M. Shil, B.C. Afrin, S.	2023	Stochastic Environmental Research and Risk Assessment
7	Wildfire-induced pollution and its short-term impact on COVID-19 cases and mortality in California	Naqvi, H.R. Mutreja, G. Shakeel, A. Singh, K. Abbas, K. Naqvi, D.F. Chaudhary, A.A. Siddiqui, M.A. Gautam, A.S. Gautam, S. Naqvi, A.R.	2023	Gondwana Research
8	Internet of Things (IoT) based automated sanitizer dispenser and COVID-19 statistics reporter in a post-pandemic world	Ashok, G. John Paul, J. Thusnavis Mary Bella, I. Packiavathy, S.V. Gautam, S.	2023	Health and Technology
9	Temporal and Spatial Variations of Satellite-Based Aerosol Optical Depths, Angstrom Exponent, Single Scattering Albedo, and Ultraviolet-Aerosol Index over Five Polluted and Less-Polluted Cities of Northern India: Impact of Urbanization and Climate Change	Singh, R. Singh, V. Gautam, A.S. Gautam, S. Sharma, M. Soni, P.S. Singh, K. Gautam, A.	2023	Aerosol Science and Engineering

10	Investigating the Impression of National Clean Air Programme in Enhancement of Air Quality Characteristics for Non-attainment Cities of Uttarakhand	Kansal, A. Subuddhi, S.P. Pandey, P. Gupta, D. Rawat, T. Gautam, A.S. Gautam, S.	2023	Aerosol Science and Engineering
11	The implementation of microbes in plastic biodegradation	Tania, M. Anand, V.	2023	Journal of Umm Al-Qura University for Applied Sciences
12	Evaluation of a novel hybrid lion swarm optimization – AdaBoostRegressor model for forecasting monthly precipitation	Priestly, S.E. Raimond, K. Cohen, Y. Brema, J. Hemanth, D.J.	2023	Sustainable Computing: Informatics and Systems
13	Evaluating groundwater contamination: An examination of a municipal solid waste dump yard in southern India's Manchester City	Ringle Raja, S. Kanagaraj, B. Eunice, S.	2023	Resources, Conservation and Recycling Advances
14	Household Air Pollution: a Progress Update by Evaluation and Scientometric Analysis	Manuel, J.J.S. Gautam, S.	2023	Water, Air, and Soil Pollution
15	Black Carbon vs Carbon Monoxide: Assessing the Impact on Indian Urban Cities	Ambade, B. Sankar, T.K. Gautam, S. Mahato, D.K. Dumka, U.C. Mohammad, F. Al-Lohedan, H.A. Soleiman, A.A. Gautam, A.S.	2023	Water, Air, and Soil Pollution
16	Investigation on Driver Drowsiness Detection using Deep Learning Approaches	Dakshnakumar, G.S. Anitha, J.	2023	Proceedings of the International Conference on Circuit Power and Computing Technologies, ICCPCT 2023
17	Impact of COVID-19 on Black Carbon and Carbon Monoxide Levels and Its Health Risk Assessment Over East India	Sankar, T.K. Kumar, A. Ambade, B. Mahato, D.K. Hussain, A.J. Sethi, S.S. Mohammad, F. Soleiman, A.A. Gautam, S.	2023	Aerosol Science and Engineering
18	Implementation of Savonius Blad Wind Tree Structure by Super Lift Luo Converter for Smart Grid Applications and Benefits to Smart City	Jency, J. Anitha, M.X. Josh, F.T. Vinoth, K.K. Vinodha, K.	2023	Smart Grids for Smart Cities: Volume 1
19	Insight into seasonal aerosol concentrations and	Divya, P.S. Moses, V. Jasmin Shany, V.	2023	Geological Journal

	meteorological influence over a flood affected area using satellite data and statistical model simulation	Samuel, C. Manoj, G.		
20	Utilizing RL and Web-Enhanced Commuting for Traffic Congestion Mitigation and Public Transportation Enhancement	Jenefa, A. Jerusha Miraclin Dulcie, B. Carolin Joanna Sheryl, K. Esswari, S. Sandra Jeslena, W. Kuriakose, B.M.	2023	7th International Conference on Electronics, Communication and Aerospace Technology, ICECA 2023 - Proceedings
21	Study of ground ozone and precursors along with particulate matter at residential sites in the vicinity of power plant	Chelani, A.B. Vyawahare, R. Gautam, S.	2023	Waste Disposal and Sustainable Energy
22	Modelling a P-System inspired multi-objective centralized heterogeneous wireless outdoor illumination	Issac, T. Silas, S. Rajsingh, E.B.	2023	Journal of Ambient Intelligence and Humanized Computing
23	Effect of Urbanism on Land Surface Temperature (LST) in a River Basin and an Urban Agglomeration	Brema, J. Alsalmi, A.K. Mayilswami, C. Thinakaran, J.	2023	Springer Climate
24	Intelligent Transportation System: A Review of VANET Applications for Urban Areas, Technologies, and Protocols	Cynthia, J. Sakthipriya, G. Sudhahar, J.C. Suguna, M.	2023	Sustainable Digital Technologies for Smart Cities: Healthcare, Communication, and Transportation
25	Seasonal variation and sources of PM2.5 bound water-soluble ions at Jammu city in the foothills of the North-western Himalayas, India	Gupta, S. Rajput, A. Kumar, R. Yadav, S. Verma, A. Gautam, A.S. Gautam, S.	2023	Geological Journal
26	Sentimental Analysis from Social Media Post for Disaster Management	Melvin, A. Godwin Sam, S. Rohgan, S.V. Juliet, S.	2023	Proceedings of the International Conference on Circuit Power and Computing Technologies, ICCPCT 2023
27	Blockchain System for Secure and Efficient UAV-to-Vehicle Communication in Smart Cities	Evangeline, S. Lenin, A. Kumaravelu, V.B.	2023	International Journal of Electronics and Telecommunications
28	Reward based Smart Waste Disposal System using RFID	Abraham, M. Sreeraj, S. Milton, D. Yohannan, A.A. Paulraj, G.J.L.	2023	2nd International Conference on Sustainable Computing and Data Communication

				Systems, ICSCDS 2023 - Proceedings
29	Internet of Things enabled electric vehicles in smart cities	Ebenezer, V. Joel, M.R. Edwin, E.B. Thanka, M.R. Kirubakaran, S.S. Kiruba, P.J. Marshell, M.J.	2023	Blockchain Enabled Secure Big Data Computing for Smart Cities Using Internet of Things
30	Enhancing Encryption Security Against Cypher Attacks	Naveenkumar, R. Sivamangai, N.M. Napolean, A. Sathyapriya, S.S.	2023	Homomorphic Encryption for Financial Cryptography: Recent Inventions and Challenges
31	YOLO and LSH-based video stream analytics landscape for short-term traffic density surveillance at road networks	Lavanya, K. Tiwari, S. Anand, R. Hemanth, J.	2023	Turkish Journal of Electrical Engineering and Computer Sciences
32	FedLANE: a federated U-Net architecture for lane detection	Santhiya Jebadurai, I.J. Paulraj, G.J.L. Vamsi, P.P.V. Reddy, M.A. Poulraju, P.	2023	Indonesian Journal of Electrical Engineering and Computer Science
33	Accident Forecasting using IoT and Deep Learning Techniques	Paul, A.R. Kanaga, E.G.M.	2023	Proceedings of the 2023 2nd International Conference on Augmented Intelligence and Sustainable Systems, ICAISS 2023
34	Seismic performance analysis of RCC benchmark problem with magnetorheological damper	Isabella Kennedy, B.M. Joseph, J.S. Ebanesar, A. Cruze, D.	2023	Research on Engineering Structures and Materials
35	Crowd management in public transport to ensure social distancing for prevention of spread of COVID-19	Nigel, K.G.J. Jenisha, J. Rajeswari, R. Pamela, D. Manimegalai, P.	2023	International Journal of Engineering Systems Modelling and Simulation
36	Deep Learning Models for Moving Vehicle Detection in Traffic Surveillance Video for Smart City Applications	Risha, K. Jude Hemanth, D.	2023	Communications in Computer and Information Science
37	Design and Development of Automated Smart Warehouse Solution	Nagajayanthi, B. JayaSingh, R.	2023	Lecture Notes in Electrical Engineering
38	A Comparative Analysis of Gradient Boost Algorithm and Deep Neural Network for Land Cover Land Use Classification	Babitha, M.S. Diana Andrushia, A. Mehthab, A.	2023	9th International Conference on Smart Computing and Communications: Intelligent

				Technologies and Applications, ICSCC 2023
39	A Unified Deep Learning Model for Multi-Satellite Image Classification of Land Use and Land Cover	Babitha, M.S. Diana Andushia, A. Mehathab, A.	2023	Lecture Notes in Networks and Systems
40	Influence of Paper Mill Effluent Irrigated Soil Characteristics under Laboratory and Field Conditions	Devakumari, M.S. Katharine, S.P. Jeeva, S.C.	2023	Agricultural Science Digest
41	Scene Classification in Enhanced Remote Sensing Images Using Pre-trained RESNET50 Architecture	Pranesh, M. Atchaya, A.J. Anitha, J. Hemanth, D.J.	2023	Communications in Computer and Information Science
42	Handbook of research on data-driven mathematical modeling in smart cities	Pramanik, S. Sagayam, K.M.	2023	Handbook of Research on Data-Driven Mathematical Modeling in Smart Cities
43	Newfangled Automatic Car Parking Technology using RFID	Rixcy Reshma, S. Anshon, S.A. Nikil Kumar, M.	2023	2nd International Conference on Automation, Computing and Renewable Systems, ICACRS 2023 - Proceedings
44	Enhancing The Reliability Of Intelligent Transport System Based On Vanet Optimal Clustering Using Grasshopper Optimization Algorithm	Wilfred, C.B. Selvi, S. Sanjith, S. Vonteddu, S.N.R. Nisha, S.R. Kumar, P.R. Kumar, M.J.	2023	Journal of the Balkan Tribological Association
45	Quantification of Floating Plastics Using UAV Images and Identification of Microplastics in Ukkadam Tank, Coimbatore, Tamil Nadu	Baburaj, K. Brema, J. Wesley, J.J.	2023	Springer Proceedings in Earth and Environmental Sciences
46	Implementing Digital Signature with RSA algorithm to enhance the data protection in cloud	Evangeline, A.B. Jegan, R. Nimi, W.S.	2023	2023 1st International Conference on Advances in Electrical, Electronics and Computational Intelligence, ICAEECI 2023
47	A Queueing Model-Based Experimental Analysis of Mobile-Energy Distribution Stations (M-Eds) for Smart City Urbanization	Raj, S.A. Ramachandran, V. Sundar, G.N. Nachiyappan, S.	2023	Journal of Advanced Research in Applied Sciences and Engineering Technology

48	Intelligent 5G Networks and Augmented Virtual Reality in Smart Transportation	Bamini, A.M.A. Gnana King, G.R. Jensha Haennah, J.H.	2023	Artificial Intelligence in Cyber-Physical Systems: Principles and Applications
49	Performance Evaluation of Palm Oil Clinker as Cement and Sand Replacement Materials in Foamed Concrete	Salari, F. Alengaram, U.J. Alnahhal, A.M. Ibrahim, Z. Srinivas, K.M. Ibrahim, M.S.I. Anand, N.	2023	Journal of Civil Engineering and Management
50	Optimum Site Suitability Analysis for Urban Open Space Facilities using Geospatial Techniques	Shanmathi Rekha, R. Radhakrishnan, N. Mathew, S.	2023	Journal of The Institution of Engineers (India): Series A
51	A compact dual-feed wide-band slotted antenna for future wireless applications	Raja, D.S.S.; Kumar, D.R.; Santhiyakumari, N.; Kumarganesh, S.; Sagayam, K.M.; Thiyaneswaran, B.; Pandey, B.K.; Pandey, D.	2024	Analog Integrated Circuits and Signal Processing
52	Prediction of Air Pollution Utilizing an Adaptive Network Fuzzy Inference System with the Aid of Genetic Algorithm	PraveenChandar, J.; Venkatesh, K.; Mohanraj, B.; Prasad, M.; Udayakumar, R.	2024	Natural and Engineering Sciences
53	A Data Management System for Smart Cities Leveraging Artificial Intelligence Modeling Techniques to Enhance Privacy and Security	Jyothi, V.; Sreelatha, T.; Thiyyagu, T.M.; Sowndharya, R.; Arvindh, N.	2024	Journal of Internet Services and Information Security
54	Improving PM10 sensor accuracy in urban areas through calibration in Timișoara	Blaga, R.; Gautam, S.	2024	npj Climate and Atmospheric Science
55	Digital 3D modeling for preconstruction real-time visualization of home interior design through virtual reality	Joy, E.; R, A.; Raja, C.	2024	Construction Innovation
56	Systematic Review on Internet of Things in Smart Livestock Management Systems	Terence, S.; Immaculate, J.; Raj, A.; Nadarajan, J.	2024	Sustainability (Switzerland)
57	Phytomonitoring of air pollution around brick kilns in urban area: Exploring the potential of plants for the remediation of pollutants	Setu, S.; Gautam, S.; Khan, H.M.S.; Baten, M.A.; Khan, M.B.	2024	Chemosphere
58	Influence of localized sources and meteorological conditions	Ahbil, K.; Sellami, F.; Baati, H.; Gautam, S.; Azri, C.	2024	Science of the Total Environment

	on dry-deposited particles: A case study of Gabès, Tunisia			
59	Quantifying the Effects of the National Clean Air Programme on Air Quality Parameters in Chandigarh: A Scientific Assessment	Dhote, L.; Sharma, P.; Dogra, S.; Arulrajan, P.; Pandey, P.; Kansal, A.; Dhiman, M.; Gautam, A.S.; Gautam, S.	2024	Aerosol Science and Engineering
60	Dynamic change analysis of water spread region and its impact assessment using spectral indices of remotely sensed data	Anand, B.; Rekha, R.S.; Remitha, K.R.; Maniyammai, V.; Ramaswamy, K.; Gautam, S.	2024	Environment, Development and Sustainability
61	Temporal dynamics of urban air pollutants and their correlation with associated meteorological parameters: an investigation in northern Indian cities	Soni, P.S.; Singh, V.; Gautam, A.S.; Singh, K.; Sharma, M.; Singh, R.; Gautam, A.; Singh, S.P.; Kumar, S.; Gautam, S.	2024	Environmental Monitoring and Assessment
62	Analysis and prediction of land surface temperature with increasing urbanisation using satellite imagery	Vohra, R.; Kumar, A.; Jain, R.; Hemanth, D.J.	2024	Helion
63	Secure smart city application using web service model and mayfly optimization-based lightweight CNN	Sheeba, A.; Rajalakshmi, R.; Maheswari, B.U.; Ebenezer, A.S.	2024	Transactions on Emerging Telecommunications Technologies
64	A Confirmation Based Accident Detection System Using IoT for Smart Vehicles	Ninan, B.	2024	2024 IEEE 3rd World Conference on Applied Intelligence and Computing (AIC 2024)
65	Validation and Spatial–Temporal Variability of Particulate Matter in Urban area Using WRF-Chem with Local and Global Emission Inventories	Rami, Y.; Kandya, A.; Chhabra, A.; Khan, A.W.; Kumar, P.; Gautam, S.	2024	Water, Air, and Soil Pollution
66	Smart sanitization on a budget: revolutionizing public transport hygiene post-COVID	Peter, J.D.; Dolly, D.R.J.; Jagannath, D.J.; Livingston, S.A.	2024	Frontiers in Public Health
67	Deep Vision: Lane Detection in ITS: A Deep Learning Segmentation Perspective	Santhiya, P.; Jebadurai, I.J.; Paulraj, G.J.L.; Jenefa, A.; Karan, S.K.; Naveen, V.	2024	Proceedings — 2024 2nd International Conference on Inventive Computing and Informatics (ICICI 2024)

68	Advanced Weather Monitoring and Disaster Mitigation System	Paul, D.J.; Janani, S.P.; Ancy Jenifer, J.	2024	2024 International Conference on Cognitive Robotics and Intelligent Systems (ICC - ROBINS 2024)
69	Flood detection using SAR images: A review	Pillai, L.G.; Dolly, D.R.J.	2024	AIP Conference Proceedings
70	Design and Development of Advanced Microstrip Antenna for Green IoT Applications	Paul, P.N.; Jones, T.A.	2024	2nd International Conference on Sustainable Computing and Smart Systems (ICSCSS 2024) — Proceedings
71	Social Media Text Analysis for Disaster Management Using DistilBERT Model	Varghese, S.R.; Juliet, S.; Athish, N.S.	2024	Proceedings — 2024 International Conference on Science, Technology, Engineering and Management (ICSTEM 2024)
72	Digital Twin Application in Various Sectors	Mythily, M.; David, B.; Vijay, J.A.	2024	Transforming Industry using Digital Twin Technology (book chapter)
73	Deep Learning-Based Flood Detection System Using Semantic Segmentation	Chandran, D.V.; Anitha, J.; Anusree, A.R.; Nair, G.	2024	Proceedings — ICCPCT 2024
74	Aerosol Optical Depth and Precipitation: Measuring Particle Concentration, Health Risks and Environmental Impacts	Gautam, S.; Kumar, R.P.; Samuel, C.	2024	(Book) Aerosol Optical Depth and Precipitation: Measuring Particle Concentration, Health Risks and Environmental Impacts
75	Advancements in Flood Mapping Methodologies: A Comprehensive Review	Chandran, D.V.; Anitha, J.; Vijayakumar, A.; Raveendran, A.	2024	RAICS — IEEE Recent Advances in Intelligent Computational Systems
76	ITS-AI Integration: Enhanced Strategies for Mitigating Urban Traffic Congestion	Santhiya, P.; Jebadurai, I.J.; Paulraj, G.J.L.; Jenefa, A.; Giftson Raja, A.; Kiruba Karan, S.	2024	5th International Conference on Recent Trends in Computer Science and Technology (ICRTCT 2024) — Proceedings
77	A Potential Inhalation Risk to Daily Commuter: Mobile Monitoring of Black Carbon	Mahato, D.K.; Ambade, B.; Gautam, S.;	2024	Water, Air, and Soil Pollution

	during Journey in Traffic Emissions	Kurwadkar, S.; Mohammad, F.		
78	Explainable artificial intelligence for traffic signal detection using LIME algorithm	Santhiya, P.; Jebadurai, I.J.; Paulraj, G.J.L.; Stewart Kirubakaran, S.; Rubee Keren, L.; Veemaraj, E.; Randlin Paul Sharance, J.S.	2024	International Journal of Informatics and Communication Technology
79	Integrating Google Maps and Deep Learning in Path Hole Detection Alert System	Sophia, S.; Ajish Moses Raj, A.; Janani, R.; Stewart Kirubakaran, S.; Dhivinkumar, A.J.; Princely Nesaraj, A.	2024	Proceedings — ICPCSN 2024
80	Enhancing the Spatial Resolution of Aerial Images using a Deep Generative Approach with Multi-Stage Residual Refinement	Shree Hari, B.; Joy, E.; Aroma, J.	2024	AMATHE 2024 Proceedings
81	EcoAI Forecast: Multi-Model Air Quality Prediction in Patancheru	Karthikeyan, I.; Jenefa, A.; Edward Naveen, V.; Santhiya, P.; Sangeetha, R.; Lincy, A.	2024	RAEEUCCI 2024 Proceedings
82	Efficient traffic signal detection with tiny YOLOv4: enhancing road safety through computer vision	Santhiya; Jebadurai, I.J.; Paulraj, G.J.L.; Veemaraj, E.; Sharance, R.P.; Keren, R.; Karan, K.	2024	International Journal of Informatics and Communication Technology
83	Optimizing Waste Management: Integrated Pollution Detection and Systematic Reporting for Sustainable Disposal	Samuel Prabakaran, M.; Sophia, S.; Sophas Samuel, S.	2024	ICNWC 2024 Proceedings
84	The future of modern transportation for smart cities using trackless tram networks	Samson Arun Raj, A.; Yogesh, P.	2024	Conversational Artificial Intelligence (book chapter)
85	Exploring chitosan nanocomposites for wastewater treatment via solid phase extraction biorefinery	Gowri Lakshmi, S.; Gomez, L.A.; Shepherd, R.; Chandrapragasam, V.; Vijay, V.; Thathapudi, J.J.	2024	Bio Refinery of Wastewater Treatment (book chapter)
86	Evaluation of the seismic performance of a multi-coil MR damper using non-linear method	Daniel, C.; Sharma, S.V.; Hemalatha, G.; Arunraj, E.	2024	Structures

87	Avenues and opportunities of detoxification of micropollutants from industrial effluent using advanced biological treatment techniques	Kandasamy, S.; Babu, S.A.; Dwaraka, S.J.B.; Naveenkumar, M.; Nandakumar, N.P.; Subbiah, K.	2024	Emerging Innovative Trends in the Application of Biological Processes for Industrial Wastewater Treatment (book)
88	Internet of Drones Security and Privacy	Sophia, S.; Paulraj, G.J.L.; Jebadurai, I.J.	2024	Cyber Space and Outer Space Security (book chapter)
89	BIPOOLNET: An advanced UNet architecture for enhanced lane detection in autonomous vehicles	Santhiya, P.; Jebadurai, I.J.; Paulraj, G.J.L.; Jenefa, A.	2024	Intelligent Decision Technologies
90	Metals Recovery from Electrical and Electronic Waste	Iyer, A.; Nambiar, K.S.; Gupta, D.K.; Murugan, S.	2024	Valorization of Resources from Urban Mined Materials (book chapter)
91	Integrating IoT for Smart Bus Tracking and Capacity Monitoring: Enhancing the Efficiency of Public Transportation	Yuvaraajan, E.; Shiprah Sharone, M.	2024	IIPERM 2024 Proceedings
92	Development of self-sustaining system by integration of AI and IoT	Sharma, D.M.; Venkatramulu, S.; Raja, M.A.M.; Vikram, G.; Alagappan, C.; Boopathi, S.	2024	The Convergence of Self-Sustaining Systems With AI and IoT (book chapter)
93	Aerosol Variability and Its Impact on Cloud-Precipitation Interaction in Urban Areas of Maharashtra, India	Chelani, A.B.; Vyawahare, R.V.; Gautam, S.	2024	Aerosol Optical Depth and Precipitation (book chapter)
94	A Geospatial assessment of Flood Susceptibility in Viluppuram Region of Tamil Nadu	Alex Immanuel Jeyasingh, R.; Patricia Kalai Arasi, J.; Susan Poonguzhali, R.; Suguna Devakumari, M.	2024	Water and Energy International
95	An Intelligent IoT Solution with Real-Time Monitoring for Road Safety	Azeez, J.K.; Mary, B.; Manoj, G.; Sivasankari, G.	2024	ICACC — Int. Conf. on Advances in Computing and Communications
96	Monsoon Shifts and Their Impact on Air Quality and Weather: A Case Study of the Amaravathi River Basin, India	Kumar, R.P.; Brema, J.; Gautam, S.; Catherina, G.	2024	Aerosol Optical Depth and Precipitation (book chapter)
97	Road Lane Line Detection in Smart Cities using Image Processing Technique	Finny, T.; George, S.; Jebaseeli, T.J.	2024	ACT 2024 Proceedings

98	An Effective Traffic Guidance and Support for Emergency Vehicles Using RFID Technology	Sesha Talpa Sai, P.H.V.; Anand, N.; Viswajeeth, A.; Nirmal Raj, M.S.; Ajith Raj, R.; Srikanth, P.	2024	Smart Innovation, Systems and Technologies (book series)
99	Pothole Detection and Alert System Using YOLO Models: A Real-Time Driver Assistance Approach	Raj, P.L.P.; Santhiya, M.; Stewart Kirubakaran, S.; Leelipushpam, G.J.; Ebenezer, V.; Bijolin Edwin, E.	2024	ICoICI 2024 Proceedings
100	Risk Analysis and Prediction in Traffic Zone during Peak Time in Smart Cities	Jaskar, I.; Jebaseeli, T.J.	2024	ACT 2024 Proceedings

11.2 Support of Arts and Heritage

11.2.1 Public Access to Heritage Sites: The Bethesda International Prayer Centre spans 1.5 acres of natural beauty, featuring lush greenery, vibrant wildlife, and key attractions like a prayer dome and a replica of the Bethesda Pool. This peaceful retreat provides spiritual reflection for visitors and enriches community engagement with natural and cultural heritage.



11.2.2 Public Access to Museums and Collections: The KITS Water Museum highlights India's heritage in water management, with demonstrations on traditional conveyance and preservation techniques. UNBOX museum is innovation and technology museum aiding in conducting Educational workshops and tours

11.2.3 Public Access to Green Spaces: Public areas near Bethesda serve as tranquil green spaces, fostering community interactions, especially during weekends, when families gather to relax and enjoy the environment.



Public Access to Museums and Collections (UNBOX and AQUA MUSEA)



Accessible public spaces with open green areas (Children's Park)

11.2.4 Artistic Events:

Karunya Institute of Technology and Sciences (KITS) fosters a vibrant campus cultural environment through music, dance, theatre, literary, and community expression platforms. The **annual MegaPlay** serves as the flagship theatre production, integrating choreography, costume design, stagecraft, live orchestra, and narrative performance — entirely student-led under faculty mentorship. Alongside this, the institution conducts **over 50 cultural and creative events every**

semester across departments and hostels. These platforms encourage participation, cultural expression, leadership, teamwork, and peer learning.

Furthermore, the **MindKraft Intercollegiate Cultural & Tech Fest** is organized every even semester, where students from other institutions participate. This provides **networking exposure, collaborative creativity, and exchange of artistic and performance perspectives**. Skits, musical ensembles, storytelling forums, spoken-word sessions, and cultural seminars are also curated throughout the semester to ensure that **arts and cultural identity are woven into everyday campus life**, not restricted to annual events.

Event	Participation / Scale
MegaPlay 2024 – Annual Theatre Production	370+ student contributors (stage, script, choreography, orchestra)
Rejoice Cultural Night	~200+ performers & volunteers
Musicorum – Multi-Band Music Fest	5 student-led bands
MindKraft Intercollegiate Fest	Multi-college participation & exposure exchange
Hostel Cultural Talent Showcases	100+ first-year performers each semester
Republic Day Parade & Cultural Performance	University-wide participation

Impact:

These cultural platforms promote artistic expression, leadership, cultural identity preservation, emotional well-being, community bonding, and student confidence, contributing directly to a socially cohesive and artistically enriched campus environment.



Fig : The listed events are illustrative highlights. In practice, KITS organizes 50+ student-led artistic and cultural activities every semester, across hostels and campus venues.

11.2.5 Library Facilities:



Library Facilities

The Central Library at KITS, along with the Karunya School of Management (KSoM) and the **Center for Community Academia and Collaboration**, actively promotes **reading culture, digital literacy, and knowledge access** both within the campus and in surrounding communities.

A key outreach activity is the **celebration of Librarians Day** at *Government Middle School, Iruttupalam*, where students are encouraged to engage with books, storytelling, and structured learning. The event was **graced by the Panchayat President, Mr. Kittusamy**, highlighting institutional collaboration with local governance bodies to strengthen community education.

In addition, the **KITS Library** organizes regular academic support programs, including:

Program / Initiative	Description & Purpose
Digital Research Skills Workshops	Training on accessing scientific databases, reference indexing, plagiarism awareness, and academic integrity.
IEEE Resource Training Sessions	Hands-on guidance from IEEE-certified trainers on navigating journals, conference proceedings, and citation tools.
“Pai & Sons” Book Exhibition & Open Display	Campus-wide reading promotion event enabling students and staff to explore and acquire books across disciplines.
Community Reading & Learning Outreach	Library faculty and student volunteers conduct reading circles, storytelling activities, and educational games in nearby schools and communities.

Impact:

These initiatives strengthen **information access, academic readiness, digital research literacy, and community learning**. By integrating library resources with outreach activities, the institution promotes **lifelong learning and equitable educational opportunities**, aligning with **SDG 4: Quality Education** and **SDG 11: Sustainable and Inclusive Communities**.



Facilities and Outreach Photographs

11.3 Expenditure on Arts and Heritage

While KITS does not have specific allocated budgets for arts and heritage expenditure, the institution invests in hosting a variety of cultural and community engagement events, enhancing public access to arts and heritage.

PRODUCT MUSEUM EXPENSES				
Date	Particulars	Vch Type	Vch No.	Debit Amount
08-Dec-21	Kit - Rep & Main Civil KS Art and Tech TDS - Contract <i>Being removal, cutting, modification and refixing of Gypsum boards for product museum.</i>	Journal	5434	6,861.00
10-Jan-22	Kit - Rep & Main Civil C. Katheras & Co. TDS - Contract <i>Being supply & installation of Vinyl flooring at product museum at Civil Engg.</i>	Journal	6209	44,708.00
27-Jan-22	Kit - Rep & Main Civil Alex Curtains TDS - Contract <i>Being supply & fixing of printer black out roller blinds for Civil Museum.</i>	Journal	6641	2,822.00
28-Jan-22	Kit - Rep & Main Civil KS Art and Tech TDS - Contract <i>Being supply & installation of display case units and wall paneling at Product Museum at Civil dept. WO210</i>	Journal	6667	2,46,421.00
21-Mar-22	GK Tech Solutions KITS - Payment A/No 917010084728524 Axis <i>Being purchase of CCTV camera for Civil Museum</i>	Payment	7821	29,382.00
22-Mar-22	Non Consumables - Civil Engg. Classic Airconditioners TDS - Contract <i>Being supply & installation of AC in Product Museum at Civil Dept. WO3079</i>	Journal	8191	1,42,350.00
24-Mar-22	Kit - Rep & Main Electrical Gopalan Electricals TDS - Contract <i>Being electrical installation work for Product Museum at Civil Dept. WO309</i>	Journal	8274	1,38,304.00
31-Mar-22	Gopalan Electricals Agst Ref 63 KITS - Payment A/No 917010084728524 Axis <i>Being electrical installation work for Product Museum at Civil Dept. WO309</i>	Payment	8040	1,288.00
22-Apr-22	D.R.K. Stickers KITS - Payment A/No 917010084728524 Axis <i>Purchase of foam board with printing (Technology museum)</i>	Payment	196	20,916.00
22-Apr-22	Technology Museum Expenses D.R.K. Stickers <i>Purchase of foam board with printing</i>	Journal	213	5,163.00

29-Apr-22 Technology Museum Expenses	Journal	364	13,805.00
D.R.K. Stickers			
Purchase of print and lamination sheet for technology museum			
10-May-22 Gopalan Electricals	Payment	689	34,395.00
KITS - Payment A/No 917010084728524 Axis			
Being network provisioning at technology museum tds 2% On rs. 8126/- @ rs. 163/- deducted			
10-May-22 Technology Museum Expenses	Journal	662	9,589.00
TDS - Contract			
Gopalan Electricals			
Being network provisioning at technology museum tds 2% On rs. 8126/- @ rs. 163/- deducted			
13-May-22 Kit - Rep & Main Civil	Journal	805	2,52,840.00
LEGNO			
TDS - Contract			
Being supply & installation of Anutone Baffle acoustic boards for product museum at Civil Engg. block. WO 036			
25-May-22 Technology Museum Expenses	Journal	1162	10,950.00
TDS - Contract			
Gopalan Electricals			
Payment of UPS provisioning at technology museum expenses paid to gopalan electricals tds 2% On rs. 9280/- @ rs. 186/- deducted			

TECHNOLOGY MUSEUM EXPENSES

9,59,796.00

WATER MUSEUM EXPENSES

19-May-22 Kit - Rep & Main Civil	Journal	1038	78,541.00
KS Art and Tech			
TDS - Contract			
Being grid false ceiling work at Water Museum for Water Institute at Civil Block. WO052			
24-May-22 Devichand Machine Tools	Payment	1054	66,823.00
KITS - Payment A/No 917010084728524 Axis			
Advance payment for purchase of water lifting device model for water museum - 50% advance			
24-May-22 Smiyo Jose	Payment	1055	33,984.00
KITS - Payment A/No 917010084728524 Axis			
Being advance payment for purchase of 3d models for water museum-30% advance			
28-May-22 Kit - Rep & Main Civil	Journal	1285	39,925.00
C. Katheras & Co.			

	<i>Being purchase of carpet tiles for Agro Hydro Museum</i>			
28-May-22	Kit - Rep & Main Civil Alex Curtains <i>Being purchase of Zebra blinds for Agro Hydro Museum</i>	Journal	1288	51,034.00
04-Jun-22	Equipments (Engineering) Equipments for Research (Engineering) Bharath Electronics & Appliance <i>Being purchase of LED TV 55" for Water Museum. Adv adjusted Inv No. 220400120 / 13.05.2022</i>	Journal	1553	14,400.00 43,200.00
44,718.00	Kit - Rep & Main Civil C. Katheras & Co. <i>Being purchase of carpet tiles for Water Museum (Agro Hydro Museum)</i>	Journal	1689	39,921.00
07-Jun-22	Equipments (Engineering) Devichand Machine Tools <i>Being purchase of water lifting device models for Water Museum</i>	Journal	1691	1,33,647.00
07-Jun-22	Furniture & Fixtures - KITS Furnify Home Decor Solutions Pvt Ltd <i>Being purchase of black tube puffy for Water Museum</i>	Journal	1693	20,650.00
08-Jun-22	Devichand Machine Tools KITS - Payment A/No 917010084728524 Axis <i>Being purchase of water lifting device models for Water Museum</i>	Payment	1614	66,824.00
13-Jun-22	Arun Innovations KITS - Payment A/No 917010084728524 Axis <i>Being purchase of Tehri & Idukki & Cauvery Basic Dam models for Water Museum</i>	Payment	1789	53,100.00
13-Jun-22	Arun Innovations KITS - Payment A/No 917010084728524 Axis <i>Being purchase of Tehri & Idukki & Cauvery Basic Dam models for Water Museum</i>	Payment	1790	2,47,800.00
13-Jun-22	Equipments (Engineering) Arun Innovations <i>Being purchase of Cavery Delta Dam models for water museum</i>	Journal	1859	1,06,200.00
13-Jun-22	Equipments (Engineering) Arun Innovations <i>Being purchase of Tehri & Idukki & Cauvery Basic Dam models for Water Museum</i>	Journal	1861	3,30,400.00
14-Jun-22	Raveendran.S KITS - Payment A/No 917010084728524 Axis <i>being installation of waterfountain in front of water museum during NAAC visit</i>	Payment	1805	4,000.00
16-Jun-22	Smijo Jose KITS - Payment A/No 917010084728524 Axis <i>Being purchase of 3D models for water museum.</i>	Payment	1894	89,294.00
16-Jun-22	Equipments (Engineering)	Journal	1981	1,23,286.00

Smijo Jose			
<i>Being purchase of 3D models for water museum,</i>			
27-Jun-22 Kit - Rep & Main Furniture	Journal	2279	14,631.00
<i>C. Katheras & Co.</i>			
TDS - Contract			
<i>Being carpet tiles laying charges for Agro Hydro Museum</i>			
06-Jul-22 Kit - Rep & Main Furniture	Journal	2613	1,90,134.00
<i>Guru Wood Tech</i>			
TDS - Contract			
<i>Being supply & installation of display platform for Agro Hydro Museum. WO 126</i>			
13-Jul-22 Kit - Rep & Main Civil	Journal	2818	2,006.00
<i>Blessing Furniture Work</i>			
TDS - Contract			
<i>Being assembling of door and fixing of water museum at civil dept.</i>			
21-Jul-22 Kit - Rep & Main Civil	Journal	3192	51,777.00
<i>Gopalan Electricals</i>			
TDS - Contract			
<i>Being electrical work at Water Museum at Civil Dept. WO133</i>			
05-Aug-22 MRP Corporation	Payment	3620	1,01,157.00
<i>KITS - Payment A/No 917010084728524 Axis</i>			
<i>Being installation of AC for Water Museum at Civil block.</i>			
05-Aug-22 Kit - Rep & Main Electrical	Journal	3768	33,282.00
<i>Mrp Corporation</i>			
TDS - Contract			
<i>Being installation of AC for Water Museum at Civil block, NAAC</i>			
25-Aug-22 R. Mahalakshmi (Civil Contractor)	Payment	4086	1,49,634.00
<i>KITS - Payment A/No 917010084728524 Axis</i>			
<i>Being shifting of platforms and furnitures at Dr. DGS centre and Water Museum. WO124</i>			
25-Aug-22 Kit - Rep & Main Furniture	Journal	4223	7,400.00
<i>R. Mahalakshmi (Civil Contractor)</i>			
TDS - Contract			
<i>Being shifting of platforms and furnitures at Dr. DGS centre and Water Museum. WO124</i>			
<i>NAAC</i>			
19-Nov-22 Kit - Rep & Main Civil	Journal	7283	24,769.00
<i>Crizy Consultants and Builders</i>			
TDS - Contract			
<i>Being interior wall painting for water museum at civil engineering block CF. WO374</i>			

WATER MUSEUM EXPENSES

21,18,627.00

**Minutes of the meeting held on 11.04.2022 at 4:45 pm in KCDC hall for establishing
Water Museum**

Members Present

Dr. E.J. James, Pro-VC(RC)
Dr. Riddling Margaret Waller, Pro-VC(QS)
Dr. K R S Krishnan, Director (IIE)
Dr. Sajan Kurien, Dean (SABS)
Dr. Christopher Gunasing, Chief Engineer
Dr. S. J. Vijay, Coordinator (AR)
Dr. C. Mayilswami, Prof. (WI)
Dr. P. Jegathambal, Prof. (WI)
Dr. Chinnusamy, Prof. (Agri.)
Dr. Rajendran, Prof. (Agri.)
Dr. P. A. Joseph, Prof. (Agri.)
Dr. Varaprasad, Asso. Prof. (Agri.)
Dr. Udayakumar, Asst. Prof. (Agri.)
Dr. Dishant James, Asst. Prof. (Agri.)
Dr. Levin Anbu Gomez, Prof. (Biotech)
Mr. Gerard, Prof. (RE)
Ms. E. Deborah, Architect
Mr. Jijo Mathew, Events Manager
Mr. Franklin, Events Manager

Points Discussed:

1. The theme and concept of the Water Museum was presented before the committee.
 - a. Suggestions to initiate the work:
 - i. Noah's Ark - Historical view, archaeology findings, wall depiction etc. (Biodiversity) Dr. P. Jegathambal has agreed to work on it with Chief Engineer and Architect
 - ii. Cauvery basin - 3 D map, hydraulic structures, irrigation, land use. (Dr.J.Brema shall be asked for producing 3D maps in GIS platform). Details on sharing of water (TN, Kerala, Karnataka & Pondicherry). Cauvery delta - conveyance systems, crops, Ramsar site, biodiversity, historicity, etc.
 - iii. Watershed concept - Development strategies, cascade systems - tanks, green water, blue water (Dean (SABS), Dr.C. Mayilswami & Agriculture faculties)
 - iv. Forests & Hydrology (Dr.E.J.James)
 - v. PAP project, Dr.C.Mayilswami & Agriculture faculty members
 - vi. Flash Floods-Chair
 - vii. Evolution of water lifting devices in Tamil Nadu (Dean (SABS))
 - viii. Tank and other irrigation systems, evolution of pumps, traditional, modern, solar, wind mill, hydraulic structures etc.
 - ix. Rainwater harvesting - charts and maps
2. It is proposed that artists be identified for completing different models.
3. Dr. E.J.James, Dr. K.R.S.Krishnan and Dr C.Mayilswami proposed a few artists who can carry out the work.
4. Possibilities of 3 D printing may be placed for which CAD models may be useful

As suggested by Prof. Virendra Chaudhary (A3), we can set up a Water Museum in KITS, since it is the place of Dissemination of Knowledge. We may go ahead with the initial work, but it may not be possible to complete the entire work for the NPCB. However, some of the basic structures can be put ready by 15th June after which

11.4 Sustainable Practices and Community Engagement

Stakeholder Engagement and Workshops

KITS organizes a range of stakeholder activities for SDG-aligned initiatives:

- **Elephant Conflict Awareness Program:** Conducted in partnership with the Forest Department at Sadivayal Community Center, the program raised awareness about safety in elephant-affected areas and provided torchlights to tribal communities.
- **Farmers' Interactive Meetings:** Held in Mullassery and Pullazhi, these gatherings helped local farmers understand impact of climate on agriculture and water conservation techniques.
- **Climate Impact Workshop:** Presented climate findings specific to Kol wetlands and released an official report to stakeholders, emphasizing the ecological importance of conservation.
- Karunya's Center for Community Academia and the Division of Physical Science spearheaded a transformative tobacco and drug abuse awareness program with over a hundred participants spreading crucial awareness and fostering a sense of unity within the community.



Encouraging Sustainable Commuting Through a Cycling Rally

Reduce Disaster Impacts

Risk	Community	Action	Beneficiaries	Materials Distributed
Human–Elephant Conflict	6 Tribal Settlements	Safety awareness program with Forest Dept + 18 search lights and torch lights	~300 residents	18 units

Outcome: Reduced conflict incidents and improved **night-time safety**.

Provide aid during Wayand Floods: Wayand Relief work – along with CCAC



Reduce Environmental Impact of Settlements

a. Research based initiatives

- Microplastic and water quality studies support **clean resource planning**.
- Environmental awareness sessions address **waste handling and ecological care**.
- Continued ecological stewardship preserves **Western Ghats–buffer zone balance**.

b. Reduce Environmental Impact of Cities/Settlements

UN aim: lower per-capita environmental impact; attention to air/waste.

On-Campus sustainability infrastructure (measurable)

System	Output/Capacity	Verified Annual Benefit
Solar PV	95 kW ~144,000 kWh/yr	₹11.20 lakh savings
Solar water heaters	3,500 L/day	₹9.61 lakh savings
Biogas (4 units)	Kitchen waste → fuel	₹23.10 lakh savings
Paper recycling	25–30 tons/yr	Circular reuse; reduced landfill
LED streetlights (160)	Reduced load	₹1.07 lakh savings
RWH & wastewater reuse	Campus-wide	₹2.00 lakh water savings

Community eco-health

- Hygiene & sanitation awareness for **185** school children.

- Health and nutrition awareness at Permalkovilpathy village
- Medical & eye screening for **128** rural residents.
 - Children's Day event – Kalimedu village – Awareness on child protection, excessive usage of mobile usage and empowering children.



- Go-Green “Manjapai” (plastic-lite) awareness at market.



-
- NSS roadside cleanup & village awareness drives.



Impact: Institutional resource-efficiency + community eco-health literacy.

Seminars and Workshops

Continuous university presence in **14 villages**; farmer/stakeholder workshops; **Farmers' Mela (~400 farmers)**; **nutrition awareness**; **vermicompost & poultry training (25 participants)**; **value-added food training (18 women, 4 villages)**; **SUEZ industrial water lab partnership**; **IWRM M.Tech launched** (industry-linked).

Impact: Knowledge, markets, and services flow between campus and region; sustained development ecosystem.





Colonia Center for community academy and Collaboration is proud to conduct a successful hand motion campaign at Muthuvarapuram Primary Government School reaching 81 eager participants, it also benefited 270 children of 5 Govt. Primary and Middle schools in and around Karunya Nagar.



Colonia Center for community academy and Collaboration is proud to conduct a successful hand motion campaign at Muthuvarapuram Primary Government School reaching 81 eager participants, it also benefited 270 children of 5 Govt. Primary and Middle schools in and around Karunya Nagar.



Medical camp held at Sadivayal



**NSS students clean local village –
SWACHHATA HI SEVA**



**Blood Donation Camp in Honor of
Chancellor's Birthday**



Karunya NSS : Supporting Wynand with essential aid

Immediate relief effort for Wayanad Landslide victims in response to **catastrophic “urulpottal” landslide in Wayanad** that claimed hundreds of lives. Karunya University and SEESHA have launched a comprehensive relief aid operation.- Dr. Paul Dhinakaran, Chancellor provided a team to mobilize **1000 families** in the first phase of relief operations.



MOA with e-Royce Motors



“Librarians Day” at Government Middle School



Empowering tribal women



International Yoga Day



11.4.1 Sustainable Commuting and Eco-Friendly Campus Initiatives

Sustainable Transportation: KITS promotes sustainable commuting through pedestrian-friendly pathways, bicycle trails, and encouragement of electric vehicles. A 6 km cycle rally was organized on World Cycle Day (June 3, 2023) by the NCC division to advocate for sustainable transportation.

Affordable Housing: KITS provides on-campus accommodation for over 8,000 students across 15 residential buildings, along with faculty and staff housing that covers a total area of 7,422.12 sq.m, ensuring affordable and accessible housing.



Pedestrian-Friendly Campus: KITS has prioritized pedestrian infrastructure to enhance safety and accessibility. Improvements include better sidewalks, ramps, lighting, and traffic-calming measures, making walking on campus safer and more convenient.



Collaboration with Local Authorities: Through the Karunya Center for Community Academy and Collaboration (CCAC), KITS partners with local agencies to conduct community programs. Notable initiatives include medical camps, the “Say NO to Ragging” campaign, and empowerment workshops for tribal women at Sadivayal, emphasizing local development and collaboration.



Elephant Conflict Awareness

11.4.7 Sustainable Infrastructure and Energy Conservation

KITS is dedicated to environmental sustainability through a series of energy-efficient initiatives:

Solar Power Plant: A 95 kW solar facility on campus generates approximately 144,000 units of energy annually, saving Rs. 11,20,000.

Paper Recycling: Around 150 - 200 kg (45,000 – 60,000 kg for 300 days in a year) of wastepaper is segregated from waste generated in the Campus daily. To recycle the segregated wastepaper, an Eco-friendly Paper Recycling Plant has been installed in the campus to produce 25 – 30 tons of paper board every year. Products like files, folders and decorative articles are made using the paper boards.

Solar Water Heaters: Twenty-five solar heaters with a total capacity of 3,500 liters save Rs. 9,61,000 annually.

Biogas Plants: Four biogas plants process food waste and generate energy, with annual savings of Rs. 23,10,000.

LED Lighting: The installation of 160 LED street lights saves Rs. 1,07,000 annually, contributing to energy conservation.

Rainwater Harvesting and Wastewater Treatment: Implemented for water conservation, these systems achieve estimated savings of Rs. 2,00,000 annually, reducing environmental impact.

Initiative	Description	Savings/Impact	Relevant SDG 11 Target
Solar Power Plant	95 kW capacity generating approx. 144,000 units annually.	Saves Rs. 11,20,000 annually	Target 11.6 - Reduce adverse environmental impact.
Solar Water Heaters	25 units with a capacity of 3,500 liters.	Saves Rs. 9,61,000 annually	Target 11.6 - Reduce adverse environmental impact.
Biogas Plants	Four biogas plants producing energy.	Saves Rs. 23,10,000 annually	Target 11.6 - Reduce adverse environmental impact.
LED Lighting	160 LED street lights installed.	Saves Rs. 1,07,000 annually	Target 11.6 - Reduce adverse environmental impact.
Rainwater Harvesting & Wastewater Treatment	Systems implemented for water conservation.	Estimated savings of Rs. 2,00,000 annually	Target 11.6 - Reduce adverse environmental impact.
Paper Recycling	Eco-friendly plant processes 150-200 kg of wastepaper daily to produce 25-30 tons of paper board annually.	Produces reusable items (files, folders, decorative articles)	Target 11.6 - Reduce adverse environmental impact.

Alignment of Student Projects with SDG 11 Targets

Project Category	Project	Description	Relevant SDG 11 Targets
Safety and Security Innovations	Video Surveillance Robot (Project 83)	Enhances community safety through advanced surveillance technology.	Target 11.3 - Enhance inclusive and sustainable urbanization.
	IoT-Based Smart Door Lock Security System (Project 123)	Improves personal security by integrating IoT for door lock systems.	Target 11.7 - Provide universal access to safe, inclusive, and accessible green and public spaces.
	InfernoSentry Alert (Project 131)	A fire detection system that increases safety in urban areas.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
	Anti-Theft System (Project 122)	Protects property by preventing theft	Target 11.7 - Provide universal access to safe, inclusive, and

		through smart technology.	accessible green and public spaces.
Sustainable and Smart Infrastructure	Safety Helmet for Construction Workers (Project 112)	Improves worker safety in construction environments.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
	IoT-Based Safety Helmet (Project 163)	Integrates technology for enhanced worker safety monitoring.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
Sustainable and Smart Infrastructure	CNC Drawing/Writing Machine (Project 86)	Promotes efficient resource management in urban planning.	Target 11.3 - Enhance inclusive and sustainable urbanization.
	Smart Dustbin (Project 124)	Improves urban cleanliness by optimizing waste collection.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
	Smart Parking System (Projects 107 and 116)	Enhances parking efficiency in urban areas, reducing congestion.	Target 11.2 - Provide access to safe, affordable, accessible, and sustainable transport systems.
	U-Turn Accident Prevention System (Project 150)	Enhances transportation safety by preventing accidents.	Target 11.2 - Provide access to safe, affordable, accessible, and sustainable transport systems.
Environmental Monitoring and Pollution Reduction	Air Pollution Monitoring System (Project 118)	Monitors air quality, contributing to better environmental management.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
	Forest Fire Detection (Project 156)	Aims to detect forest fires early to prevent damage and promote safety.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
	Acid Rain Detection (Project 153)	Monitors environmental health and pollution levels.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
	IoT-Based Smart Irrigation System (Project 160)	Enhances water management and reduces waste in urban agriculture.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.

Smart Housing and Automation	Home Security System using Camera Module and PIR Sensor (Project 98)	Enhances urban housing security with modern technology.	Target 11.1 - Ensure access for all to adequate, safe, and affordable housing and basic services.
	Voice and Hand Gesture Control Appliance (Project 99)	Promotes energy efficiency and convenience in smart homes.	Target 11.1 - Ensure access for all to adequate, safe, and affordable housing and basic services.
	Personalized Home Automation (Project 115)	Improves energy management and user convenience in urban homes.	Target 11.1 - Ensure access for all to adequate, safe, and affordable housing and basic services.
Emergency Response and Health Monitoring	Smart Hospital Bed (Project 128)	Enhances emergency care through smart monitoring technologies.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
	Coma Patient Monitoring (Project 125)	Improves healthcare monitoring capabilities in urban settings.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
	Contactless Door Bell (Project 92)	Enhances accessibility and convenience in urban living.	Target 11.2 - Provide access to safe, affordable, accessible, and sustainable transport systems.
	Automatic Street Lights using LDR Sensor (Project 94)	Improves energy efficiency and safety in urban areas.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
Urban Health and Safety Enhancements	Smart Saloon Vacuum Chair and Bathroom Floor Cleaning Robots	Improves hygiene and sanitation in urban settings.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
	Fire Extinguisher Drone	Enhances rapid response capabilities for fire emergencies.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
Infrastructure and Energy Efficiency	Power Generating Tile	Introduces renewable energy solutions for public spaces.	Target 11.4 - Strengthen efforts to protect and safeguard

			the world's cultural and natural heritage.
	Smart Parking System for Metro Cities using IoT	Optimizes urban parking, reducing congestion and pollution.	Target 11.2 - Provide access to safe, affordable, accessible, and sustainable transport systems.
Environmental Management and Sustainability	Development of Corrosion Resistant Coating	Enhances durability of materials, reducing waste.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
	High Strength Geopolymer Concrete	Promotes sustainability in construction practices.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
	Air Purification Robot	Improves urban air quality, contributing to healthier environments.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
Smart Transportation and Accessibility	Robot for Inventory Management and Assistance in Library of Books	Enhances efficiency in public service spaces.	Target 11.3 - Enhance inclusive and sustainable urbanization.
	Hand Gesture-Controlled Wheelchair	Improves mobility for differently-abled individuals.	Target 11.7 - Provide universal access to safe, inclusive, and accessible green and public spaces.
	Walk Assistive Robot	Enhances mobility options for individuals with disabilities.	Target 11.7 - Provide universal access to safe, inclusive, and accessible green and public spaces.
Disaster Prevention and Management	Gas Flame Monitoring System	Monitors and mitigates hazards in urban areas.	Target 11.5 - Substantially reduce the number of deaths and injuries caused by disasters.
Urban Automation and Smart Living	Smart Dustbin	Automates waste management in urban areas.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.
	Smart Plant Monitoring System	Supports urban agriculture and sustainability.	Target 11.6 - Reduce the adverse per capita environmental impact of cities.

Social Inclusion and Accessibility Technologies	Obstacle Recognition System for the Blind	Enhances accessibility for visually impaired individuals.	Target 11.7 - Provide universal access to safe, inclusive, and accessible green and public spaces.
	Emotion Bot for Autistic Children	Provides care and support for children with special needs.	Target 11.7 - Provide universal access to safe, inclusive, and accessible green and public spaces.

Through extensive research, community involvement, sustainable infrastructure, and strategic collaboration, KITS actively supports SDG 11. By fostering eco-friendly practices and prioritizing community engagement, KITS is creating a sustainable, resilient campus environment that serves as a model for sustainable cities and communities.