
11
SUSTAINABLE CITIES
AND COMMUNITIES

GOAL 11

Sustainable Cities and Communities

23	811	19
Research Projects	Publications	Patents

Smart Waste Management

A smart city is a municipality that leverages the use of ICT technologies to optimize daily operations, such as traffic, transportation, power, water supply networks, waste transportation, law enforcement, education, health care, and other community services.
This project implemented a novel application of the IoT for Smart waste transportation and shares an illustrative study on the design of smart waste transportation processes for the city of Islamabad, the capital of Pakistan. Our researchers surveyed the current traditional waste transportation process and obtained retrospective data from the Capital Development Authority (CDA). An IoT-based solution for the smart waste transportation system was simulated at the city level to show the performance gain and resource-saving. Later, the model was implemented, including physical hardware equipped with top-load waste bins, ultrasonic range sensors, and communication modules, an online server/ dashboard for computing optimization algorithms and visualizations accompanied by a mobile application for job assignments and transport navigation. The proposed solution assists in optimal planning and making informed decisions for waste collection through optimal routes, thus reducing cost and time.

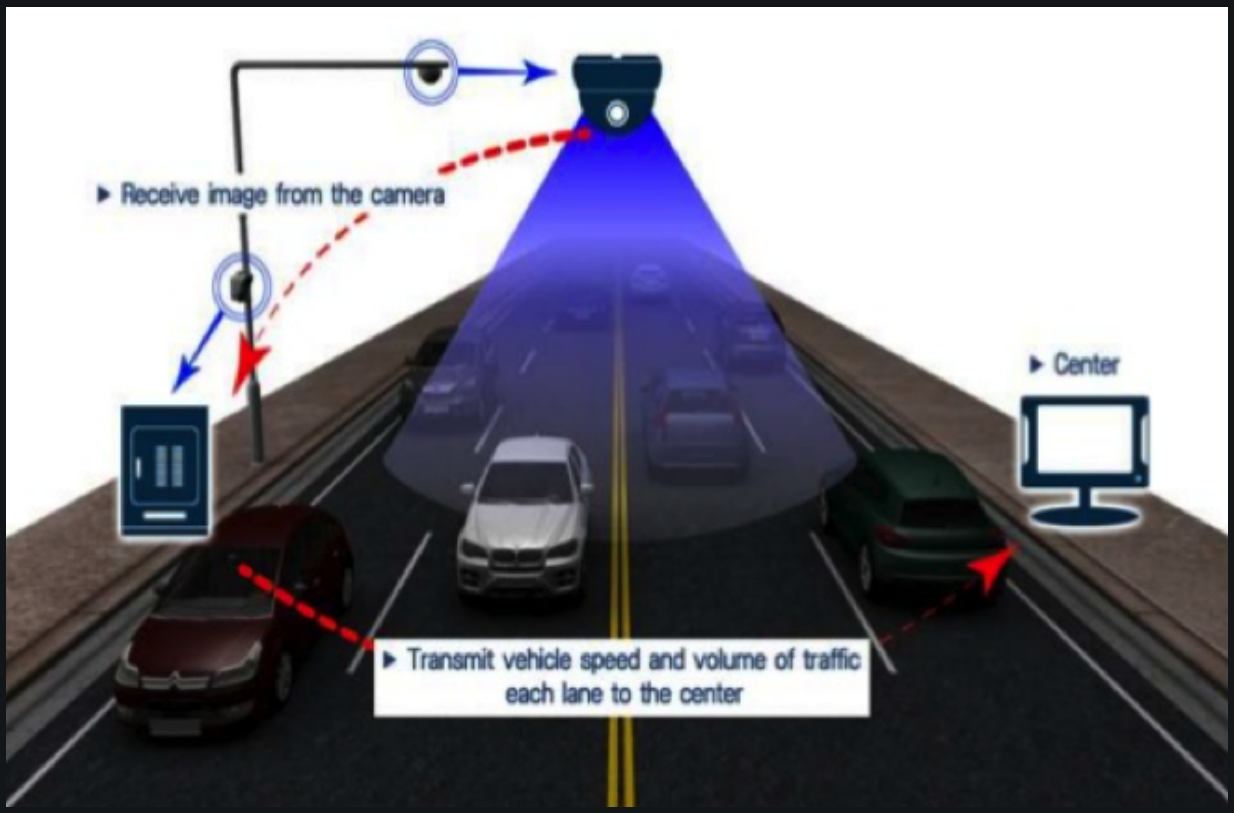
Promoting “Green Buildings”

NUST has been actively engaged in promoting sustainable green buildings with zero carbon footprint with research in new materials for sustainable infrastructures. As a part of a collaborative effort to enhance the capacity of students and faculty on green buildings, NUST organized a workshop on “Green Buildings: the US and Pakistani Practices” in December 2016. The workshop highlighted the international best practices in terms of sustainability in structures and buildings and discussed the design considerations to minimize the carbon footprint of buildings. Besides government officials, representatives from industry including ENERCON, Pakistan Green Building Council, SMC, etc., attended the two-day event.

An Automatic Real Time Vehicle Detection, Identification and Registration Plate Recognition System (VSURV)

Stolen Vehicles are a huge problem for the security agencies of Pakistan as they are prone to be used in illegal activities. Video surveillance cameras are installed at different locations in all major cities of Pakistan but these video cameras are controlled from the control rooms where the illegal activity is being detected manually. Automatic vehicle detection, registration plate recognition, and authentications play a significant role in efficient traffic management where safety is the main concern. An automatic real-time vehicle detection, identification, and registration plate recognition system is being developed for traffic management and security surveillance of roads in Pakistan.

VSURV is a project aiming to develop an extensive database for training a machine learning algorithm for the traffic management system in Pakistan. Features of VSURV include background estimation, foreground object extraction, vehicle detection and identification, registration plate localization, a region of interest detection, and registration plate recognition and authentication.



Video Vehicle Detection

15th HONET-ICT International Conference 2018: Smart Cities: A Step Towards Improving Lives using IoT And AI

Smart Cities, being one of the research themes of NUST, has further been divided into 8 research areas which are crucial for efficient infrastructure development of the country. With current mega-scale infrastructure development projects in pipeline due to CPEC, NUST wants to build the capacity and engage its researchers with other stakeholders involved in development sector.

HONET-ICT is an international conference that attracts researchers from around the world with a global audience and presence. In Oct 2018, the conference was held at NUST, the focus of which was on using technologies like Optical Networks, Cloud Computing, Virtualization Technologies, Big Data, Energy and enabling technologies, Artificial Intelligence, Internet of Things (IoT), Cyber Security and related areas for smart cities applications. HONET-ICT 2018 also featured a Symposia on Higher Education, CPEC and Industry-Academia Partnership. Several distinguished invited speakers from renowned foreign universities, industrial reps of local and foreign multi-national companies attended the event. Workshops and tutorials on A.I., IoT, BlockChain, Big Data Analytics, Smart Grid, and many other interesting topics were covered during the conference.

Green Building Design Projects

NUST engages its researchers to provide their expertise on sustainable technologies for planning its expansion and infrastructure development. "Energy Efficient Building Design," is one of such projects of NUST in which NUST researchers highlighted the recommendations for suitable measures, materials, orientations, layouts and internal fixtures to construct energy-efficient buildings at NUST. A similar project, "Self Compacting Pace Systems using Secondary Raw Materials" was an attempt to investigate the effects of different cement replacements by Secondary Raw Materials (SRM), which includes silica fumes, fly ash and hemihydrate or their combinations.