SERB Sponsored Workshop On
Small-World LPWANs towards IoT Applications
Under SERB Scientific Social Responsibility (SSR) Policy
December 15, 2023

About Institute

The foundation of the Indian Institute of Technology (Banaras Hindu University) can be attributed to Mahamana Pandit Madan Mohan Malviya, Bharat Ratna, who established the Banaras Hindu University, the first residential university in modern India. In 1968, the three engineering colleges of BHU, namely BENCO, MINMET, and TECHNO, were merged to create the Institute of Technology (IT-BHU) with the aim of providing a comprehensive educational platform. In recognition of its excellence, IT-BHU was renamed IIT (BHU) on June 29, 2012, through an Act of Parliament. IIT (BHU) Varanasi has been highly regarded in national rankings. The institute offers a four-year Bachelor of Technology program, five-year Integrated Dual Degree programs, and various postgraduate programs.

About Department: The Department of Electronics Engineering (DEE) was established in 1971 as a branch of the Electrical Engineering Department. The department maintains close collaborations with esteemed national research and development laboratories, leading software companies, and foreign universities in key areas such as wireless communications, signal processing, and microelectronics.

Small-World LPWANs: Opportunities and Challenges towards Internet of Things

Development of ubiquitous systems over a vast geographical area requires vital data in a continuous manner with minimum delay and zero data loss. Additionally, these systems demand least data interference along with improved devices' battery lifetime. The pervasive systems which can work in real time scenario addressing the above challenges could be viable socially and commercially. In addition, for such pervasive systems, the problem of bandwidth scarcity towards data transfer also need to be alleviated.

The implementation of small-world characteristics (SWC) is a key area of focus for LPWANs. The method can utilize efficient machine learning techniques leading to development of intelligent, adaptive, robust, scalable, and affordable small-world LPWAN for IoT applications. LP-WANs are emerging to provide long-range communication capability with low-power consumption of the end devices. Nevertheless, given the demand in delivering an increasingly large volume of data generated by IoT devices, the direct data transmission model is not suitable due to its reduced device lifetime, more data loss, increased network deployment cost, and poor network scalability. On the other hand, multiple hops required for data transmission over a LPWAN leads to reduced network performance in the context of device localization, energy efficiency, energy balancing, data latency, data interference, bandwidth utilization, speed of the event detection and parameter estimation, and network robustness.

In order to address these issues, several methods are proposed in the literature. However, introduction of small-world phenomena in a LPWAN has hitherto not been used in this context. Introduction of small-world phenomena in a LPWAN will bring down average path length (APL), while maintains high average clustering coefficient (ACC), which are known as SWC of a network. A small-world LPWAN when designed with novel routing strategies leads to optimized hop counts in device data transmission. Utilization of optimal hops towards data transfer improves the network performance in various contexts such reduced data transmission delay, increased energy efficiency of the devices, minimized data interference, and more reliable data gathering at the gateway.

Who can attend

Faculty members (nearby colleges) working in the area of Wireless Communication/ Internet of Things/ Signal Processing/ Cyber Physical Systems/ Data Science/ AI and ML for wireless systems and other relevant areas of wireless communication and networking.

Certification
Attendees will be given E-certificate.

Registration Details
There is no registration fee. Deadline of registration is December 14, 2023.

The Workshop offers a valuable platform for participants to gain insights and knowledge regarding the opportunities and challenges of low-power wide area networks towards IoT applications.

Workshop
on
Small-World LPWANs towards IoT Applications
Date: December 15 (Friday), 2023

Scan to register: