National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Design Strategies and Methods for Sustainable IoT-Enabled Framework in Consumer Light Management
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Venue	: EC-303 (Seminar Hall)
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Abstract	: Consumer lighting represents a significant application that requires a considerable amount of power and plays a major role in the energy budget of a country. The development of Light Emitting Diodes (LEDs) and the progress in Internet of Things (IoT) have greatly enhanced traditional lighting technology. Nevertheless, the rapid expansion of IoT devices has posed a significant challenge for designers to supply power to the extensive range of IoT devices, potentially hindering the global adoption of IoT. Thus, it acts as an impetus to develop sustainable IoT devices complying with Sustainable Development Goal (SDG) 7 and SDG 9 of the United Nations (UN). In this dissertation, various strategies and methods have been investigated to develop sustainable computing framework for IoT-enabled consumer light application in smart energy. This dissertation introduces various strategies and methods to develop sustainable computing framework for IoT-enabled consumer light management application in smart energy. A sustainable framework has been developed to incorporate energy-autonomous and battery-less computing architecture using energy harvesting techniques from multiple energy sources such as solar, thermal, and artificial light. Power consumption optimization techniques, including duty cycle technique as well as decomposition and recombination technique, have been implemented to optimize the power consumption of the device. The device exhibits a minimum of 1.129 mW average consumption. Subsequently, an energy predictive based task scheduling framework has been introduced, aiding the system in addressing the challenges of energy harvesting in adverse weather conditions. The proposed predictive model has been developed using Deep Learning (DL) technique which yields accurate energy prediction possessing minimum Mean Absolute Error (MAE) of 0.000365 and Maximum R2 score of 0.997. The proposed device can be retrofitted to any type of existing LED based consumer lighting infrastructure including on-grid, off-grid and hybrid to make it a complete sustainable, energy efficient, smart solution.