

Innovative Task-lighting for Reading Table of a Library

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By

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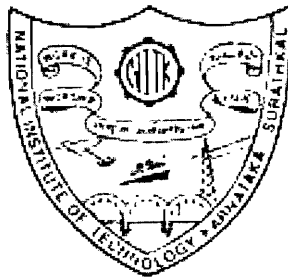
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Abstract

Project Title: Innovative Task-lighting for Reading Table of a Library¹

Lighting today is at the cusp of a major revolution with the advent of power LEDs for lighting purposes. The presence of LED lighting application in niche areas like tunnel lightings, signage lighting is already established and rapidly transitioning towards general lighting too. However the capital cost, electronics and lack of standards have been major impediments in general acceptance.

The project explores the use of LEDs in task-lighting applications. The existing illumination at reading tables of the library at NITK Surathkal is measured to be between 30 lx and 200 lx. An arrangement using 4 LEDs of 1 W each for each of the sections of the reading table is proposed. A model is built and it is shown that such an arrangement provides a minimum illumination of 350 lx. The scheme with LEDs is more energy-efficient than the existing fluorescent tubes and meets the illumination standard requirements.

The illumination of carom tables at the Sports Complex at NITK Surathkal is measured. The existing incandescent lamps of 100 W provide a highly non-uniform illumination (ranging from 120 to 1500 lx). A physical arrangement is built using 12 LEDs of 1 W each placed along the four diagonals of the square area of the carom board and at an optimum distance from the centre and optimum angle from the vertical. The optimal parameters are obtained through the use of 'fmincon' function of the Optimization Toolbox in MATLAB. The optimization is carried out for obtaining uniform illumination over the target surface. This physical arrangement is energy-efficient compared to the incandescent bulb and provides a more uniform profile of illumination (ranging from 310 to 402 lx).

The physical models of the arrangements for reading table and carom board are built. The measured experimental results compare well with the simulation results.

Prototype for other application of LEDs such as that for a note-taking lamp on a conference chair is demonstrated.

¹ During the conception of the project idea, this was decided upon as the project title and sent to KSCST for consideration. However looking into all the objectives that were met upon completion of the project, a suitable title would have been “**Task-lighting Applications using Power LEDs**”. However, keeping in view the KSCST guidelines, the project title initially decided has been retained.