Design and Development of a Smart Lighting System for Indian Roads and Highways

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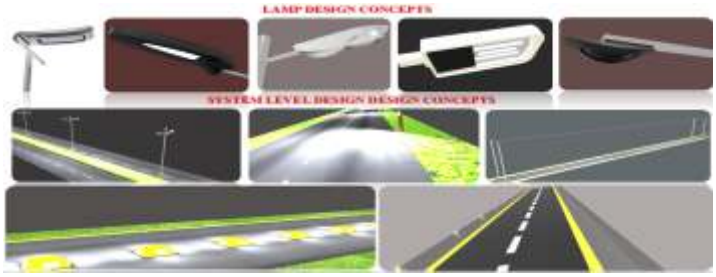
Abstract:

Major stretch of the India's road network doesn't have a lighting system and the roads that having lighting, is using outdated technology which consumes a lot of energy. The recent studies pointed out the need of road lighting in reducing the accident in night time. In these circumstances implementation of a smart road lighting system which consumes lesser energy with improved performance is the need of the hour. This project is an attempt to address different problems in road lighting system and produce innovative solutions.

The design process started with the data collection through various primary research methods and found the need of a smart lighting system for Indian roads which won't make further energy burden to the country. Data collection carried out through literature review, product study, product environment study, market study and trend study produced major input for the final product. Ethnographic study along with stakeholder's interview was carried out for finding out the aspirations of the public. Detailed ergonomics study was carried out for making the product more user friendly. The data produced from various researches results in arriving at a QFD (Quality Function Deployment) and PDS (Product Design Development) followed by generation of various concepts for system level design and product design making use of different design boards and metaphors. Final concept was selected using weighted ranking method. The selected concept uses an LED (Light Emitting Diode) lighting fixture using self-generated solar power. The system uses light sensor for automatic ON/OFF and a sensor for detecting the vehicle presence for saving energy by using lamp only in the presence of vehicle or pedestrians and a GSM (Global system for Mobile Communication) technology for giving feedback about the lamp condition.

A 1:2 working model for lamp and a working principle prototype for system level design was made for validating the performance of the selected concept and getting the user feed backs. The validation was carried about the function, aesthetics, ergonomics and other important aspects of the product and the feed backs were positive and satisfactory.



Design concepts

Final rendered model