

Analysis and Representation of Light Environment in the Street at Night

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In Japan, the landscape law was enforced in 2004 to preserve, protect and create unique landscapes. Furthermore, night-time street lighting for pedestrians has increased, this includes the distance of streetlights by the number of pedestrians and soft light sources such as sodium lamps, and lighting for traffic direction has increased.

The influence of the light environment on pedestrian behavior and psychology in the night-time outdoor space is considerable. Various kinds of outdoor light exist such as; light for safety purposes to brighten a road like a street lamps, lights for visual purposes such as outdoor advertisements or signs, and indirect light leaking from building interiors etc.

Multiple factors the authors taken into consideration in choosing a target area such as the various lighting sources and features. The authors chose Osaka-shi Chuo-ku, as the night-time pedestrian traffic here was also taken into consideration as shown.

A special light receiver is required that can measure spherical illuminance, hemispheric surface illuminance, cylindrical surface illuminance and half cylindrical surface illuminance. Furthermore, as a method of substituting the illuminance meter for ordinary planar illuminance measurement, a method of averaging measured values of illuminance in six directions or four directions is recommended. When considering the light hitting a certain point in space, light is irradiated not only from one direction but from many directions. Therefore, it is difficult to accurately measure illuminance on-site (outside) from a single light source because there is light from various sources interfering. Taking this into account, the authors opts to use a model in order to isolate a single light source, and measure the distance. This is done by calculating the illuminance corresponding to a box placed virtually in the street space and converted to spherical illuminance. As a result, it is possible to simply depict the nighttime light environment. Finally, the results of the lighting of each street are expressed on a map, creating a comprehensive night-time urban street map.

In this research, as a means of better grasping the lighting environment in urban streets, the authors studied about modeling the light sources. The authors think that there is enough victory to express the lighting situation of the whole city easily. In this example, the authors calculated the planar light source, but to get a more accurate analyzation, calculating the three-dimensional light source should be considered. Furthermore, the authors will also consider aspects such as appropriate shapes and sizes for modeling.

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