

INVESTIGATION AND DEVELOPMENT OF THE SMART ILLUMINATION SYSTEM FOR ENHANCED COLOR DISCRIMINATION

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During medical surgeries, it is essential to provide high quality and sufficient illumination to facilitate surgeons to discern details and different tissues. According to international standard for surgery luminaires have to be powerful enough, ensure even illumination, comfortable for surgeons and not overheating the patient. Light-emitting diodes are the main choice of light sources used in surgeon lighting, but some shortcomings are still present.

Color discrimination in surgery is of high importance, but currently natural (black body radiator or sun) illumination spectra are understood to be the best for color rendering and color discrimination. Recent investigation shows that colour rendering and colour difference discrimination are not the same characteristics of white light, and some custom spectra were proposed.

In this study we present the prototype development and investigation steps of smart multi-color solid state illumination source for medical applications. In particular, optical, electrical and thermal characteristics of prototype luminaire were studied. Light spectra of the luminaire were engineered to be as close as possible to theoretically optimal solutions for enhanced colour discrimination.

We conclude, that despite the certain engineering obstacles, multicolour dynamic illumination systems have a great potential in medical applications. Furthermore, such a system could be applied in other areas where analytical properties of illumination are needed.

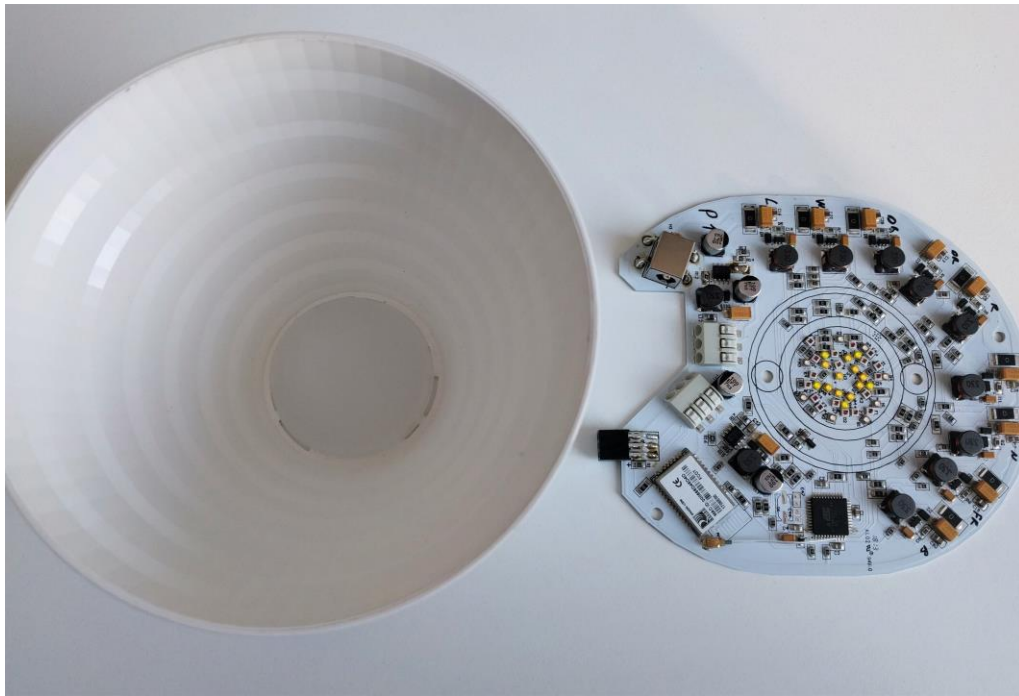


Fig. 1. Electronics and optics of the luminaire prototype