

Study of the Effectiveness of Infrared LED Source for Underwater Night Photography

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Abstract: The infrared light provides illumination that is invisible to the naked eyes, but that can be seen by night vision CCD. Generally, an infrared monitoring system is used for the detection of biological behavior with the aim of reducing influence of visible light on the biological effects. The use of infrared photography is great in air; however, there are not many applications reported for underwater environment. As a result, the characteristic of infrared illuminator used for night photography in air is well known, on the other hand, the understanding of the ability of infrared light in water is little. This paper attempts to explore the effectiveness of infrared light for underwater night photography. Because environmental factors, the settings of photo shoot, and the arrangement of infrared light source greatly affect the quality of night photography, an efficient method is needed to obtain the optimal levels of the related factors. In this paper, we employ an effective

statistical tool including the design of experiment (DOE) process and analysis of variance (ANOVA) to find the optimal levels for shooting distance, aperture, inferred light source casting angles, and etc. A commercial camera with the ability of infrared night shot is used to take pictures in complete darkness. The targets for underwater photography are several flat plates of same size with different surface patterns. Strips of same width are uniformly distributed in each plate. The space between strips is the same for all plates. But, both the width and color of strips are different for each plate. The aim of the surface pattern design of the flat plate is help to quantify the accuracy evaluation of object recognition. The preliminary experimental result shows that the propagating distance of infrared light is much shorter in water than in air. This is because the photon absorption of infrared light is considerably stronger in water than in air.