

Abstract

This thesis investigates the extent to which different display technologies (LCD, OLED, and E Ink) affect the dark adaptation of the human eye, with specific attention to the context of maritime watchkeeping. In a fully darkened simulation environment, an experiment was conducted in which the time required for participants to regain their night vision after screen exposure was measured.

The literature review highlights the importance of dark adaptation for situational awareness on board, as well as the disruptive influence of blue light emitted by screens. E Ink displays, which operate passively and were illuminated with an external red light source, were compared to conventional LCD and OLED displays, which emit light themselves.

The results showed that E Ink displays had the least impact on dark adaptation: six of the seventeen participants immediately returned to their baseline values. LCD screens proved to be the most disruptive, presumably due to their backlighting, despite showing comparable lux values to OLED. OLED displays performed intermediately.

The study highlights the potential of E Ink technology, as well as the limitations of LCD screens, for critical applications such as the use of ECDIS, where nighttime screen interaction is unavoidable. Importance is given to a critical evaluation of the displays currently used on board modern merchant vessels.