Eye Disease Simulator – how do we see the world when vision is failing?

Jon Y. Hardeberg[1,2], Steven Le Moan[2], Jonny Nersveen[2,3], Heidi Sårheim[3]

[1]Hardeberg Image and Color Technology
[2]Gjøvik University College
[3]The Norwegian Association of the Blind and Partially Sighted

For those of us who are walking through life with a normal sight and no need for glasses, it is difficult to imagine how weak-sighted persons see the world. Watching a flower is to us simply an image of a flower; whether it is red, yellow, blue, tall or small. However this image is not at all the same for everyone; and due to a visual impairment the perceived image can be very different and maybe even changing while watching the same flower.

In order to spread knowledge and understanding about vision deficiencies in our diverse society we have developed an eye disease simulator. The software is developed using the Java programming language to be accessible on different computing platforms. The user can load an image either from a file or from a webcam. One of several eye diseases can be selected, and by clicking in a certain location in the image with the mouse, a realistic simulation is displayed of how this image would appear when the gaze is directed at this location. Currently the simulated diseases include age-related macular degeneration (AMD), cataract, retinis pigmentosa, diabetic retinopathy, and glaucoma.

The Eye Disease Simulator will be made available online through the World Wide Web, and will initially be targeted specifically towards children. By increasing children's knowledge about this kind of disability we hope to raise their awareness, dignity and respect. However, through the innovative process of designing, developing, and testing this software, we have discovered that it could also be an important tool for professionals who often face challenges related to visual impairments (doctors, architects, designers, teachers, therapists, etc.) Planning for universal design requires knowledge of the visual impairment challenges, and the eye disease simulator is a practical tool that can help designers understand fundamental visual tasks.

Key words: universal design, vision deficiencies, teaching tool