Lumos: Automated Smartphone-Based Ophthalmic Screening for Glaucoma Using Computer Vision and Deep Learning Algorithms through Low-Cost and Non-Mydriatic Retinal Fundus Imaging

Shah, Shalin

Glaucoma is the leading irreversible cause of blindness worldwide. And in its early stages, it's shows no symptoms. So most of the affected patients don't know they have it until it causes much irreversible damage. To prevent unnecessary spread, patients need early detection. But not all patients have access to ophthalmologists due to barriers such as finances, distance, and time. This research project aims to alleviate this problem. Lumos is made of two components. The first component is a low-cost lens attachment that allows nonspecialist to take a picture of an eye’s retina. This lens mimics ophthalmoscopes that cost up to thousands of dollars for about 30 dollars. The second component is an algorithm that analyzes the retinal image for patterns of glaucoma and identifies risk. A smartphone app connects these two components into a seamless process. Lumos can allow patients to quickly screen for glaucoma and detect the disease in its early stages. All the patient needs is a smartphone, and the app will identify the glaucoma risk rapidly and automatically, so those lacking medical access can screen for glaucoma themselves.

Awards Won:

Fourth Award of $500

Oracle Academy: Award of $5,000 for outstanding project in the systems software category.