

A non-mydratic near-infrared fundus imaging system with light illumination from electric contact lens

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An ophthalmic fundus imaging has become an important technique for the diagnosis and treatment of eye diseases. The imaging system requires the portability, low cost, and high resolution for remote monitoring of eye health at the home, however the common systems are large and heavy, and must be examined in a hospital. Here, we demonstrate a non-mydratic near-infrared fundus imaging system with light illumination from an electric contact lens (E-lens). The E-lens can illuminate the retinal and choroidal structures in the eyes when we apply the voltage to the lens wirelessly. The irradiated light is reflected at the layered structures of fundus, and subsequently the reflected light passes through the pupil of the eye lens to capture the images with the potable camera. The captured images are blurred, so we reconstruct the images with a depth-dependent point-spread function to suppress the scattering effect that eventually visualize the clear fundus images of retinal and choroidal vasculature. The present imaging system provides a new way for remote monitoring with increased functionality.

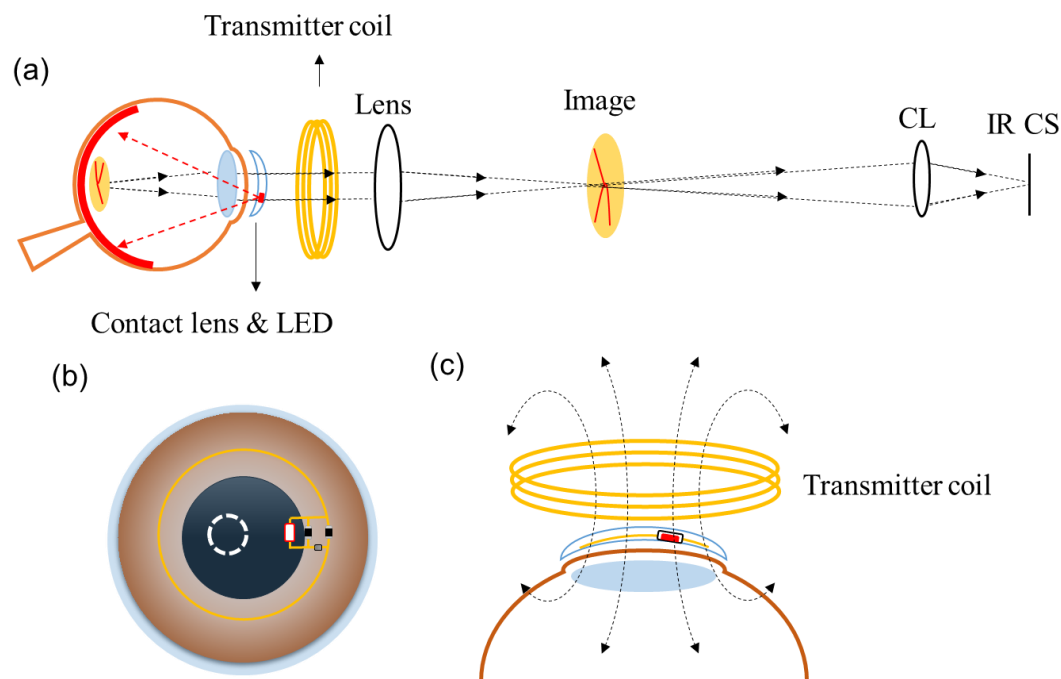


Fig. 1. NIR (near-infrared) fundus imaging system. (a) optical layout of NIR fundus imaging system with a functional contact lens, CL: camera lens, IR CS: infrared camera sensor. (b) Top view of contact lens placed on pig eye, gold circle: receiver coil, red square: infrared LED, the wavelength: 870nm, white dotted circle: observation area. (c) Schematic diagram of wireless power supply.

Key words: fundus imaging, near-infrared, contact lens.