

Anterior Segment Imaging

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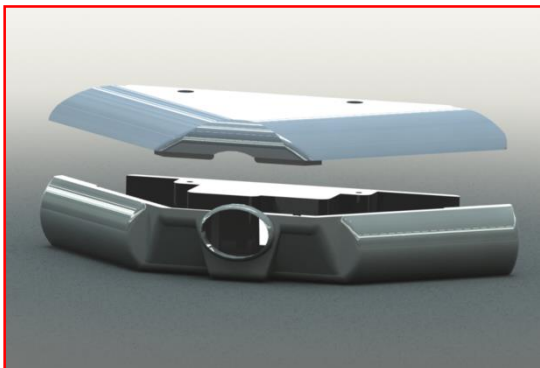
Problem Statement

The ophthalmic slit lamp is a qualitative device that is big, expensive and requires a trained physician to operate. This project is about developing a low-cost, wearable solid-state device with no moving parts, for 3D reconstruction of the anterior segment of the eye.

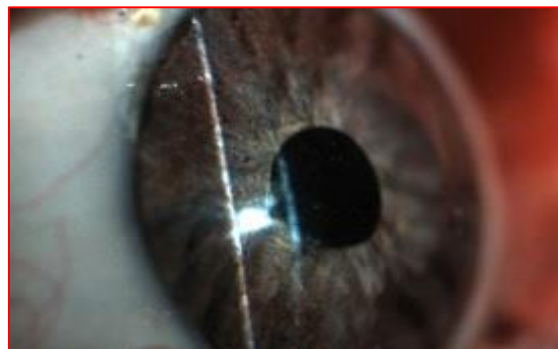
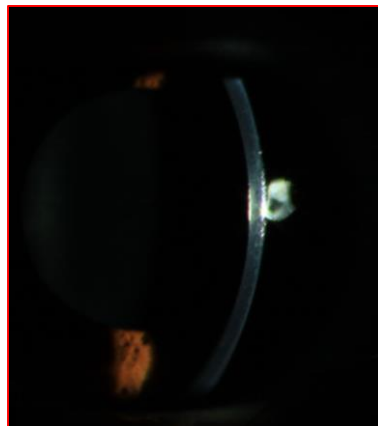
Proposed Approach

Our prototype consists of cameras and a projector which combine stereo-vision and slit scan. Stereoscopic profiles are continuously recorded as 3D surface swept by the slit. Stereo-correspondences are for reconstruction and to generate sparse point clouds which are then meshed together and rendered.

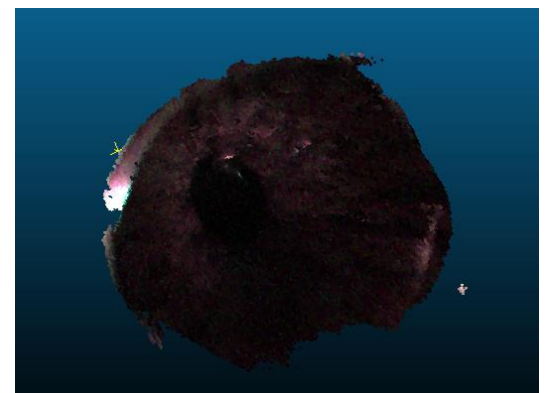
Pipeline



Prototype



Slit scan



3D Reconstruction

Current Prototype and Future Work

At REDx 2015, the prototype design gets revised to enhance the quality of corneal images from the slit scan. Data collected from a high quality slit lamp and used to further develop the 3D reconstruction software. Future work includes further testing the device and software on a synthetic eye, followed by adapting the device to comply with laser safety standards. Furthermore, the current camera-projector setup will be made more compact and robust. The reconstruction software will also include quantitative analyses of the anterior segment of patients' eyes.