Claims:

1 . An ophthalmic imaging apparatus comprising:

an illumination light source and an optical assembly for directing light from the light source into an eye of a subject;

a photosensor array comprising a plurality of photosensors positioned for acquiring images of portions of a fundus of the eye;

an objective lens positioned along an imaging axis intersecting a point on the fundus of the eye wherein the objective lens is positioned for refracting light that has been reflected by the fundus to form an image of the fundus on an image plane of the objective lens such that the image plane is positioned away from the photosensor array;

a relay lens positioned in between the objective lens and the photosensor array for relaying the image plane of the objective lens; and

a microlens array comprising a plurality of microlenses wherein the microlens array is spaced away from and positioned behind the image plane of the objective lens such that the relay lens is positioned in between the objective lens and the microlens array and wherein the microlens array is positioned in between the image plane of the objective lens and the photosensor array and spaced away from an image plane of the relay lens such that each microlens in the array projects a different view of an image formed at the image plane of the relay lens thereby forming an array of elemental images on the photosensor array.

2. An ophthalmic imaging apparatus in accordance with claim 1 wherein a plurality of contiguous portions of the image formed on the image plane of the relay lens are projected by the array onto the photosensor array.

3. An ophthalmic imaging apparatus in accordance with claim 2 wherein during use each elemental image projected by a corresponding microlens of the array is received on a separate portion of the photosensor array.

4. An ophthalmic imaging apparatus in accordance with any one of the preceding claims further comprising an aperture stop that is positioned along the imaging axis to form an entrance pupil at a pupil of the eye of the subject and to simultaneously project images of an exit pupil in a plane of the photosensor array such that the elemental images

formed under each microlens of the microlens array are equal to or smaller than the diameter of each microlens.

5. An ophthalmic imaging apparatus in accordance with claim 4 wherein each elemental image is bounded by the projected image of the exit pupil created by the aperture stop such that the elemental images are contiguous and do not overlap.

6. An ophthalmic imaging apparatus in accordance with any one of claims 4 or 5 wherein the aperture stop is positioned to allow chief rays of a ray bundle, refracted by the relay lens, that are parallel to the imaging axis to be directed towards the microlens array and produce elemental images of substantially identical size and separation regardless of field angle.

7. An ophthalmic imaging apparatus in accordance with any one of the preceding claims wherein each microlens of the microlens array is associated with a corresponding set of pixels on the photosensor array.

8. An ophthalmic imaging apparatus in accordance with any one of the preceding claims wherein each of the microlenses in the microlens array is positioned at a distance b from the photosensor array, wherein f is a focal length of the microlenses, and wherein b is independent of f.

9. An ophthalmic imaging apparatus in accordance with any one of the preceding claims wherein the microlens array is positioned along the imaging axis of the objective lens.

10. An ophthalmic imaging apparatus in accordance with any one of the preceding claims further comprising a fixation assembly for axial alignment of the user's eye with the objective lens, the fixation assembly comprising:

a fixation target whereby during use an image of the target is formed in the retinal plane of the eye by rear illumination of the target by a secondary light source;

one or more condenser lenses for projecting the light from the secondary light source into the user's eye; and

one or more beamsplitters for redirecting light received from the one or more condenser lenses to from an image of the fixation target at or near the focal plane of the objective lens.

11. An ophthalmic imaging apparatus in accordance with any one of the preceding claims wherein the optical assembly for directing light from the light source into the eye further comprises:

one or more condenser lenses for collimating a beam of light from the illumination source; and

one or more beamsplitters for redirecting collimated light from the illumination source into the objective lens for illuminating the fundus of the eye.

12. An ophthalmic imaging system comprising the apparatus in accordance with any one of the preceding claims and further comprising a processing module to render two-dimensional images by stitching patches of the elemental images projected by each microlens in the array.

13. An ophthalmic imaging system in accordance with claim 12 wherein focal depth of the rendered images can be adjusted by varying size of the patches of the elemental images stitched by the processing module.

14. An ophthalmic imaging system in accordance with claim 12 or claim 13 wherein the processing module is configured to reconstruct a depth map of the fundus from information relating to a plurality of the elemental images projected by one or more of the microlenses of the microlens array.

15. An ophthalmic imaging apparatus or system in accordance with 12 to 14 wherein the information relating to the plurality of the elemental images projected by the microlenses of the array comprises directional and positional light field information.

16. An ophthalmic imaging apparatus or system in accordance with claim 12 wherein the processing module comprises one or more processors and a memory comprising executable program instructions for processing a plurality of the elemental images by selecting separate regions of the plurality of the elemental images in accordance with a pre-determined rule and to obtain a plurality of sub- images and subsequently rendering the sub-images by stitching together said sub- images to obtain a processed image of the fundus.

17. An ophthalmic imaging apparatus or system in accordance with claim 12 for reducing or minimizing glare in a processed image of the fundus wherein the processing module

comprises one or more processors and a memory comprising executable program instructions for processing a plurality of the elemental images by selecting separate regions of the plurality of the elemental images to obtain a first set of sub-images, selectively ignore one or more portions of sub-images in accordance with a pre-determined rule and to obtain a sub-set of the sub-images and subsequently rendering the sub-images from the sub-set by stitching together said sub-images to obtain a processed image of the fundus.

18. An ophthalmic imaging apparatus or system in accordance with claim 12 wherein the processing module comprises one or more processors and a memory comprising executable program instructions to undertake the steps of obtaining a set of radiance images comprising a plurality of the elemental images; calibrating the radiance images to obtain an intrinsic matrix for the apparatus; and applying the intrinsic matrix to undistort the plurality of elemental images before undertaking subsequent processing steps to form a processed image of the fundus.

19. An ophthalmic imaging apparatus or system in accordance with claim 12 wherein the processing module comprises one or more processors and a memory comprising executable program instructions to receive image data depicting an image of the fundus from a plurality of elemental images; generating at least one data structure from the image data, the at least one data structure comprising data describing a difference in position of at least one object between the plurality of elemental images and wherein the at least one data structure corresponds to at least one region of the image of the fundus; and generating a depth map based on the at least one data structure.

20. A method for ophthalmic imaging of the fundus of an eye of a subject, the method comprising the steps of:

illuminating the eye of the subject by directing light from a light source into the eye of a subject;

positioning a photosensor array for acquiring images of portions of a fundus of the eye;

aligning an objective lens along an imaging axis intersecting a point on the fundus of the eye to refracting light that has been reflected by the fundus to form an image of the fundus on an image plane such that the image plane is positioned away from the photosensor array;

positioning a relay lens in between the objective lens and the photosensor array for relaying the image plane of the objective lens; and

positioning a microlens array comprising a plurality of microlenses, said microlens array being spaced away from and behind the image plane of the objective lens such that the relay lens is positioned in between the objective lens and the microlens array and wherein the microlens array is positioned in between the image plane of the objective lens and the photosensor array and spaced away from an image plane of the relay lens whereby each microlens of the array projects a different view of the image formed at the image plane of the relay lens thereby forming an array of elemental images on the photosensor array.