I claim:

1. A method for forming an image of an object, comprising:

providing a panoramic imaging system, wherein the panoramic imaging system comprises a plurality of discrete imaging systems each characterized by a field of view; and

constraining a stencil of chief rays at the edge of the field of view of every one of the discrete imaging systems to be substantially parallel to a stencil of chief rays at the edge of the field of view of an immediately adjacent one of the discrete imaging systems such that all of the parallel stencils of chief rays appear to converge to a common point when viewed from object space,

wherein the imaging system is parallax-free.

2. The method of claim 1, further comprising constraining at least 50% of the stencil of chief rays to deviate from parallel by twenty degrees or less.

3. A method for designing a (substantially) parallax-free, panoramic imaging system, comprising:

determining an overall panoramic imaging system geometry, wherein the overall panoramic imaging system comprises a plurality of discrete imaging systems having respective fields of view, disposed in a side-by-side array such that the fields of view of adjacent imaging systems conjoin;

designing the discrete imaging systems such that a stencil of chief rays at the edge of the field of view of one of the discrete imaging systems will be substantially parallel to a stencil of chief rays at the edge of the field of view of an adjacent one of the discrete

imaging systems such that the substantially parallel stencil of chief rays would appear to converge to a common point when viewed from object space.

4. The design method of 3, wherein the overall panoramic imaging system comprises a plurality of identical discrete imaging systems.

5. The method of claim 3, wherein in designing the discrete imaging systems, ensuring that there is no physical overlap between any of the plurality of the discrete imaging systems.

6. The method of claim 3, wherein in designing the discrete imaging systems, ensuring that the apparent convergence point lies behind a respective image sensor of each discrete imaging system.

7. A multicamera panoramic imaging system, comprising:

a plurality of discrete, imaging systems disposed in a side-by-side array, wherein a field of view of each discrete, imaging systems is conjoined with a field of view of each adjacent discrete imaging system, further wherein a stencil of chief rays at the edge of the field of view of any one of the discrete imaging systems will be substantially parallel to a stencil of chief rays at the edge of the field of view of any adjacent ones of the discrete imaging systems such that all of the substantially parallel stencils of chief rays appear to converge to a common point when viewed from object space.

8. The multicamera panoramic imaging system of claim 7, comprising a plurality of identical discrete imaging systems.

9. The multicamera panoramic imaging system of claim 7, wherein at least 50% of the stencil of chief rays deviate from parallel by twenty degrees or less.

10. The multicamera panoramic imaging system of claim 7, wherein each of the discrete imaging systems includes an image sensor, further wherein the apparent convergence point lies behind the image sensor of each of the discrete imaging systems.

11. The multicamera panoramic imaging system of claim 7, wherein none of the discrete imaging systems physically overlap.

12. The multicamera panoramic imaging system of claim 7, wherein the system has a dodecahedron geometry, further wherein the system is characterized by a 360 degree FOV.

13. The multicamera panoramic imaging system of claim 7, wherein a front lens of each of the discrete imaging systems is a portion of a single, contiguous freeform optic.

14. The multicamera panoramic imaging system of claim 10, wherein each image sensor is a wavefront sensor.

15. The multicamera panoramic imaging system of claim 7, wherein each of the discrete imaging systems has a curved image plane so as to match a distortion and Petzval Curvature of the imaging system.

16. The method of claims 1 or 3, further comprising using an algorithm to correct a distortion aberration in a contiguous 360 degree image formed by the imaging system.

I claim:

1. A method for forming a panoramic image, comprising:

providing a panoramic imaging system having a plurality of discrete imaging systems disposed in a side-by-side array, each of the discrete imaging systems characterized by a field of view; and

constraining a plurality of chief rays that strike along an edge of the field of view of every one of the discrete imaging systems to be substantially parallel to another plurality of chief rays that strike along an adjacent edge of the field of view of an immediately adjacent one of the discrete imaging systems such that all of the chief rays appear to converge to a common point when viewed from object space and the field of view of each of the plurality of discrete imaging systems conjoins with but does not overlap the field of view of the immediately adjacent one of the discrete imaging systems.

2. The method of claim 1, further comprising constraining at least 50% of the chief rays that strike along adjacent edges of the field of view of adjacent discrete imaging systems to deviate from parallel by twenty degrees or less.

3. The method of claim 1, wherein each of the discrete imaging systems share a same set of chief rays with the immediately adjacent one of the discrete imaging systems.

4. The method of claim 1, wherein each of the plurality of discrete imaging systems are identical.

5. The method of claim 1, wherein the step of providing the panoramic imaging system comprises:

configuring the side-by-side array in a three-dimensional geometric shape having a center,

configuring each of the plurality of discrete imaging systems with a front lens having a plurality of edges, which define a plurality of edge surface angles at points along the

edges with respect to the center of the three-dimensional geometric shape and a mid-point of the front lens, and

configuring each edge in the plurality of edges to be adjacent to an adjacent edge in an adjacent front lens, and

the step of constraining the plurality of chief rays that strike along the field of view comprises matching an angle of incidence of each of the plurality of chief rays along the edges with the edge surface angles along the adjacent edge.

6. The method of claim 5, wherein the three-dimensional shape is a dodecahedron, and the front lens in each of the discrete imaging systems is configured to have a pentagon shape wherein the edges of the pentagon shape have a length a, the diameter of a circle circumscribing the pentagon shape is equal to a/sin(36°) = 1.7013a, a radius of a sphere inscribed within the dodecahedron is equal to:

$$r_i = a\frac{1}{2}\sqrt{\frac{5}{2}+\frac{11}{10}\sqrt{5}} \approx 1.113516364 \cdot a$$

and a distance from a center of the dodecahedron to a mid-point on the edge of the front lens equal to

$$r_m = a\frac{1}{4}\left(3+\sqrt{5}\right) \approx 1.309016994 \cdot a$$

7. A multi-camera panoramic imaging system, comprising:

a plurality of discrete imaging systems characterized by a field of view and disposed in a side-by-side array, wherein the field of view of each of the discrete imaging systems is conjoined with but does not overlap the field of view of each adjacent discrete imaging system, each of the discrete imaging systems comprising a front lens configured to constrain a plurality of chief rays that strike along an edge of the field of view of every one of the discrete imaging systems to be substantially parallel to another plurality of chief rays that strike

along an adjacent edge of the field of view of an immediately adjacent one of the discrete imaging systems such that all of the chief rays appear to converge to a common point when viewed from object space.

8. The multi-camera panoramic imaging system of claim 7, wherein at least 50% of the chief rays that strike along adjacent edges of the field of view of adjacent discrete imaging systems deviate from parallel by twenty degrees or less.

9. The multi-camera panoramic imaging system of claim 7, wherein the side-by-side array forms a three-dimensional geometric shape having a center, the front lens in each of the discrete imaging systems has a plurality of edges which define a plurality of edge surface angles at points along the edges with respect to the center of the three-dimensional geometric shape and a mid-point of the front lens, each edge in the plurality of edges being configured adjacent to an adjacent edge in an adjacent front lens, and the plurality of edge surface angles along the edges in each of the plurality of edges matching an angle of incidence of each of the plurality of chief rays along the adjacent edge in the adjacent front lens.

10. The multi-camera panoramic imaging system of claim 7, wherein the three-dimensional shape is a dodecahedron, and the front lens in each of the discrete imaging systems is configured to have a pentagon shape wherein the edges of the pentagon shape have a length a, the diameter of a circle circumscribing the pentagon shape is equal to a/sin(36°) = 1.7013a, a radius of a sphere inscribed within the dodecahedron is equal to:

$$r_i = a\frac{1}{2}\sqrt{\frac{5}{2}+\frac{11}{10}\sqrt{5}} \approx 1.113516364 \cdot a$$

and a distance from a center of the dodecahedron to a mid-point on the edge of the front lens equal to

$$r_m = a\frac{1}{4}\left(3+\sqrt{5}\right) \approx 1.309016994 \cdot a$$

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11. The multi-camera panoramic imaging system of claim 7, wherein a front lens of each of the discrete imaging systems is a portion of a single, contiguous freeform optic.

12. The multi-camera panoramic imaging system of claim 7, wherein each image sensor is a wavefront sensor.

13. The multi-camera panoramic imaging system of claim 7, wherein each of the discrete imaging systems has a curved image plane so as to match a distortion and Petzval Curvature of the imaging system.