CLAIMS

1. An optical system comprising:

at least one primary optical element configured to receive incident light from a scene;

a plurality of relay mirrors optically coupled to the at least one primary optical element, wherein the plurality of relay mirrors includes a first reflective surface and a second reflective surface, and wherein the first reflective surface has a higher reflectivity than the second reflective surface;

a lens optically coupled to the plurality of relay mirrors; and

an image sensor configured to receive focused light from the lens, wherein the image sensor comprises a first light-sensitive area and a second light-sensitive area, wherein a combination of: the at least one primary optical element, the plurality of relay mirrors, and the lens interacts with the incident light so as to form a first focused light portion and a second focused light portion, wherein the first focused light portion forms a first image portion of the scene on the first light-sensitive area and wherein the second focused light portion forms a second image portion of the scene on the second light-sensitive area, wherein the first and second light-sensitive areas are non-overlapping, wherein the first focused light portion has a first light intensity and the second focused light portion has a second light intensity, and wherein the first light intensity is at least ten times greater than the second light intensity.

2. The optical system of claim 1, wherein the optical system further comprises a vehicle, and wherein the image sensor is operable to capture images of at least a portion of an environment of the vehicle.

~~3. The optical system of claim 1, wherein the first light intensity is at least ten times greater than the second light intensity.~~

~~4.~~3. The optical system of claim 1, wherein the second light intensity is about one per cent of the first light intensity.

~~5.~~4. The optical system of claim 1, wherein the image sensor comprises a plurality of pixels, wherein at least one pixel of the plurality of pixels comprises: a CMOS sensor, a CCD sensor,

a silicon photomultiplier (SiPM), a single photon avalanche detector (SPAD), or an avalanche photoconductor.

~~6.~~5. The optical system of claim 1, wherein the at least one primary optical element and the plurality of relay mirrors are arranged about a common optical axis.

~~7.~~6. The optical system of claim ~~6~~5, wherein the at least one primary optical element comprises an annular mirror surface configured to reflect light toward the plurality of relay mirrors.

~~8.~~7. The optical system of claim 1, wherein the plurality of relay mirrors includes a first reflective surface and a second reflective surface, wherein the first light-sensitive area receives the first focused light portion via the first reflective surface and the second light-sensitive area receives the second focused light portion via the second reflective surface.

~~9.~~8. The optical system of claim 1, further comprising a light baffle between the first light-sensitive area and the second light-sensitive area.

~~10.~~9. The optical system of claim 1, wherein the first light-sensitive area encompasses a first plurality of pixels and the second light-sensitive area encompasses a second plurality of pixels, and wherein a third plurality of pixels is arranged between the first plurality of pixels and the second plurality of pixels.

~~11.~~10. The optical system of claim 1, further comprising a controller, wherein the controller executes instructions so as to carry out operations, the operations comprising:

receiving the first focused light portion at the first light-sensitive area;

determining the first image portion based on the received first focused light portion;

receiving the second focused light portion at the second light-sensitive area;

determining the second image portion based on the received second focused light portion; and

determining at least one high-dynamic range image based on the first image portion and the second image portion.

~~12.~~11. The optical system of claim 1, further comprising at least one filter, wherein the at least one filter comprises at least one of: a neutral density filter, a polarizing filter, a spectral filter, a band pass filter, a low-pass filter, or a high-pass filter.

~~13.~~12. The optical system of claim ~~12~~11, wherein the at least one filter is configured to filter at least one of: the first focused light portion or the second focused light portion.

~~14.~~13. The optical system of claim ~~12~~11, wherein the at least one filter is coupled to at least one of: the image sensor, the lens, the at least one primary optical element, or the plurality of relay mirrors.

~~15.~~14. An optical system, comprising:

a lens body comprising an opening at a distal end of the lens body, wherein the opening is configured to receive light from a scene;

a primary optical element within the lens body;

a plurality of relay mirrors optically coupled to the primary optical element, wherein the primary optical element is configured to reflect light from the scene toward the plurality of relay mirrors, wherein the plurality of relay mirrors are configured to form respective portions of relay light from the light from the scene, wherein the plurality of relay mirrors includes a first reflective surface and a second reflective surface, and wherein the first reflective surface has a higher reflectivity than the second reflective surface;

a lens optically coupled to the plurality of relay mirrors;

an image sensor with a first light-sensitive area and a second light-sensitive area, wherein the lens interacts with the respective portions of relay light so as to form a first focused light portion and a second focused light portion, wherein the first focused light portion forms a first image portion of the scene on the first light-sensitive area and wherein the second focused light portion forms a second image portion of the scene on the second light-sensitive area, wherein the first and second light-sensitive areas are non-overlapping, wherein the first focused light portion has a first light intensity and the second focused light portion has a second light intensity, and wherein the first light intensity is at least ten times greater than the second light intensity; and

a controller comprising a memory and at least one processor, wherein the controller executes instructions stored in the memory so as to carry out operations, the operations comprising:

receiving the first focused light portion at the first light-sensitive area;

determining the first image portion based on the received first focused light portion;

receiving the second focused light portion at the second light-sensitive area;

determining the second image portion based on the received second focused light portion; and

determining at least one high-dynamic range image based on the first image portion and the second image portion.

~~16. The optical system of claim 15, wherein the first light intensity is at least ten times greater than the second light intensity.~~

~~17.~~15. The optical system of claim ~~16~~14, wherein determining at least one high-dynamic range image based on the first image portion and the second image portion comprises applying at least one of: a non-linear tone-mapping algorithm, a non-linear radiance-mapping algorithm, or a color appearance model.

~~18.~~16. The optical system of claim ~~16~~14, wherein the image sensor comprises at least one of: a CMOS sensor, a CCD sensor, a silicon photomultiplier (SiPM), a single photon avalanche detector (SPAD), or an avalanche photoconductor.

~~19.~~17. The optical system of claim ~~16~~14, further comprising a light baffle between the first light-sensitive area and the second light-sensitive area.