

CLAIMS

1. A system comprising:

at least one substrate comprising a plurality of angled facets along a front edge, wherein the at least one substrate further comprises a die attach location corresponding to each angled facet, wherein the plurality of angled facets provides a corresponding plurality of elevation angles, wherein a set of angle differences between adjacent elevation angles comprises at least two different angle difference values; and

a plurality of light-emitter devices, wherein respective light-emitter devices are coupled to respective die attach locations according to a respective elevation angle of the respective angled facet, wherein the plurality of light-emitter devices is configured to emit light into an environment along the plurality of elevation angles toward respective target locations;

wherein the at least one substrate is disposed along a vertical plane and the plurality of elevation angles are defined with respect to a horizontal plane; and

wherein at least one respective angle difference between adjacent elevation angles below the horizontal plane is greater than respective angle differences between adjacent elevation angles above the horizontal plane.

2. The system of claim 1, wherein a spatial resolution is about 7.5 centimeters between adjacent target locations along a horizontal ground plane.

3. The system of claim 1, comprising six substrates, wherein each substrate comprises a respective plurality of angled facets that correspond to a respective portion of the plurality of elevation angles.

4. The system of claim 3, wherein the six substrates are coupled together and aligned according to a set of alignment features, wherein the plurality of light-emitter devices is distributed between each of the substrates, and wherein each portion of the plurality of light-emitter devices is configured to illuminate the environment at a respective pointing angle with respect to the vertical plane.

5. The system of claim 1, wherein the plurality of light-emitter devices comprises at least 64 light-emitter devices.

6. The system of claim 1, wherein the at least one substrate further comprises, for each light-emitter device, a respective pulser circuit, wherein each respective pulser circuit is configured to accept a power signal, an enable signal, and a trigger signal, wherein the respective pulser circuits are configured to provide pulses between 1 – 10 nanoseconds in duration.

7. The system of claim 1, further comprising a plurality of lenses, wherein each respective light-emitter device of the plurality of light-emitter devices is optically coupled to a respective lens of the plurality of lenses.

8. The system of claim 1, further comprising a vehicle, wherein the plurality of light-emitter devices is configured to emit light into an environment around the vehicle.

9. A method of manufacturing, the method comprising:

providing at least one substrate, wherein the at least one substrate comprises a plurality of angled facets along a front edge and a die attach location corresponding to each angled facet, wherein the plurality of angled facets provides a corresponding plurality of elevation angles, wherein a set of angle differences between adjacent elevation angles comprises at least two different angle difference values;

attaching a plurality of light-emitter devices to respective die attach locations, wherein the attaching is performed according to a respective elevation angle of the respective angled facet;

electrically connecting each respective light-emitter device of the plurality of light-emitter devices to a respective pulser circuit; and

optically coupling each respective light-emitter device of the plurality of light-emitter devices to a respective lens;

wherein the at least one substrate is disposed along a vertical plane and the plurality of elevation angles are defined with respect to a horizontal plane; and

wherein at least one respective angle difference between adjacent elevation angles below the horizontal plane is greater than respective angle differences between adjacent elevation angles above the horizontal plane.

10. The method of claim 9, wherein attaching the plurality of light-emitting devices is performed with a conductive, thermally-cured adhesive, and wherein electrically connecting each respective light-emitter device of the plurality of light-emitter devices to a respective pulser circuit comprises providing a plurality of wire bonds between the respective light-emitter device and the respective pulser circuit.

11. The method of claim 9, wherein optically coupling each respective light-emitter device of the plurality of light-emitter devices to a respective lens comprises aligning the respective lens to the respective light-emitter device through an active optical feedback control process.

12. The method of claim 11, wherein the active optical feedback control process comprises causing the respective light-emitter device to emit light and adjusting a position of the respective lens such that a target location is illuminated by the emitted light having a desired light pattern.

13. A system comprising:

a plurality of light-emitter devices of a light detection and ranging system of a vehicle, wherein each light-emitter device of the plurality of light-emitter devices is configured to emit light pulses along a respective beam elevation angle defined with respect to a horizontal plane, wherein the plurality of light-emitter devices are arranged such that a combination of the respective beam elevation angles comprises a non-uniform beam elevation angle distribution, wherein at least one angle difference between respective beam elevation angles of two light-emitter devices having adjacent elevation angles below the horizontal plane is larger than angle differences between respective beam elevation angles of light-emitter devices having adjacent elevation angles above the horizontal plane.

14. The system of claim 13 wherein less than 50% of the plurality of light-emitter devices have respective beam elevation angles below the horizontal plane.

15. The system of claim 13 wherein at least one light-emitter device with a respective elevation angle below the horizontal plane is configured to emit light pulses at a higher shot rate than at least one light-emitter device with a respective elevation angle above the horizontal plane.

16. The system of claim 13 wherein at least one light-emitter device with a respective elevation angle above the horizontal plane is configured to emit light pulses with a lower duty cycle than at least one light-emitter device with a respective elevation angle below the horizontal plane.

17. The system of claim 13 wherein at least one light-emitter device with a respective elevation angle below the horizontal plane is configured to emit light pulses with a lower duty cycle than at least one light-emitter device with a respective elevation angle above the horizontal plane.

18. The system of claim 13 wherein at least one light-emitter device with a respective elevation angle below the horizontal plane is configured to emit light pulses with a lower power output per pulse than at least one light-emitter device with a respective elevation angle above the horizontal plane.