Claims

1. A display for displaying an image, comprising:

a condenser lens array having a plurality of condenser lenses;

a projection lens array having a plurality of projection lenses;

a plurality of optical channels which each comprise at least one condenser lens and one projection lens and are configured for projecting the image to be displayed by means of the display;

a plurality of collecting lenses arranged between optical paths of adjacent condenser lenses;

wherein a respective collecting lens is configured for collecting incident light and steering it to regions outside the projection lenses.

2. The display in accordance with claim 1, wherein at least a subset of the plurality of collecting lenses is configured to steer the incident light onto a non-imaging region, associated to the collecting lens, between projection lenses or between optical channels.

3. The display in accordance with claim 2, wherein the non-imaging region comprises a light-absorbing and/or light-scattering region.

4. The display in accordance with claim 2 or 3, wherein at least one non-imaging region comprises a light-absorbing region which comprises a metal layer arrangement, in particular a chrome layer arrangement.

5. The display in accordance with any of claims 2 to 4, wherein the non-imaging region is arranged at regions elevated relative to the plurality of projection lenses with respect to a plane of the projection lenses.

6. The display in accordance with claim 5, wherein the non-imaging region is arranged at the elevated regions as a coating, in particular having a color layer.

7. The display in accordance with any of claims 2 to 6, wherein the non-imaging region is arranged in a plane between the projection lens array and the condenser lens array.

8. The display in accordance with any of claims 2 to 7, wherein projection lenses of the projection lens array are formed on or in a surface of the projection lens substrate; and the non-imaging region is arranged on or in the surface of the projection lens substrate in an intermediate region between the adjacent projection lenses.

9. The display in accordance with any of claims 2 to 8, wherein the non-imaging region defines apertures of the projection lenses.

10. The display in accordance with any of claims 2 to 9, wherein at least one collecting lens of the plurality of collecting lenses is configured to focus the incident light onto the non-imaging region within a tolerance range of 20 % relative to the focal length of the collecting lens.

11. The display in accordance with any of claims 2 to 10, wherein a combination of the condenser lens array and the plurality of collecting lenses covers an optically active entrance side of the display preferably completely, to an extent of at least 90 %, and the plurality of collecting lenses is configured to steer the light incident on the plurality of collecting lenses onto the non-imaging region completely, within a tolerance range of at most 10 %.

12. The display in accordance with any of the preceding claims, wherein a contour of the condenser lenses of the condenser lens array matches with at least a sub-region of the image to be displayed by means of the display.

13. The display in accordance with any of the preceding claims, wherein at least one of the condenser lenses of the condenser lens array comprises a decentered lens segment.

14. The display in accordance with any of the preceding claims, wherein the condenser lens array and the collecting lenses on the one hand and the projection lens array on the other hand are arranged on opposite sides of a lens substrate.

15. The display in accordance with any of the preceding claims, wherein the condenser lens array comprises an array of lenses comprising irregular edges.

16. The display in accordance with any of the preceding claims, wherein the plurality of optical channels comprises a first subset for displaying the image as a first image and a second subset for displaying a second image.

17. The display in accordance with claim 16, configured for displaying the first image with a first color and the second image in a second color.

18. The display in accordance with any of the preceding claims, formed as a projection display and/or a light-field display.

19. The display in accordance with any of the preceding claims, configured for displaying at least parts of the image with a three-dimensional effect.

20. The display in accordance with any of the preceding claims, wherein the condenser lens array is formed as a micro lens array and the projection lens array is formed as a micro lens array.

21. The display in accordance with any of the preceding claims, wherein each optical channel of the plurality of optical channels is configured to display an elementary image of a plurality of matching elementary images; wherein the plurality of optical channels is configured to image the plurality of elementary images in a projection plane to be overlapping.

22. The display in accordance with any of the preceding claims, wherein each of the plurality of condenser lenses is configured to image a light source illuminating the condenser lens into the projection lens associated to the condenser lens.

23. The display in accordance with any of the preceding claims, wherein at least a subset of the projection lenses is formed as a decentered lens segment.

24. The display in accordance with any of the preceding claims, wherein at least one condenser lens of the condenser lens array is configured to project a first subset of

light incident on the condenser lens onto the associated projection lens and to steer a second subset of the incident light onto at least one non-imaging region arranged adjacent to the associated projection lens.

25. The display in accordance with claim 24, wherein the at least one condenser lens of the condenser lens array comprises at least one of:

- a diffuser;
- a free form lens; and
- a plurality of condenser lens sub-regions;

to separate the first subset from the second subset.

26. The display in accordance with any of the preceding claims, comprising a light source configured to provide to the condenser lens array collimated light as the incident light.

27. The display in accordance with any of the preceding claims, wherein an arrangement of the condenser lenses and/or an arrangement of the projection lenses comprise at least 6 lenses in an arrangement having at least three columns and at least two lines.

28. A system comprising a display in accordance with any of the preceding claims.

29. The system in accordance with claim 28, comprising a plurality of displays or a display comprising a plurality of sub-regions configured for projecting different sub-regions of an overall image to be displayed.

30. The system in accordance with claim 28 or 29, comprising a touchless keyboard in which the image to be displayed comprises keys of the keyboard.

31. The system in accordance with claim 30, configured to display the touchless keyboard as a floating structure.

32. The system in accordance with claim 28 or 29, comprising an automotive light, in particular a rear light or break light, and wherein the image is a three-dimensional sign in a region of the automotive light.

33. The system in accordance with claim 28 or 29, configured as a vehicle light and configured for dynamically displaying the image for communicating with another road user.

34. A method for projecting an image, comprising:

illuminating a condenser lens array having a plurality of condenser lenses, in which at least one respective condenser lens, with a respective projection lens of a projection lens array, forms part of an optical channel and the projection lenses are configured for projecting the image to be displayed by means of the display;

steering light from gaps between adjacent condenser lenses onto regions outside the optical channels.

35. A method for manufacturing a display, comprising:

manufacturing a condenser lens array having a plurality of condenser lenses and a projection lens array having a plurality of projection lenses;

so that a plurality of optical channels each comprise at least one condenser lens and a projection lens and are configured for projecting the image to be displayed by means of the display;

so that a plurality of collecting lenses are arranged between optical paths of adjacent condenser lenses; and

so that a respective collecting lens collects incident light and steers it to regions outside the projection lenses.

36. The method in accordance with claim 35, wherein manufacturing comprises an injection molding process.

37. The method in accordance with claim 35 or 36, comprising:

producing at least one non-imaging region as a target region of the collecting lenses by executing a coating process on a region of a projection lens substrate, which is elevated relative to the projection lenses.