CLAIMS

1. A system comprising:

a first camera mounted in order to capture images of an environment, the first camera having a first exposure time and being without an ND filter;

a second camera mounted in order to capture images of the environment, the second camera having a second exposure time that is greater than or equal to the first exposure time and having an ND filter;

one or more processors configured to:

capture images using the first camera and the first exposure time;

capture images using the second camera and the second exposure time;

use the images captured using the second camera to identify illuminated objects;

use the images captured using the first camera to identify the locations of objects; and

use the identified illuminated objects and identified locations of objects to control a vehicle in an autonomous driving mode.

2. The system of claim 1, wherein the first camera and the second camera each include a near infrared filter.

3. The system of claim 1, wherein the second exposure time is on the order of milliseconds.

4. The system of claim 3, wherein the second exposure time is at least 5 milliseconds and the first exposure time is no greater than 5 milliseconds.

5. The system of claim 1, wherein the ND filter is selected according to the second exposure time.

6. The system of claim 1, wherein the ND filter is implemented at a pixel level for the second camera.

7. The system of claim 1, further comprising the vehicle.

8. The system of claim 1, wherein the one or more processors are further configured to use the images of the second camera to identify illuminated images by identifying light from a PWM light source.

9. The system of claim 1, wherein the one or more processors are further configured to use the images of the second camera to identify illuminated images by identifying text generated by a plurality of PWM light sources comprising LEDs.

10. The system of claim 9, wherein the one or more processors are further configured to select the second exposure time based on a frequency of the PWM light sources.

11. The system of claim 1, wherein the one or more processors are further configured to use the images of the second camera to identify illuminated images by identifying light from a light source which flickers at a rate defined by a power grid that supplies power to the light source.

12. The system of claim 11, wherein the one or more processors are further configured to select the second exposure time based on a rate defined by the power grid.

13. The system of claim 1, wherein the second exposure time is a fixed exposure time.

14. The system of claim 1, wherein the first exposure time is a variable exposure time that is adjusted according to ambient lighting conditions.

15. The system of claim 14, wherein the second exposure time is always greater than the first exposure time.

16. The system of claim 14, wherein the second exposure time is a variable exposure time.

17. The system of claim 1 wherein the second camera further comprises:

a set of photodiodes; and

an ND filter arranged to filter light before the light reaches the set of photodiodes; and

a controller configured to expose the set of photodiodes using a fixed exposure time of at least 5 milliseconds in order to capture an image, wherein the exposure time allows the camera to capture light from a PWM light source during the exposure time, the PWM light being located in an environment of the vehicle.

18. The system of claim 17, further comprising a near-infrared filter arranged to filter light before the light reaches the set of photodiodes.

19. The system of claim 1, wherein the second camera further comprises:

a set of photodiodes;

an ND filter arranged to filter light before the light reaches the set of photodiodes; and

a controller configured to expose the set of photodiodes using a fixed exposure time of at least 5 milliseconds in order to capture an image, wherein the exposure time allows the camera to capture light from a light source which flickers at a rate defined by a power grid that supplies power to the light source, the light source being located in an environment of the vehicle.

20. The system of claim 19, further comprising a near-infrared filter arranged to filter light before the light reaches the set of photodiodes.