WHAT IS CLAIMED IS:

1. An autonomous driving system for detecting environment of an autonomous vehicle, comprising:

a storage device storing a set of instructions; and

one or more processors configured to communicate with the storage device, wherein when executing the set of instructions, the one or more processors are configured to cause the system to:

receive, from a camera, a first image including a plurality of pixels relating to one or more objects;

receive, from one or more light detection and ranging equipments (LiDARs), a first point set including a plurality of points corresponding to the plurality of pixels of the first image;

determine first 3D coordinates of the plurality of points and reflection intensities of the plurality of points based on the first point set;

generate a segment result by classifying the plurality of points based on the first 3D coordinates of the plurality of points and the reflection intensities of the plurality of points;

transform the first 3D coordinates of the plurality of points into first 2D coordinates of the plurality of points; and

determine an object type of the one or more objects based on the

first 2D coordinates of the plurality of points, the first 3D coordinates of the plurality of points, the segment result, and the first image.

2. The system of claim 1, the one or more processors are further configured to cause the system to:

determine environmental information relating to the one or more objects based on the object type.

3. The system of claim 2, wherein the environmental information relating to the one or more objects includes at least one of:

the object type of the one or more objects,

a motion state of at least one of the one or more objects,

a velocity of at least one of the one or more objects relative to a vehicle including the one or more LiDARs and the camera,

an acceleration of at least one of the one or more objects relative to the vehicle,

a moving direction of at least one of the one or more objects, or

a distance between at least one of the one or more objects and the vehicle.

4. The system of claim 1, wherein the first point set includes a first point subset obtained by a first LiDAR and a second point subset obtained by a second LiDAR.

5. The system of claim 4, wherein to determine the first 3D coordinates of the plurality of points, the one or more processors are configured to cause the system to:

determine second 3D coordinates of the first point subset corresponding to a first 3D coordinate system relating to the first LiDAR;

determine third 3D coordinates of the second point subset corresponding to a second 3D coordinate system relating to the second LiDAR;

transform the third 3D coordinates into fourth 3D coordinates of the second point subset corresponding to the first 3D coordinate system; and

determine the first 3D coordinates based on the second 3D coordinates of the first point subset and the fourth 3D coordinates of the second point subset.

6. The system of claim 1, wherein to transform the first 3D coordinates of the plurality of points into the first 2D coordinates of the plurality of points, the one or more processors are configured to cause the system to:

obtain a transformation matrix; and

transform the first 3D coordinates of the plurality of points into the first 2D coordinates of the plurality of points based on the transformation matrix.

7. The system of claim 6, wherein to obtain the transformation matrix, the one or more processors are configured to cause the system to:

receive, from one of the one or more LiDARs, a second point set including a plurality of points relating to a target;

receive, from the camera, a second image including a plurality of pixels relating to the target;

determine second 3D coordinates of the plurality of points relating to the target;

determine second 2D coordinates of the plurality of pixels relating to the target; and

determine the transformation matrix based on the second 3D coordinates and the second 2D coordinates.

8. The system of claim 7, wherein to determine the transformation matrix based on the second 3D coordinates and the second 2D coordinates, the one or more processors are configured to cause the system to:

determine the transformation matrix according to a least square method.

9. The system of claim 7, wherein the target includes a 2D pattern having one or more points, each of which is a center of a circle.

10. The system of claim 1, wherein to determine the object type of the one or more objects, the one or more processors are configured to cause the system to:

determine the object type of the one or more objects according to a Faster-RCNN model.

11. An autonomous driving method for detecting environment of an autonomous vehicle implemented on a computing device having one or more processors and a storage device, the method comprising:

receiving, from a camera, a first image including a plurality of pixels relating to one or more objects;

receiving, from one or more light detection and ranging equipments (LiDARs), a first point set including a plurality of points corresponding to the plurality of pixels of the first image;

determining first 3D coordinates of the plurality of points and reflection intensities of the plurality of points based on the first point set;

generating a segment result by classifying the plurality of points based on

the first 3D coordinates of the plurality of points and the reflection intensities of the plurality of points;

transforming the first 3D coordinates of the plurality of points into first 2D coordinates of the plurality of points; and

determining an object type of the one or more objects based on the first 2D coordinates of the plurality of points, the first 3D coordinates of the plurality of points, the segment result, and the first image.

12. The method of claim 11, the method further comprising:

determining environmental information relating to the one or more objects based on the object type.

13. The method of claim 12, wherein the environmental information relating to the one or more objects includes at least one of:

the object type of the one or more objects,

a motion state of at least one of the one or more objects,

a velocity of at least one of the one or more objects relative to a vehicle including the one or more LiDARs and the camera,

an acceleration of at least one of the one or more objects relative to the vehicle,

a moving direction of at least one of the one or more objects, or

a distance between at least one of the one or more objects and the vehicle.

14. The method of claim 11, wherein the first point set includes a first point subset obtained by a first LiDAR and a second point subset obtained by a second LiDAR.

15. The method of claim 14, wherein the determining of the first 3D coordinates of the plurality of points comprising:

determining second 3D coordinates of the first point subset corresponding to a first 3D coordinate system relating to the first LiDAR;

determining third 3D coordinates of the second point subset corresponding to a second 3D coordinate system relating to the second LiDAR;

transforming the third 3D coordinates into fourth 3D coordinates of the second point subset corresponding to the first 3D coordinate system; and

determining the first 3D coordinates based on the second 3D coordinates of the first point subset and the fourth 3D coordinates of the second point subset.

16. The method of claim 11, wherein the transforming of the first 3D coordinates of the plurality of points into the first 2D coordinates of the plurality of points comprising:

obtaining a transformation matrix; and

transforming the first 3D coordinates of the plurality of points into the first 2D coordinates of the plurality of points based on the transformation matrix.

17. The method of claim 16, wherein the obtaining of the transformation matrix comprising:

receiving, from one of the one or more LiDARs, a second point set including a plurality of points relating to a target;

receiving, from the camera, a second image including a plurality of pixels relating to the target;

determining second 3D coordinates of the plurality of points relating to the target;

determining second 2D coordinates of the plurality of pixels relating to the target; and

determining the transformation matrix based on the second 3D coordinates and the second 2D coordinates.

18. The method of claim 17, wherein the target includes a 2D pattern having one or more points, each of which is a center of a circle.

19. The method of claim 17, wherein the determining of the transformation matrix based on the second 3D coordinates and the second 2D coordinates comprising:

determining the transformation matrix based on a least square method.

20. A non-transitory computer readable medium, comprising at least one set of instructions for detecting environment of a vehicle, wherein when executed by one or more processors of a computing device, the at least one set of instructions causes the computing device to perform a method, the method comprising:

receiving, from a camera, a first image including a plurality of pixels relating to one or more objects;

receiving, from one or more light detection and ranging equipments (LiDARs), a first point set including a plurality of points corresponding to the plurality of pixels of the first image;

determining first 3D coordinates of the plurality of points and reflection intensities of the plurality of points based on the first point set;

generating a segment result by classifying the plurality of points based on the first 3D coordinates of the plurality of points and the reflection intensities of the plurality of points;

transforming the first 3D coordinates of the plurality of points into first 2D

coordinates of the plurality of points; and

determining an object type of the one or more objects based on the first 2D coordinates of the plurality of points, the first 3D coordinates of the plurality of points, the segment result, and the first image.