CLAIMS

1. A pantograph periphery obstruction detection device comprising:

a reference camera and a first correction camera that capture images of the pantograph periphery; and

an image processing device that processes images from the cameras,

wherein the image processing device comprises

a stereo parallelization unit that corrects lens distortion and stereo parallelization, and

a data processing unit that processes the images corrected by the stereo parallelization unit, and

the data processing unit comprises

a pantograph template setting unit that sets a template of the pantograph,

a background removal unit that creates a foreground image from which a background has been removed,

a pantograph detection unit that detects the position of the pantograph,

a parallax calculation unit that determines a parallax, which is an amount of deviation of a projection point of an object in each camera image,

a three-dimensional coordinate calculation unit that calculates three-dimensional coordinates based on the parallax,

an overhead wire detection unit that extracts lines such as overhead wires and creates an overhead wire mask image,

an overhead wire support fitting detection unit that detects overhead wire support fittings from the foreground image and creates an overhead wire support fitting mask image, and

an obstruction determination unit that applies the overhead wire mask image and the overhead wire support fitting mask image to the foreground image and determines obstructions based on the distance from the pantograph.

2. The pantograph periphery obstruction detection device of claim 1, wherein in the overhead wire support fitting detection unit, abnormal coupling between the overhead wire support fittings and the overhead wires is detected.

3. The pantograph periphery obstruction detection device of claim 1 or 2,

comprising a second correction camera, which second correction camera is arranged in a direction orthogonal to a line segment connecting the positions of the reference camera and the first correction camera when viewed from the reference camera.

4. A pantograph periphery obstruction detection method comprising:

capturing images of a pantograph periphery with a reference camera and a first correction camera;

correcting lens distortion and stereo parallelization;

setting a template of the pantograph;

creating a foreground image from which a background has been removed;

detecting the position of the pantograph;

determining a parallax, which is an amount of deviation of a projection point of an object in each camera image;

calculating three-dimensional coordinates based on the parallax;

extracting lines such as overhead wires and creating an overhead wire mask image;

detecting overhead wire support fittings from the foreground image and creating an overhead wire support fitting mask image; and

applying the overhead wire mask image and the overhead wire support fitting mask image to the foreground image and determining obstructions based on the distance from the pantograph.

5. The pantograph periphery obstruction detection method of claim 4, wherein detecting the overhead wire support fittings includes detecting abnormal coupling between the overhead wire support fittings and the overhead wires.

6. The pantograph periphery obstruction detection method of claim 4 or 5 comprising capturing images of the pantograph periphery with a second correction camera, which second correction camera is arranged in a direction orthogonal to a line segment connecting the positions of the reference camera and the first correction camera when viewed from the reference camera.