CLAIMS

1. An obstacle detection device comprising:

an acquiring unit that acquires a visible light image obtained by imaging in a traveling direction of a railway vehicle by an imaging unit included in the railway vehicle and a distance image for identifying a distance to an object existing in an imaging range of the imaging unit;

a rail detector that detects, from the visible light image, a rail on which the railway vehicle travels;

a monitoring region setting unit that, using the detected rail, sets a three-dimensional monitoring region defined by a loading gauge of the railway vehicle or a construction gauge in the visible light range, wherein when a plurality of the rails is detected by the rail detector from the visible light image, the monitoring region setting unit sets the monitoring region for each of the rails or one of the detected rails on which the railway vehicle travels;

an obstacle detector that detects an obstacle that exists in the monitoring region and hinders the traveling of the railway vehicle, based on range information for identifying a distance range to the monitoring region based on the visible light image to be identifiable and the distance image; and

an output unit that outputs a result of detecting the obstacle.

2. The obstacle detection device according to claim 1, further comprising:

a candidate detector that detects, as candidates of the obstacle, objects existing in the monitoring region based on the distance image and the range information,

wherein

the obstacle detector detects the obstacle from among the candidates of the obstacle based on at least one of sizes of the candidates of the obstacle and moving vectors of the candidates of the obstacle.

3. The obstacle detection device according to claim 1 or 2, wherein

the acquiring unit acquires, as the visible light image, any one of a plurality of images obtained by imaging in the traveling direction of the railway vehicle by a plurality of the imaging units from different points of view and acquires the images as the distance image.

4. The obstacle detection device according to claim 3, wherein

the distance image indicates disparity between the images, and

the range information indicates a range of disparity of the monitoring region.

~~5. The obstacle detection device according to any one of claims 1 to 4, wherein~~

~~when a plurality of the rails are detected by the rail detector from the light visible image, the monitoring region setting unit sets the monitoring region for each of the rails.~~

~~6. The obstacle detection device according to any one of claims 1 to 4, wherein~~

~~when a plurality of the rails are detected by the rail detector from the light visible image, the monitoring region setting unit sets the monitoring region for one of~~

~~the detected rails on which the railway vehicle travels.~~

~~7~~5. The obstacle detection device according to claim 2, wherein

the candidate detector sets a standard plane in contact with an upper surface of the rail in the visible light image and detects, as a candidate of the obstacle, an object existing above the standard plane.

~~8~~6. The obstacle detection device according to any one of claims 1 to ~~7~~5, wherein

the monitoring region setting unit enlarges the monitoring region so that a region around the loading gauge of the railway vehicle or the construction gauge is included in the monitoring region in a predetermined section within a traveling section in which the railway vehicle travels.

~~9~~7. The obstacle detection device according to claim ~~8~~6, wherein

the monitoring region setting unit detects the predetermined section from the visible light image and enlarges the monitoring region in the predetermined section.

~~10~~8. The obstacle detection device according to claim ~~8~~6, wherein

the monitoring region setting unit receives, from an external device, positional information indicating the predetermined section and enlarges the monitoring region based on the positional information.

~~11~~9. The obstacle detection device according to claim ~~8~~6, further comprising:

a position measuring unit that measures a traveling position of the railway vehicle; and

a storage that stores positional information indicating the predetermined section, wherein

the monitoring region setting unit enlarges the monitoring region in the predetermined section based on the traveling position measured by the position measuring unit and the positional information stored in the storage.