CLAIMS

1. A detection device for detecting a target behavior that is a vehicle behavior subjected to detection in a preset detection area using a laser radar that generates point cloud information by irradiating the detection area with laser light and receiving reflected light resulting from the irradiation with the laser light, the detection device comprising:

an acquisition unit configured to acquire the point cloud information;

a vehicle detection unit configured to detect a vehicle based on the point cloud information;

an object tracking unit configured to track the vehicle detected by the vehicle detection unit and generate a tracking result; and

a behavior detection unit configured to detect the target behavior based on a direction of movement and an amount of movement per unit time of the vehicle detected by the vehicle detection unit and tracked by the object tracking unit, wherein

the vehicle detection unit calculates position information indicating a position of the vehicle based on the point cloud information,

the behavior detection unit calculates a position vector indicating a distance and a direction from a second position indicated by second position information which is the position information at time 2 before time 1 to a first position indicated by first position information which is the position information at the time 1, and divides the position vector by a time difference between the time 1 and the time 2 to calculate a velocity vector, and

the behavior detection unit calculates an inner product of the velocity vector and a reference vector having an orientation along a direction of traffic of the vehicle permitted in the detection area, and compares the inner product with a predetermined threshold value to determine whether the vehicle has performed the target behavior.

2. The detection device according to claim 1, wherein

the behavior detection unit determines whether the vehicle has performed the target behavior based on a transition of the velocity vector.

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

when the target behavior is a traffic violation behavior, the behavior detection unit outputs an acquisition command to cause an external device to acquire vehicle information that identifies the vehicle that has performed the target behavior.

4. A detection system, comprising:

a detection device according to any one of claims 1 to 3; and

a laser radar.