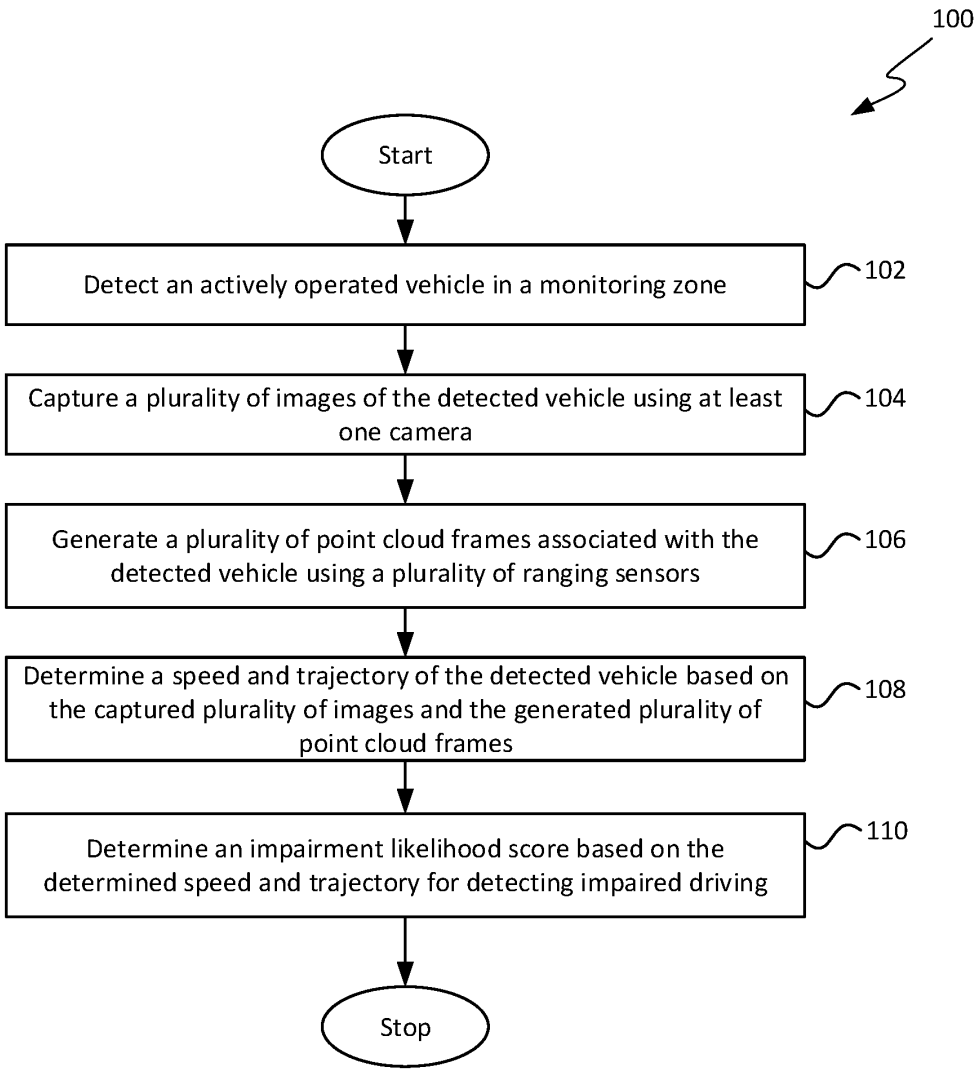

100
Start
Detect an actively operated vehicle in a monitoring zone
102
Capture a plurality of images of the detected vehicle using at least one camera
104
Generate a plurality of point cloud frames associated with the detected vehicle using a plurality of ranging sensors
106
Determine a speed and trajectory of the detected vehicle based on the captured plurality of images and the generated plurality of point cloud frames
108
Determine an impairment likelihood score based on the determined speed and trajectory for detecting impaired driving
110
Stop

Figure 1

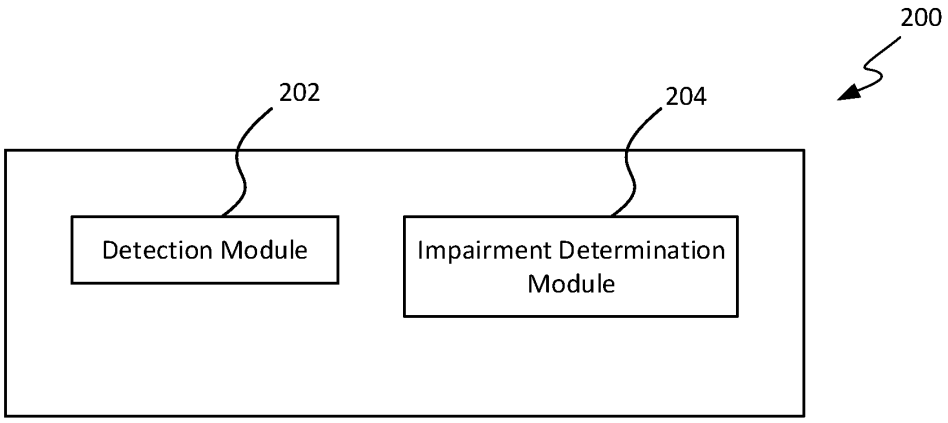


Figure 2

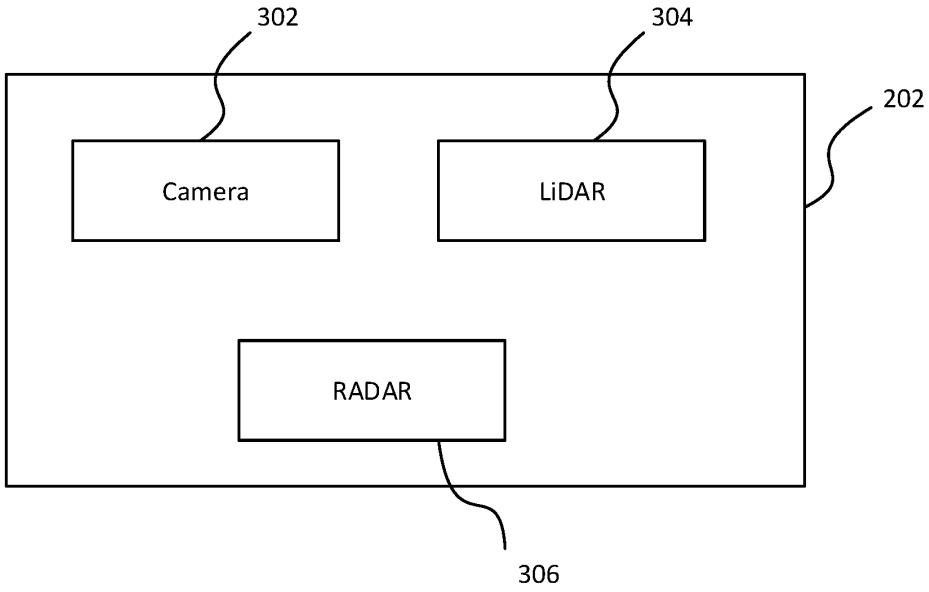


Figure 3

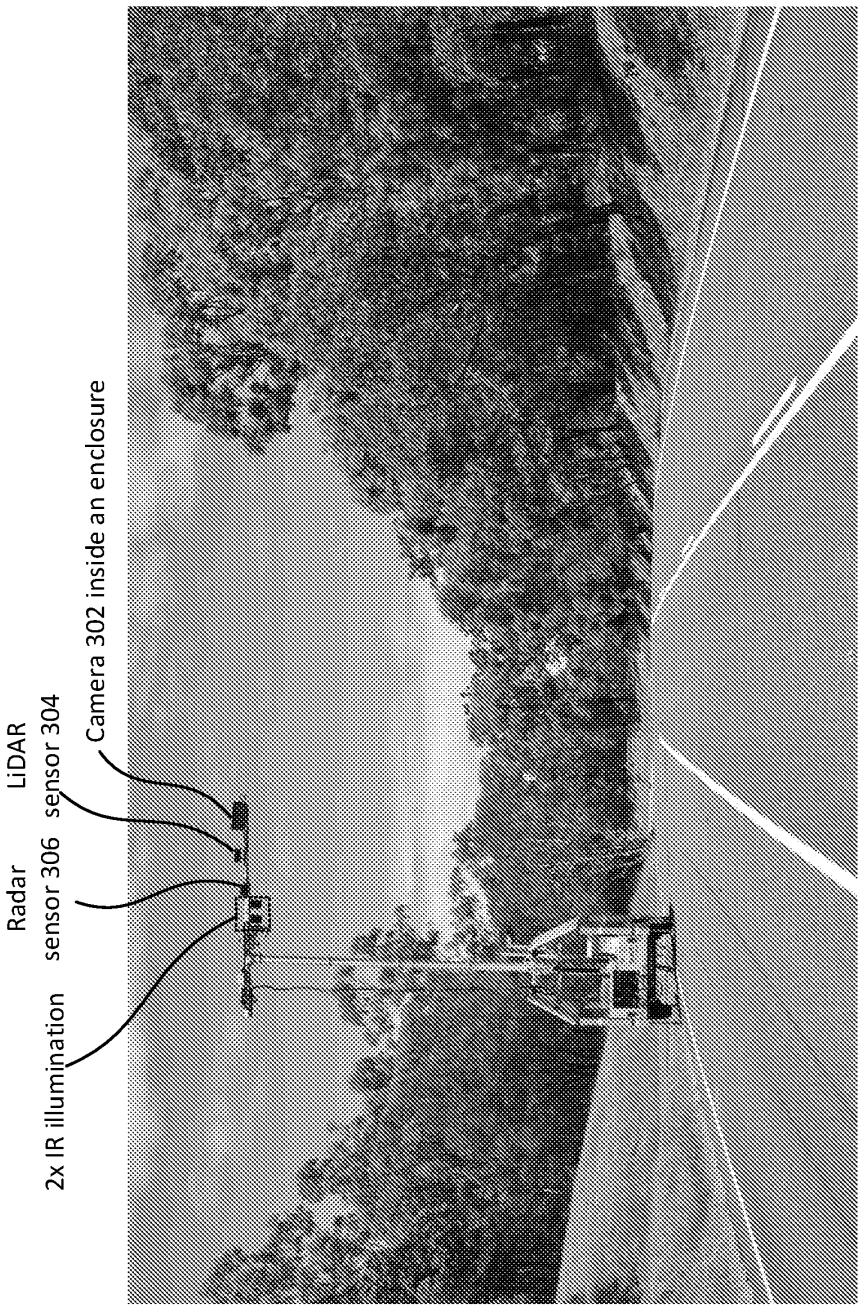

Camera 302 inside an enclosure
LiDAR sensor 304
Radar sensor 306
2x IR illumination

Figure 4

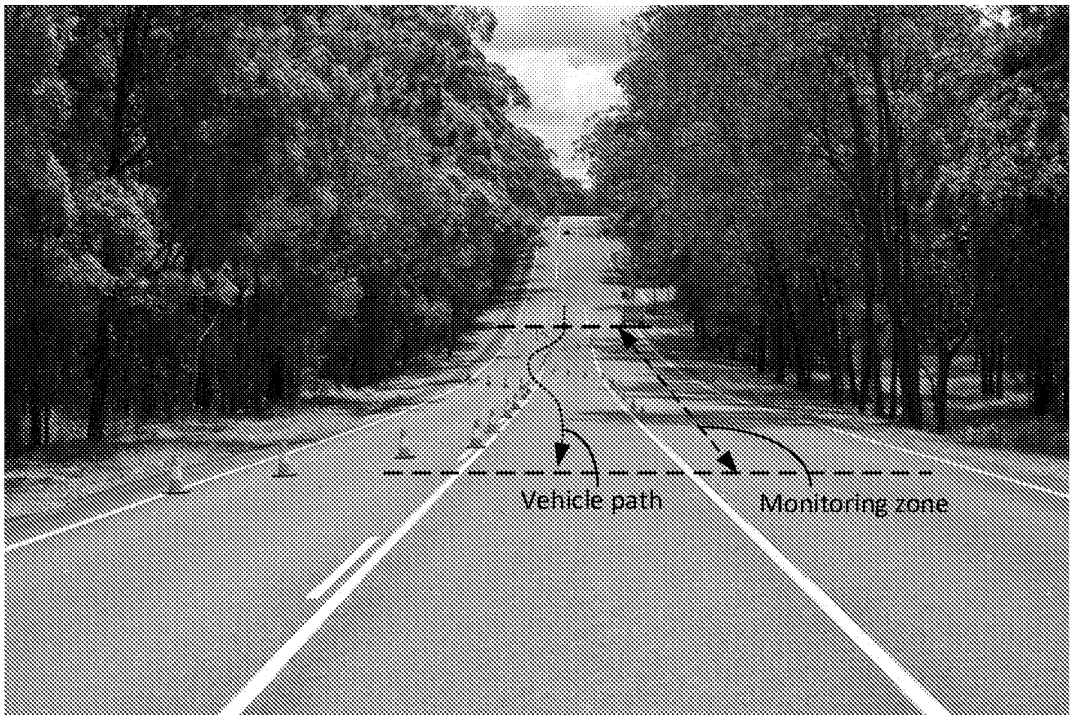


Figure 5



Figure 6

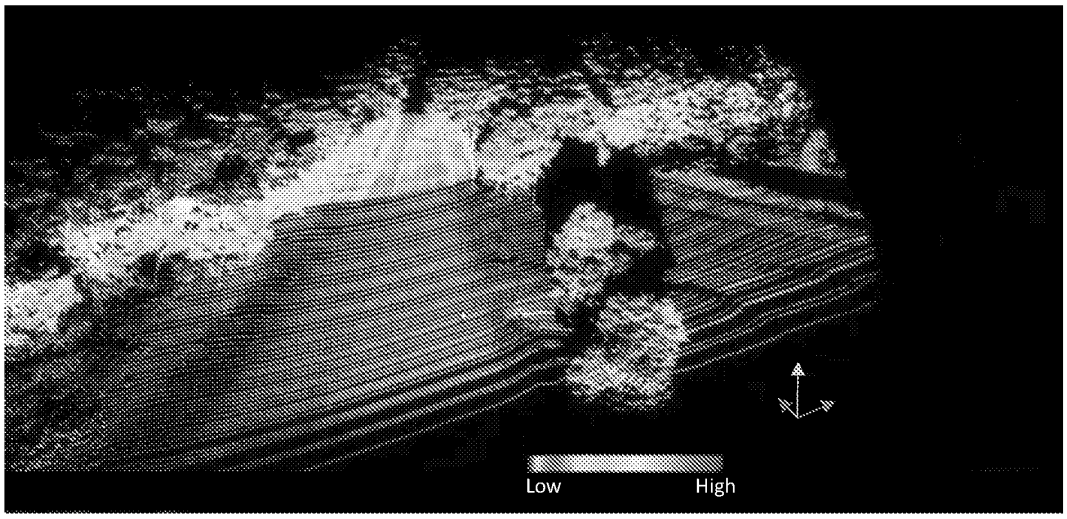


Figure 7

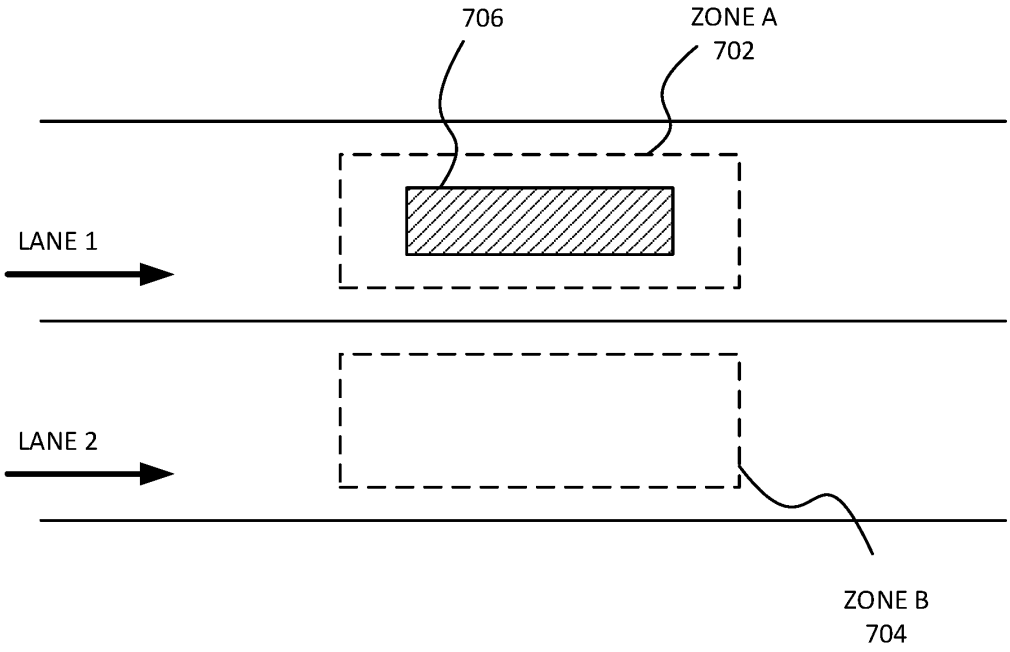


Figure 8A

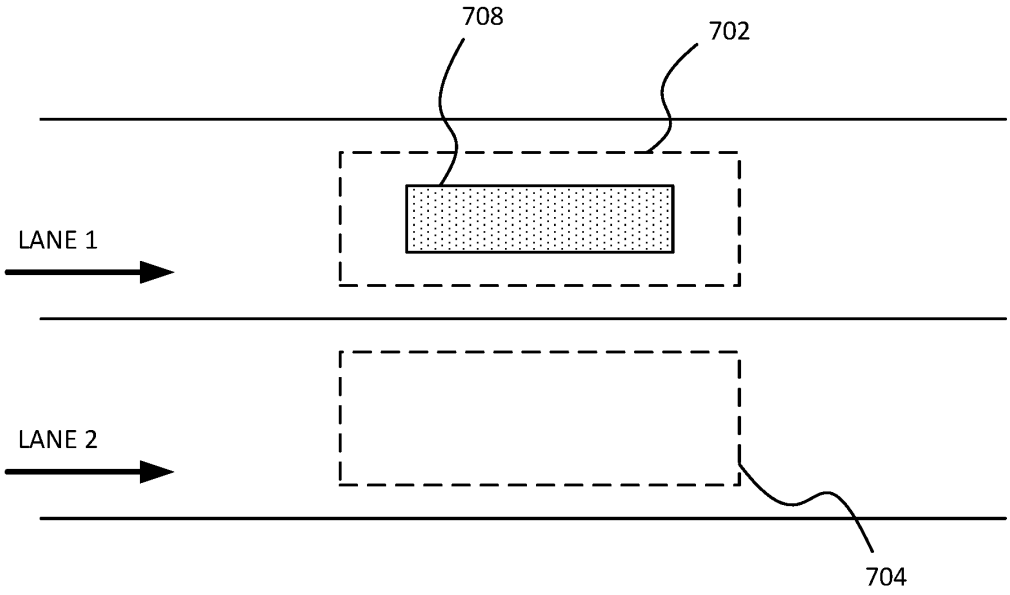


Figure 8B

Object ID	Lane	Class	Speed [km/ h]	Monitoring Zone
1	1	4	90	A
2	1	7	109	A

Figure 8C

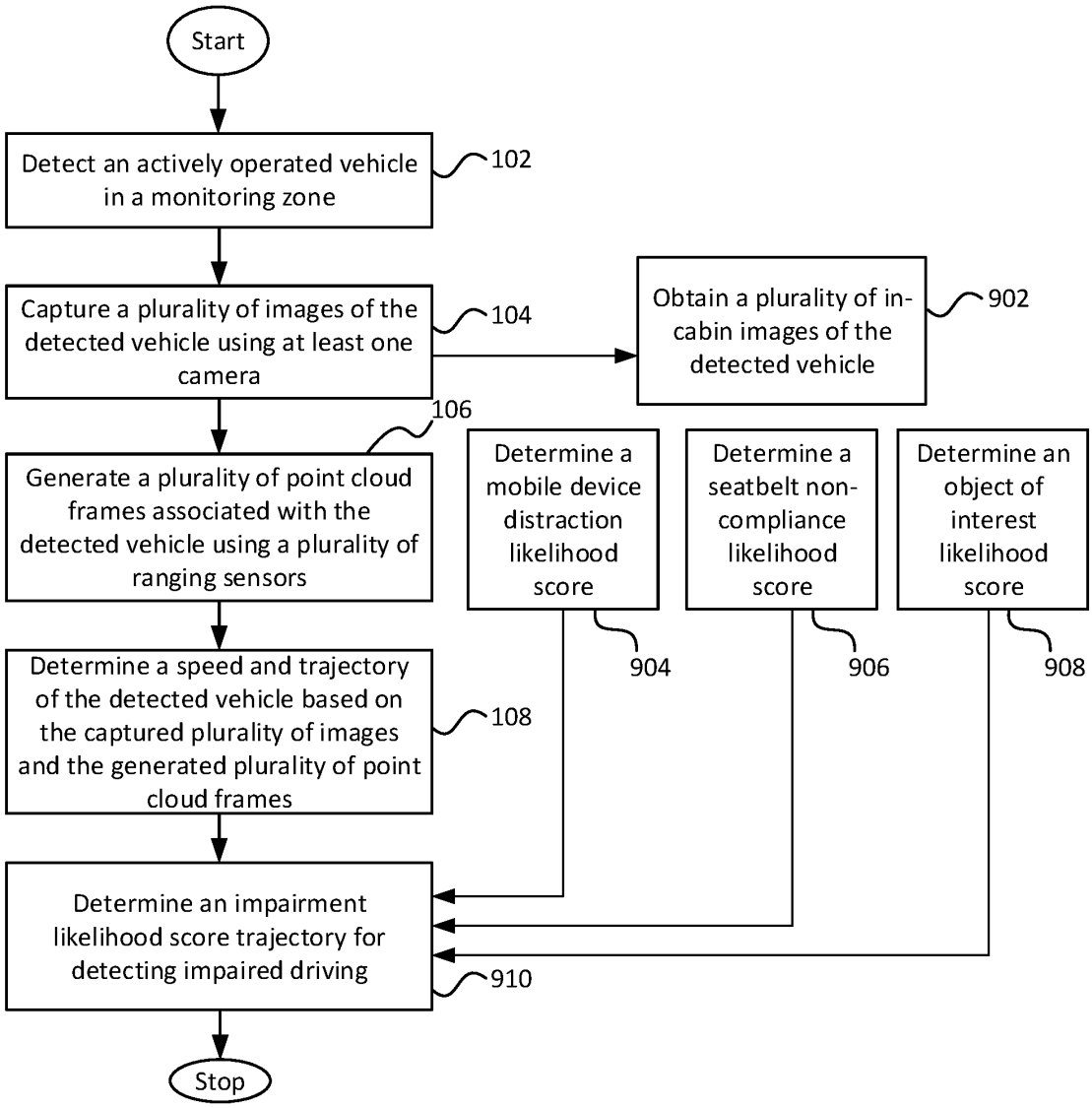

Start
Detect an actively operated vehicle in a monitoring zone
102
Capture a plurality of images of the detected vehicle using at least one camera
104
Obtain a plurality of in-cabin images of the detected vehicle
902
106
Generate a plurality of point cloud frames associated with the detected vehicle using a plurality of ranging sensors
Determine a mobile device distraction likelihood score
Determine a seatbelt non-compliance likelihood score
Determine an object of interest likelihood score
904
906
908
Determine a speed and trajectory of the detected vehicle based on the captured plurality of images and the generated plurality of point cloud frames
108
Determine an impairment likelihood score trajectory for detecting impaired driving
910
Stop

Figure 9

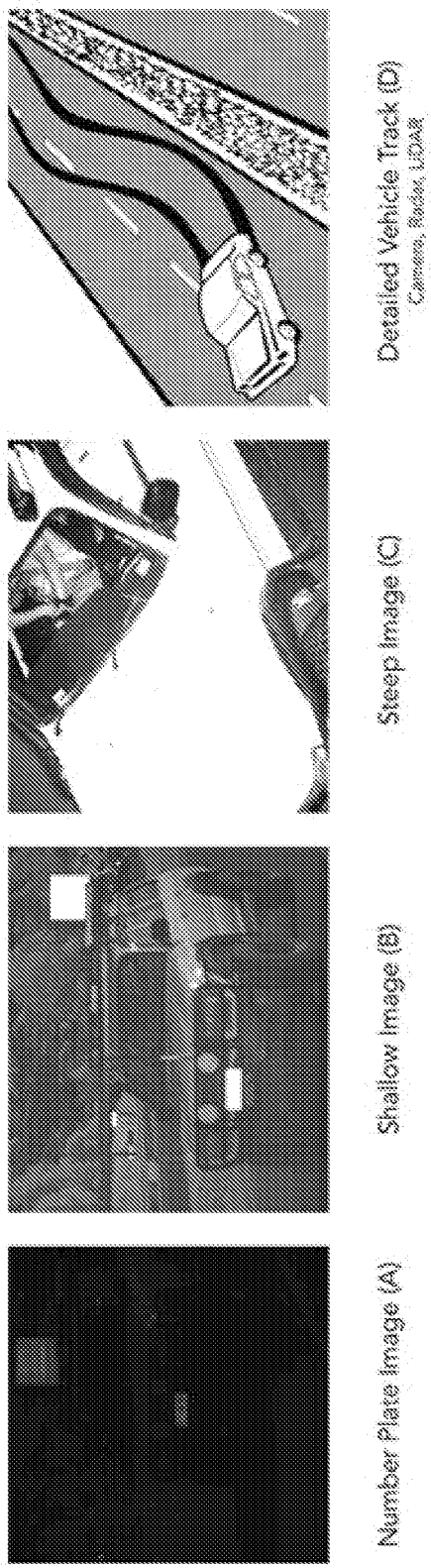

Number Plate Image (A)
Shallow Image (B)
Steep Image (C)
Detailed Vehicle Track (D)
Camera, Radar, LiDAR

Figure 10

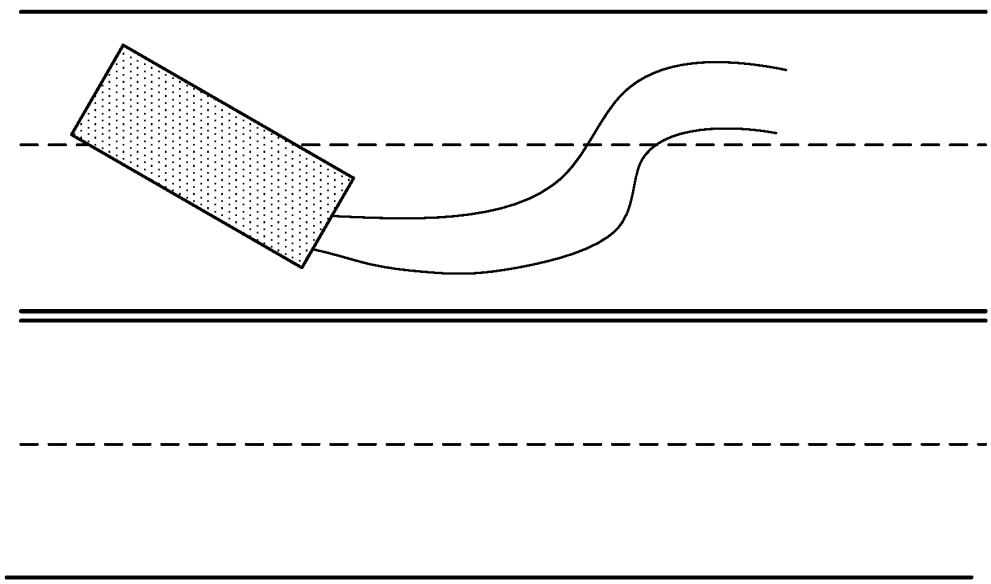


Figure 11A

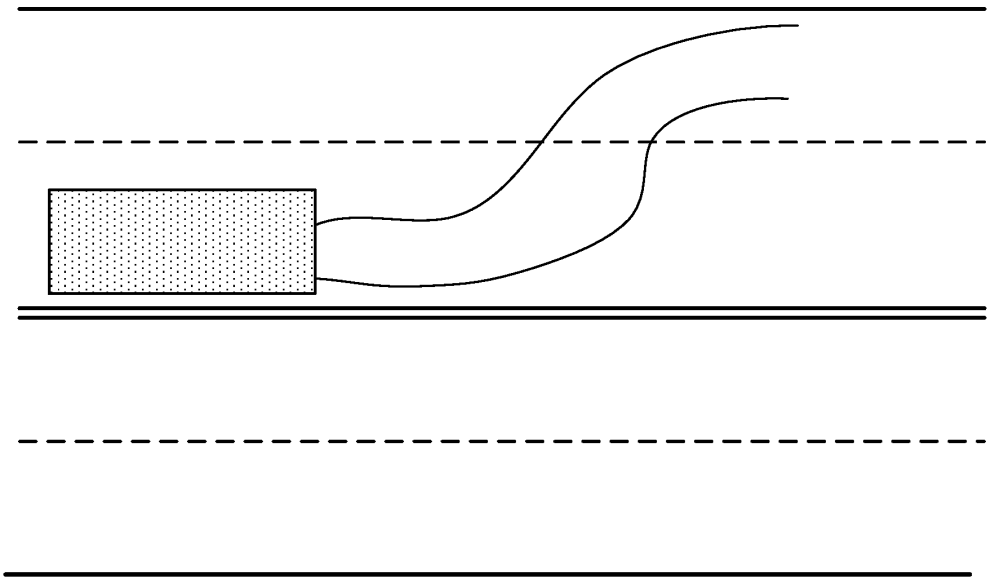


Figure 11B

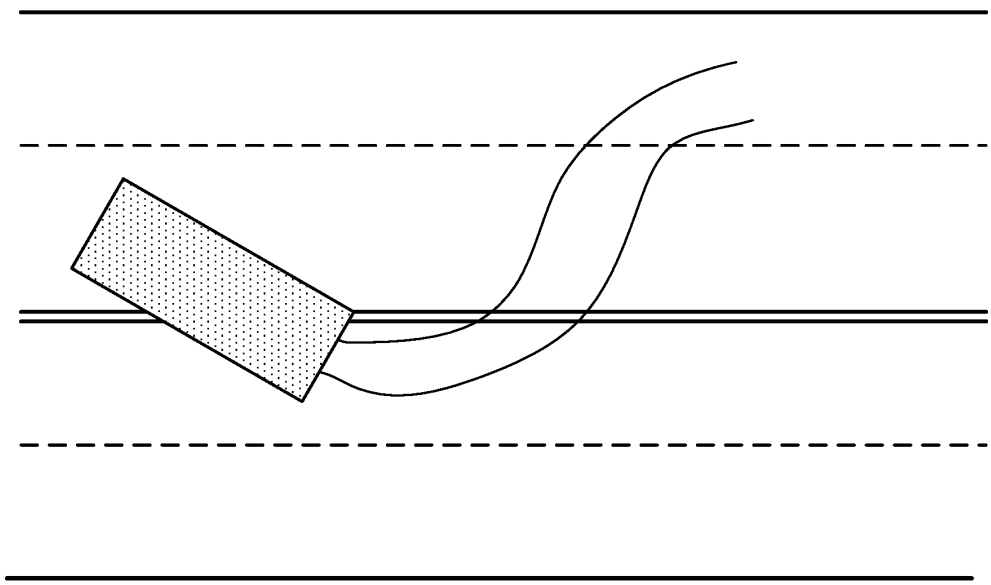


Figure 11C

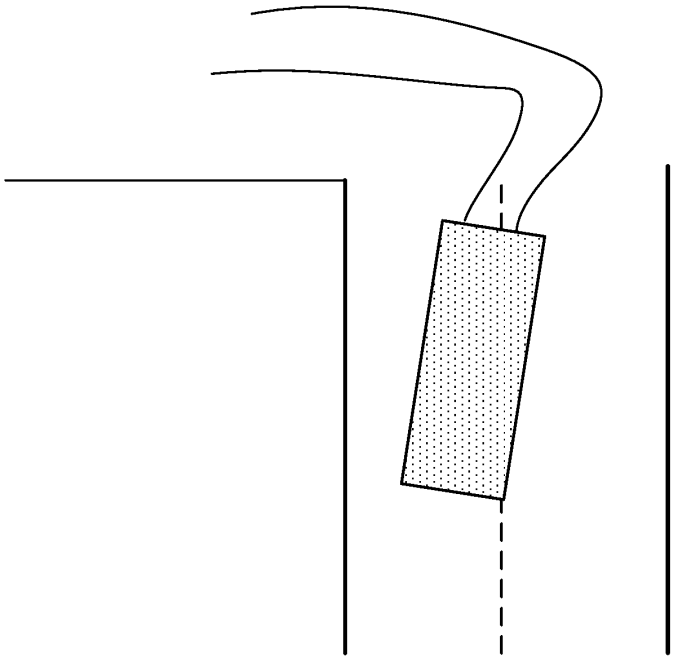


Figure 11D

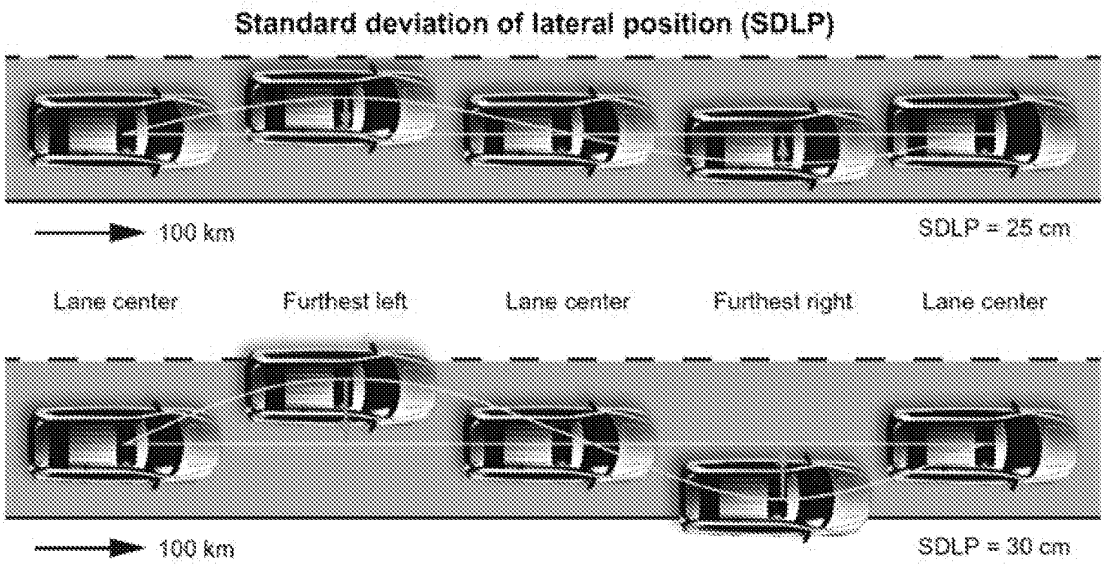


Figure 12

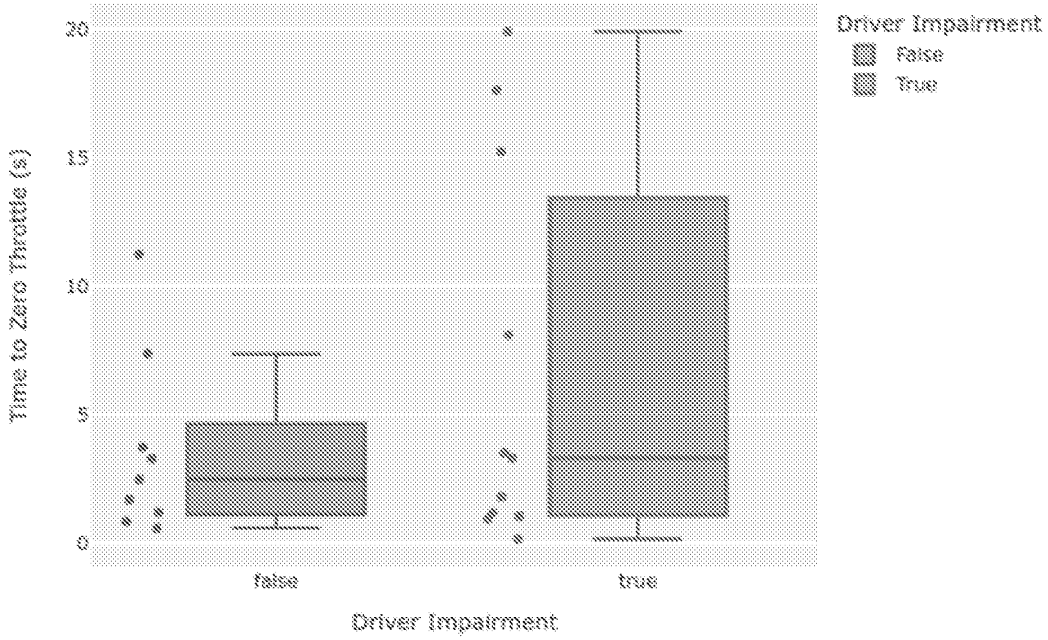


Figure 13

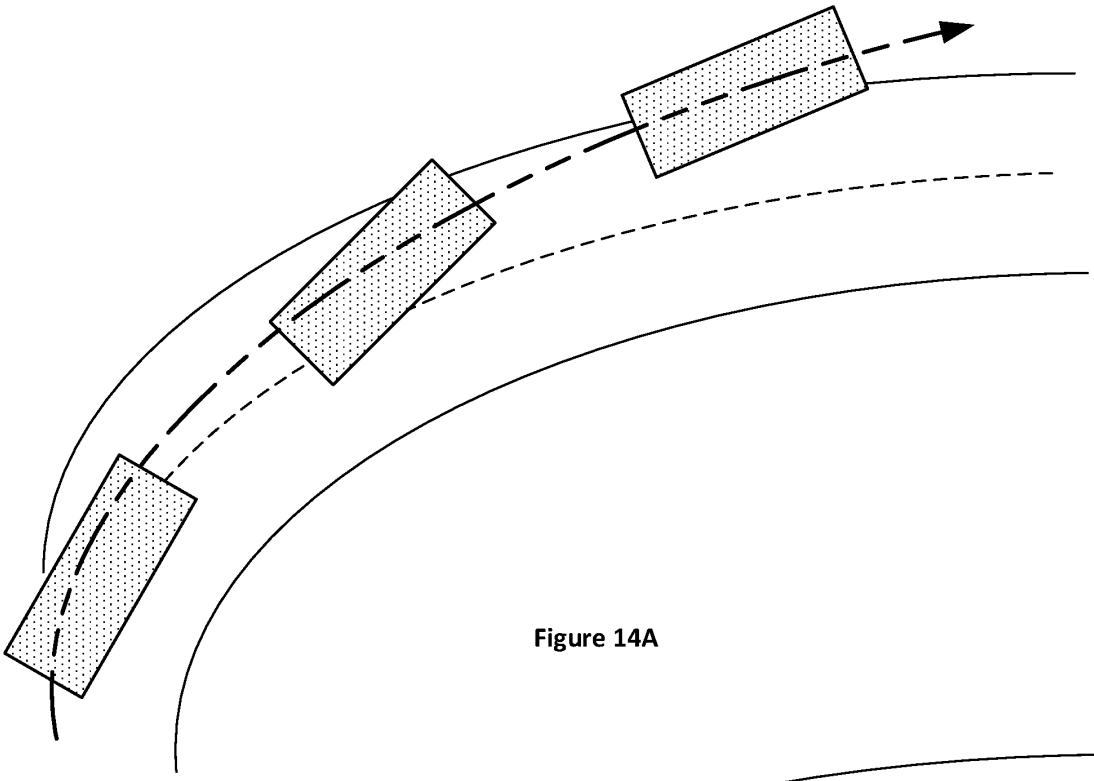


Figure 14A

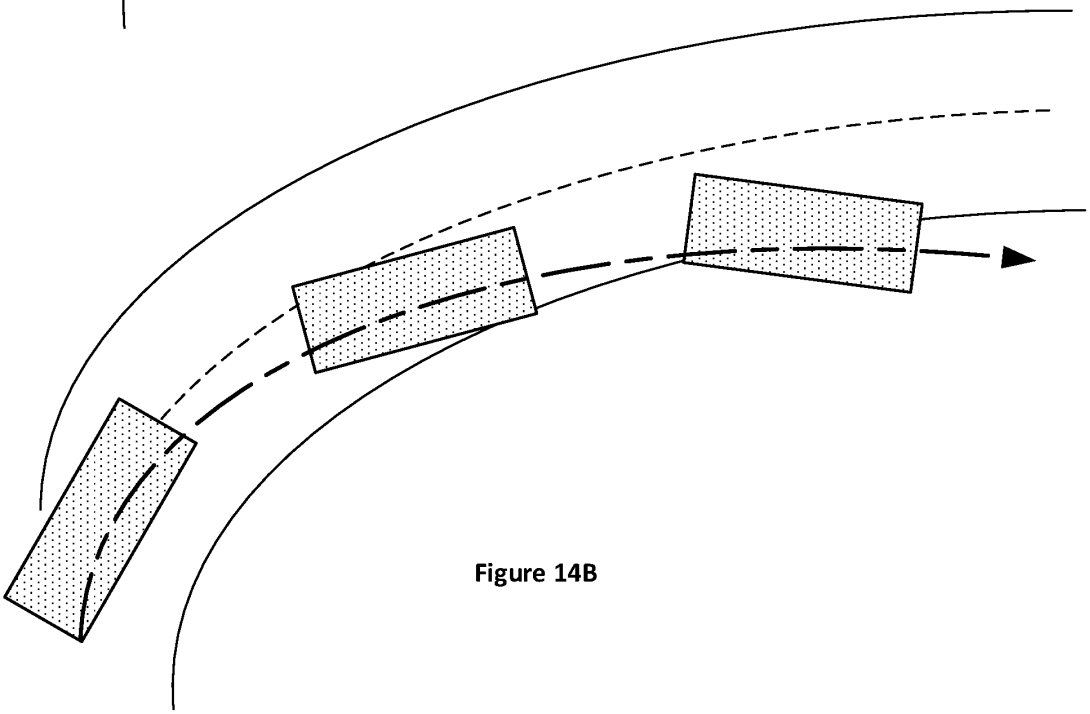


Figure 14B

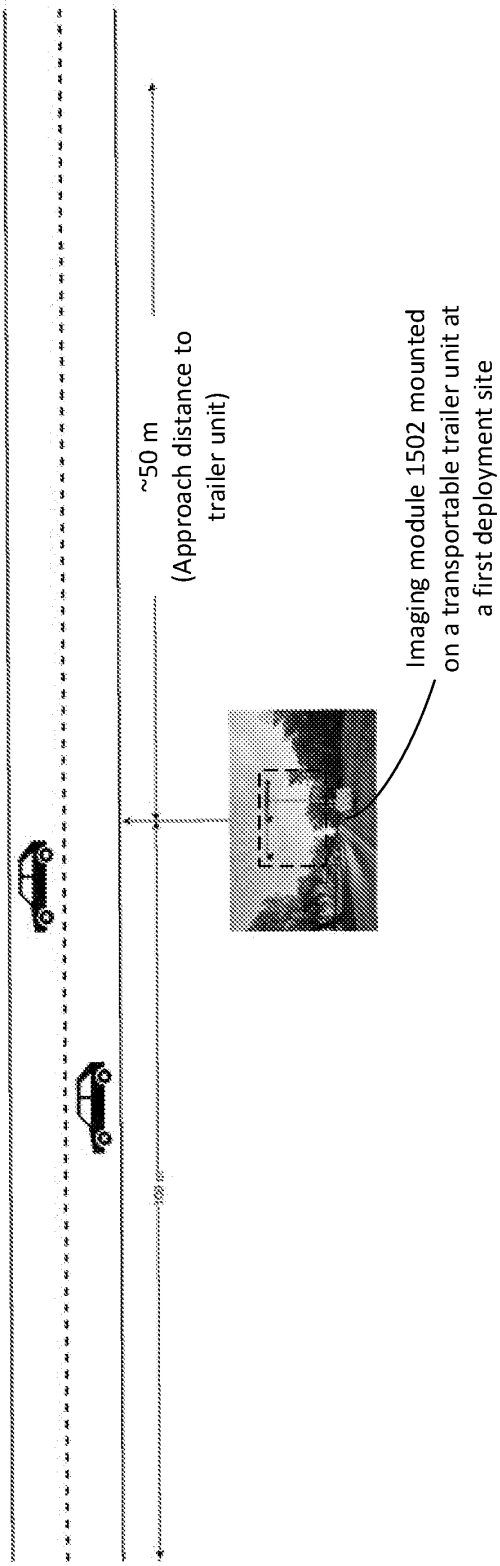

~50 m
(Approach distance to
trailer unit)
Imaging module 1502 mounted
on a transportable trailer unit at
a first deployment site

Figure 15A

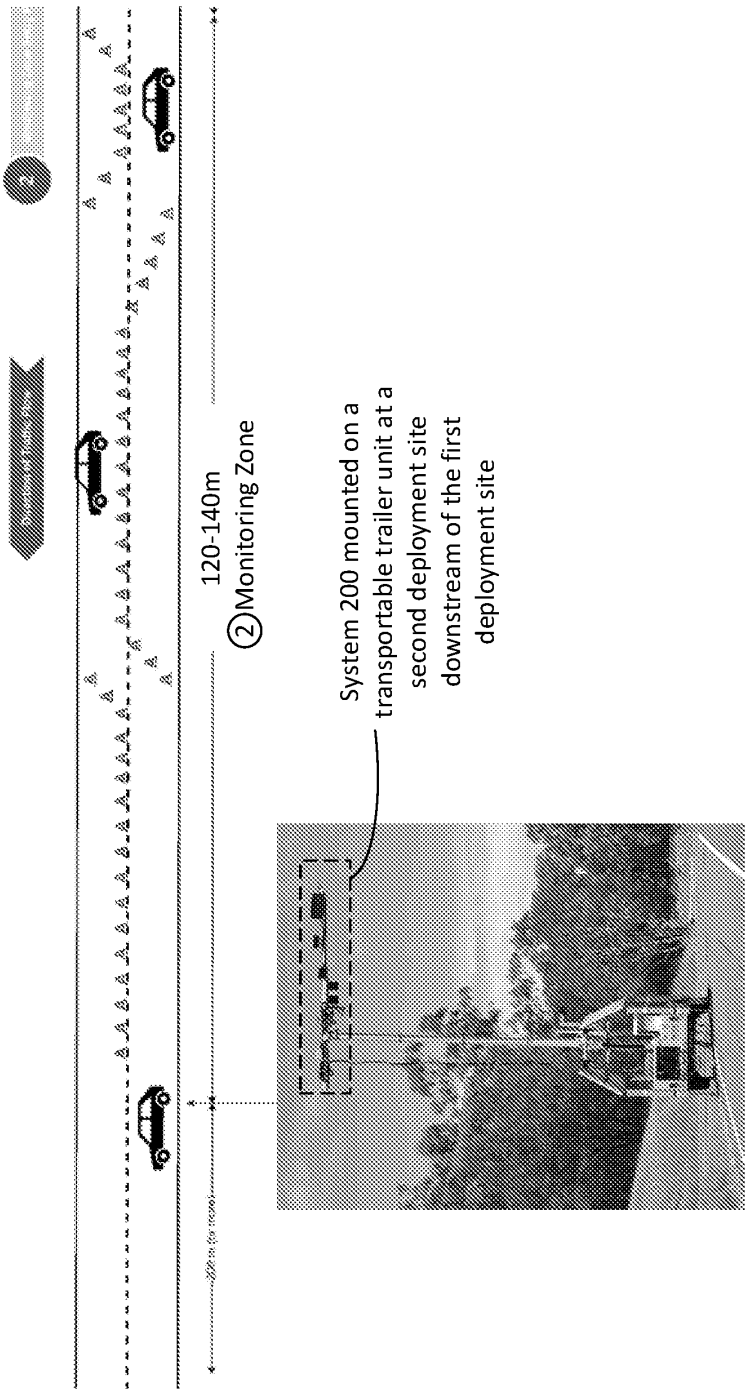

120-140m
②Monitoring Zone
System 200 mounted on a transportable trailer unit at a second deployment site downstream of the first deployment site

Figure 15B

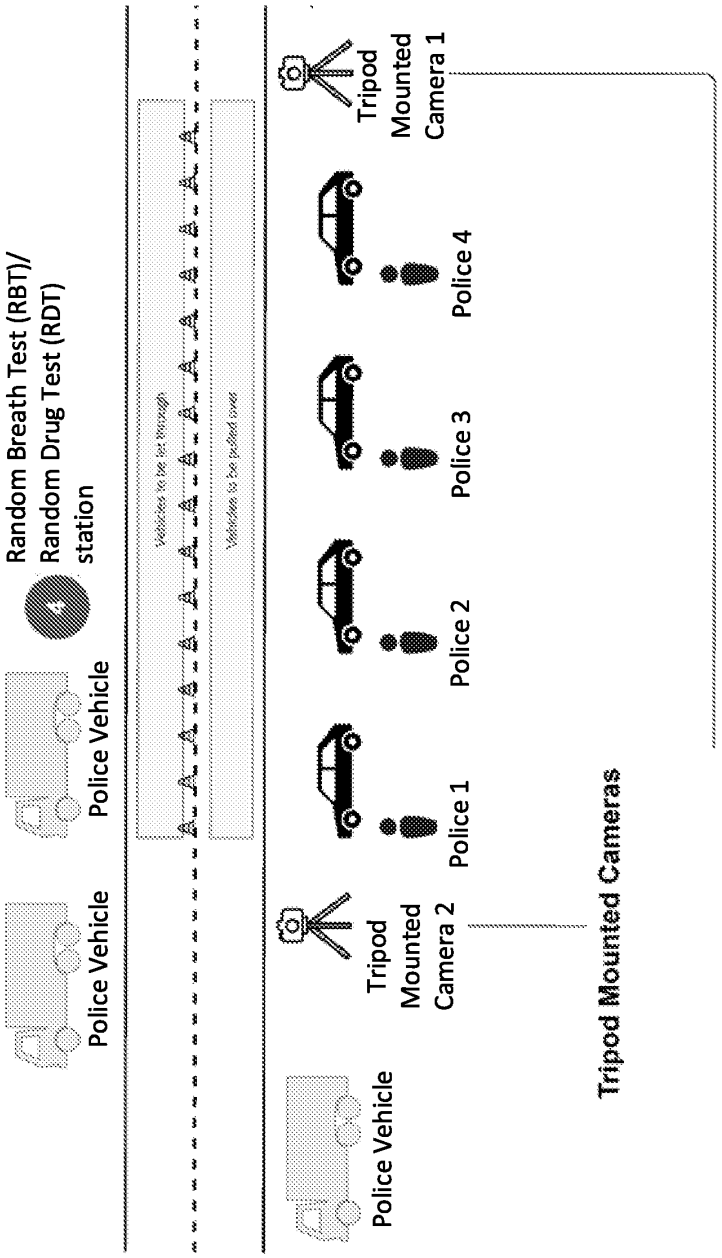

Police Vehicle
Police Vehicle
1
Random Breath Test (RBT)/
Random Drug Test (RDT)
station
Vehicles to be let through
Vehicles to be pulled over
Police Vehicle
Tripod
Mounted
Camera 2
Police 1
Police 2
Police 3
Police 4
Tripod
Mounted
Camera 1
Tripod Mounted Cameras

Figure 15C

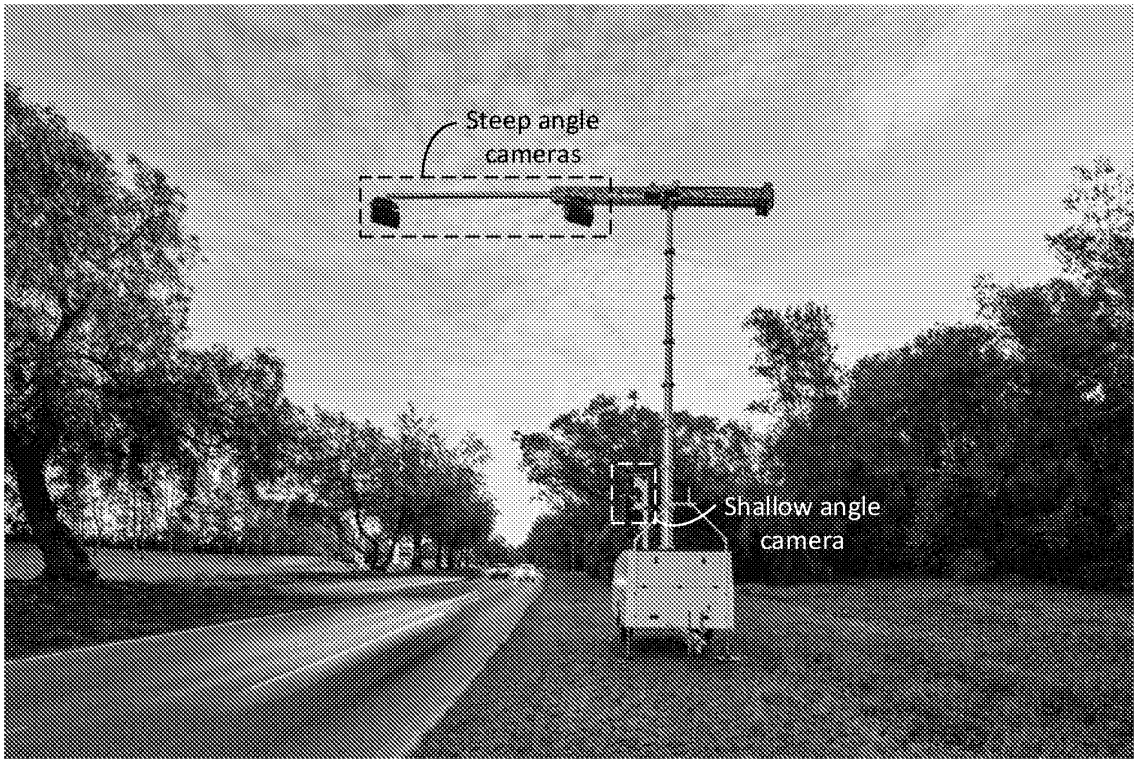


Figure 16