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Inventor(s)	Yamamoto; Shuki et al.

Information detecting device and road-surface drawing device

Abstract

A light emitter emits detecting light to a detecting area located outside a monitoring device. A light receiver detects reflected light that is generated in accordance with reflection of the detecting light by an object located in the detecting area. A first processor is capable of executing first detecting processing that is a part of information detecting processing for detecting information of the object based on the reflected light. A second processor is capable of executing second detecting processing that is a part of the information detecting processing, and is at least partially different from the first detecting processing. A controller changes a ratio of each of the first detecting processing and the second detecting processing to the information detecting processing.

Inventors:	**Yamamoto; Shuki (Shizuoka, JP), Ito; Akinori (Shizuoka, JP)**
Applicant:	**KOITO MANUFACTURING CO., LTD.** (Tokyo, JP)
Family ID:	**1000008750034**
Assignee:	**KOITO MANUFACTURING CO., LTD. (Tokyo, JP)**
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USPC: 700/2; 700/12

References Cited

U.S. PATENT DOCUMENTS

Patent No.	Issued Date	Patentee Name	U.S. Cl.	CPC
2005/0278520	12/2004	Hirai et al.	N/A	N/A
2010/0156616	12/2009	Aimura	340/436	G06T 7/593
2013/0343071	12/2012	Nagaoka	362/466	B60Q 1/085
2015/0258928	12/2014	Goto	701/49	B60Q 1/525
2016/0298809	12/2015	Lutz et al.	N/A	N/A
2017/0057501	12/2016	Schiraga	N/A	N/A
2017/0270375	12/2016	Grauer	N/A	N/A
2019/0163254	12/2018	Dewey et al.	N/A	N/A
2019/0187765	12/2018	Ashwood et al.	N/A	N/A
2019/0270405	12/2018	Fukumoto	N/A	B60Q 1/507
2019/0283658	12/2018	Furui	N/A	N/A
2020/0010079	12/2019	Ito	N/A	B60Q 1/1423

FOREIGN PATENT DOCUMENTS

Patent No.	Application Date	Country	CPC
3871924	12/2020	EP	N/A
8-16531	12/1995	JP	N/A
2019-164916	12/2018	JP	N/A
2020-75708	12/2019	JP	N/A
2018/128655	12/2017	WO	N/A
2019/234503	12/2018	WO	N/A

OTHER PUBLICATIONS

International Search Report (PCT/ISA/210) dated Sep. 7, 2021 issued by the International Searching Authority in International Application No. PCT/JP2021/026803. cited by applicant
Written Opinion (PCT/ISA/237) dated Sep. 7, 2021 issued by the International Searching Authority

in International Application No. PCT/JP2021/026803. cited by applicant
Communication dated Oct. 27, 2023, issued by European Patent Office in European Patent Application No. 21845899.0. cited by applicant

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Primary Examiner: Cao; Chun

Attorney, Agent or Firm: Sughrue Mion, PLLC

Background/Summary

(1) This is a National Stage of PCT Application No. PCT/JP2021/026803 filed Jul. 16, 2021, claiming priority based on Japan Patent Application No. 2020-125574 filed Jul. 22, 2020.
FIELD
(2) The presently disclosed subject matter relates to an information detecting device adapted to be installed in a monitoring device for detecting external information of the monitoring device. The presently disclosed subject matter also relates to a road-surface drawing device adapted to be installed in a monitoring device to draw a prescribed image on a road surface located outside the monitoring device.
BACKGROUND
(3) Patent Document 1 discloses a LiDAR (Light Detection and Ranging) sensor as an example of an information detecting device for detecting an object located outside a mobile entity as an example of a monitoring device.
(4) Patent Document 2 discloses a road-surface drawing device for drawing a marker image on a road surface by controlling on/off of a light source installed in a mobile entity as an example of a monitoring device as well as a projecting direction of light emitted from the light source.
CITATION LIST
Patent Document
(5) Patent Document 1: Japanese Patent Publication No. 2019-164916 A Patent Document 2: Japanese Patent Publication No. 2020-075708 A
SUMMARY
Technical Problem
(6) It is demanded to suppress the generation of heat during the execution of the processing for detecting the external information of the monitoring device (first demand). In addition, it is demanded to suppress heat generation caused by the execution of the processing for drawing an image on a road surface located outside the monitoring device (second demand).
Solution to Problem
(7) In order to meet the demand described above, an illustrative aspect of the presently disclosed subject matter provides an information detecting device adapted to be installed in a monitoring device, comprising: at least one light emitter configured to emit detecting light to a detecting area located outside the monitoring device; at least one light receiver configured to detect reflected light that is generated in accordance with reflection of the detecting light by an object located in the detecting area; a first processor capable of executing first detecting processing that is a part of information detecting processing for detecting information of the object based on the reflected light; a second processor capable of executing second detecting processing that is a part of the information detecting processing, and is at least partially different from the first detecting processing; and a controller configured to change a ratio of each of the first detecting processing and the second detecting processing to the information detecting processing.
(8) As the first detecting processing is executed, the first processor generates heat. Similarly, in

accordance with the execution of the second detecting processing, the second processor generates heat. However, since the processing load in each processor can be suppressed by the information detecting processing being shared by the first processor and the second processor, the total amount of heat generation is suppressed as compared with the case where a single processor is driven non-intermittently. In addition, the ratio of each of the first detecting processing and the second detecting processing to the object detecting processing can be appropriately changed by the controller according to the thermal environment wherein each of the first processor and the second processor is disposed. Accordingly, it is possible to more appropriately suppress the generation of heat during the execution of the object detecting processing.

(9) In order to meet the demand described above, an illustrative aspect of the presently disclosed subject matter provides a road-surface drawing device adapted to be installed in a monitoring device, comprising: at least one light source configured to emit visible light; a projector configured to project the visible light on a road surface located outside the monitoring device; a first processor capable of executing first drawing processing that is a part of road-surface drawing processing for controlling on/off of the light source and a projecting direction of the visible light; a second processor capable of executing second drawing processing that is a part of the road-surface drawing processing, and is at least partially different from the first drawing processing; and a controller configured to change a ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing.

(10) As the first drawing processing is executed, the first processor generates heat. Similarly, in accordance with the execution of the second drawing processing, the second processor generates heat. However, since the processing load in each processor can be suppressed by the road-surface drawing processing being shared by the first processor and the second processor, the total amount of heat generation is suppressed as compared with the case where a single processor is driven non-intermittently. In addition, the ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing can be appropriately changed by the controller according to the thermal environment wherein each of the first processor and the second processor is disposed. Accordingly, it is possible to more appropriately suppress the generation of heat during the execution of the road-surface drawing processing.

Description

BRIEF DESCRIPTION OF DRAWINGS

(1) FIG. **1** illustrates a functional configuration of an information detecting device according to a first embodiment.

(2) FIG. **2** illustrates a vehicle in which the information detecting device of FIG. **1** is to be installed.

(3) FIG. **3** illustrates an exemplary operation of the information detecting device of FIG. **1**.

(4) FIG. **4** illustrates another exemplary operation of the information detecting device of FIG. **1**.

(5) FIG. **5** illustrates another exemplary operation of the information detecting device of FIG. **1**.

(6) FIG. **6** illustrates a functional configuration of an information detecting device according to a second embodiment.

(7) FIG. **7** illustrates a functional configuration of a road-surface drawing device according to a third embodiment.

(8) FIG. **8** illustrates a vehicle in which the road-surface drawing device of FIG. **7** is to be installed.

(9) FIG. **9** illustrates an exemplary operation of the road-surface drawing device of FIG. **7**.

(10) FIG. **10** illustrates another exemplary operation of the road-surface drawing device of FIG. **7**.

(11) FIG. **11** illustrates another exemplary operation of the road-surface drawing device of FIG. **7**.

(12) FIG. **12** illustrates a functional configuration of a road-surface drawing device according to a fourth embodiment.

(13) FIG. **13** illustrates a case where the information detecting device and the road-surface drawing device are installed in traffic infrastructure equipment.

DESCRIPTION OF EMBODIMENTS

(14) Examples of embodiments will be described below in detail with reference to the accompanying drawings. In each of the drawings used in the following descriptions, the scale is appropriately changed in order to make each item have a recognizable size.

(15) In the accompanying drawings, an arrow F represents a forward direction of the illustrated configuration. An arrow B represents a rearward direction of the illustrated configuration. An arrow U represents an upward direction of the illustrated configuration. An arrow D represents a downward direction of the illustrated configuration. An arrow L represents a leftward direction of the illustrated configuration. An arrow R represents a rightward direction of the illustrated configuration.

(16) FIG. **1** illustrates a functional configuration of an information detecting device **101** according to a first embodiment. The information detecting device **101** is configured to be mounted at an appropriate position in a vehicle **200** illustrated in FIG. **2**. The position is defined as a position at which information of an object OB located in a detecting area DA that is set outside the vehicle **200** can be sensed. The vehicle **200** is an example of a mobile entity. The vehicle **200** is also an example of a monitoring device.

(17) As illustrated in FIG. **1**, the information detecting device **101** includes a light emitter **110**. The light emitter **110** includes a light source that emits detecting light DL toward the detecting area DA. The light source may be, for example, a semiconductor light emitting element that emits infrared light. Examples of the semiconductor light emitting device include a light emitting diode and a laser diode.

(18) As illustrated in FIG. **3**, the detecting area DA is spreading two-dimensionally in an up-down direction and a left-right direction. The light emitter **110** may include a reflective optical system that changes the traveling direction of the detecting light DL in the up-down direction and the left-right direction so that the detecting area DA is two-dimensionally scanned by the detecting light DL.

(19) The combination of the light source and the reflective optical system can be appropriately changed. As an example, it is possible to adopt a configuration wherein the traveling direction of the detecting light DL emitted from each of a plurality of light sources arranged in the up-down direction is changed in the left-right direction by the reflective optical system, so that the two-dimensional scanning of the detecting area DA is realized. As another example, it is possible to adopt a configuration wherein the traveling direction of the detecting light DL emitted from each of a plurality of light sources arranged in the left-right direction is changed in the up-down direction by the reflective optical system, so that the two-dimensional scanning of the detecting area DA is realized.

(20) Since the configuration per se for realizing the two-dimensional scanning as described above is well known, detailed descriptions thereof will be omitted.

(21) As another example, the light emitter **110** may include a plurality of light sources arranged in the up-down direction and the left-right direction. The number of light sources corresponds to the resolution defined for the detecting area DA. In this case, the reflective optical system for scanning can be omitted.

(22) As illustrated in FIG. **1**, the information detecting device **101** includes a light receiver **120**. When the detecting light DL is reflected by an object OB located in the detecting area DA, reflected light RL is generated. The light receiver **120** includes a light receiving element that detects the reflected light RL. Examples of the light receiving element include a photodiode, a phototransistor, and a photo resistor. The light receiver **120** is configured to output a detection signal S**0** corresponding to received light intensity of the reflected light RL. The detection signal S**0** may be an analog signal or a digital signal.

(23) In a case where the light emitter **110** includes a plurality of light sources, the light receiver **120** may also include a plurality of light receiving elements. The direction in which the light receiving elements are arrayed may correspond to the direction in which the light sources are arrayed. However, in a case where the light receiver **120** includes an appropriate reflective optical system, the number of light sources and the number of light receiving elements need not necessarily coincide with each other. For example, it is possible to adopt a reflective optical system configured to sequentially reflect reflected light RL generated from detecting light DL emitted from each of a plurality of light sources toward a single light receiving element. Since such a reflective optical system is also well known, detailed descriptions thereof will be omitted.
(24) The information detecting device **101** includes a first processor **131** and a second processor **132**. The first processor **131** and the second processor **132** are configured to execute object detecting processing for detecting an object OB located in the detecting area DA based on the detection signal S**0** outputted from the light receiver **120**. In a case where pulsed detecting light DL is emitted from the light emitter **110** in a specific direction toward the detecting area DA, the presence of an object OB in that direction can be detected based on a fact that the intensity of the detection signal S**0** exhibits a pulsed change. In addition, the distance to the object OB in that direction can be detected based on a time length from when the detecting light DL is emitted from the light emitter **110** to when the reflected light RL is detected by the light receiver **120**. By accumulating distance information based on the detection signal S**0** while changing the traveling direction of the detecting light DL, a surface shape of the object OB can also be detected. The object detecting processing is an example of information detecting processing.
(25) Specifically, as illustrated in FIG. **3**, the detecting area DA includes a first sub-area SA**1** and a second sub-area SA**2**. The first sub-area SA**1** is an area subjected to the object detecting processing executed by the first processor **131**. The second sub-area SA**2** is an area that is to be subjected to the object detecting processing executed by the second processor **132**. In the following descriptions, the object detecting processing executed by the first processor **131** will be referred to as a “first detecting processing”. Similarly, the object detecting processing executed by the second processor **132** is referred to as a “second detecting processing”. In other words, each of the first detecting processing and the second detecting processing is a part of the object detecting processing.
(26) A period from when the detecting light DL emitted from the light emitter **110** starts scanning the detecting area DA to when the scanning of the entire detecting area DA is completed corresponds to one cycle of the object detecting processing.
(27) In a first cycle CY**1** illustrated in FIG. **3**, the first processor **131** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the detecting light DL scans a first sub-area SA**1** located uppermost. The second processor **132** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the detecting light DL scans a second sub-area SA**2** located below the first sub-area SA**1**. Similarly, the first processor **131** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the detecting light DL scans a first sub-area SA**1** located below the second sub-area SA**2**. The second processor **132** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the detecting light DL scans a second sub-area SA**2** located lowermost. The same processing is repeated also in a second cycle CY**2** subsequent to the first cycle CY**1**.
(28) As illustrated in FIG. **1**, the information detecting device **101** includes a controller **140**. The controller **140** includes an output interface configured to output a light emission control signal CL**0** for controlling the operation of the light emitter **110**. The light emission control signal CL**0** may include information indicative of a scanning position of the detecting light DL in the detecting area DA. The light emitter **110** is configured to emit detecting light DL based on the light emission control signal CL**0**. The light emission control signal CL**0** may be an analog signal or a digital

signal. In a case where the light emission control signal CL**0** is an analog signal, the output interface of the controller **140** is provided with an appropriate conversion circuit including a D/A converter.

(29) The output interface of the controller **140** is configured to additionally output a first processing control signal CP**1** for controlling the operation of the first processor **131** and a second processing control signal CP**2** for controlling the operation of the second processor **132**. The first processor **131** is configured to execute a first detecting processing in response to receiving of the first processing control signal CP**1**. The second processor **132** is configured to execute a second detecting processing in response to receiving of the second processing control signal CP**2**. The controller **140** is configured to provide each of the first processing control signal CP**1** and the second processing control signal CP**2** so as to include the information indicative of the scanning position. The position of the object OB and the distance to the object OB in the detecting area DA described above are specified by each of the first processor **131** and the second processor **132** based on the information indicative of the scanning position.

(30) In other words, the controller **140** outputs the first processing control signal CP**1** while the detecting light DL scans the first sub-area SA**1**. Similarly, the controller **140** outputs the second processing control signal CP**2** while the detecting light DL scans the second sub-area SA**2**.

(31) The controller **140** is configured to change a ratio of each of the first detecting processing and the second detecting processing to the object detecting processing. Specifically, the controller **140** changes a ratio of each of the first sub-area SA**1** and the second sub-area SA**2** to the detecting area DA.

(32) In the first cycle CY**1** and the second cycle CY**2** illustrated in FIG. **3**, the ratio of each of the first sub-area SA**1** and the second sub-area SA**2** to the detecting area DA is equal. In the m-th cycle CYm, the controller **140** increases the ratio of the first sub-area SA**1** to the detecting area DA. Accordingly, the ratio of the second sub-area SA**2** to the detecting area DA is decreased. As a result, the ratio of the first detecting processing executed by the first processor **131** to the object detecting processing is made higher than the ratio of the second detecting processing executed by the second processor **132** to the object detecting processing.

(33) In the n-th cycle CYn illustrated in FIG. **3**, the controller **140** increases the ratio of the second sub-area SA**2** to the detecting area DA. Accordingly, the ratio of the first sub-area SA**1** to the detecting area DA is decreased. As a result, the ratio of the second detecting processing executed by the second processor **132** to the object detecting processing is made higher than the ratio of the first detecting processing executed by the first processor **131** to the object detecting processing.

(34) The detecting area DA subjected to the object detecting processing of one cycle does not necessarily have to include both the first sub-area SA**1** and the second sub-area SA**2**. FIG. **4** illustrates another example of the ratio changing processing that can be executed by the controller **140**.

(35) In the first cycle CY**1**, the detecting area DA includes only the first sub-area SA**1**. Accordingly, during the first cycle CY**1**, the controller **140** outputs only the first processing control signal CP**1**, so that only the first detecting processing with the first processor **131** is executed.

(36) In the second cycle CY**2**, the detecting area DA includes only the second sub-area SA**2**. Accordingly, during the second cycle CY**2**, the controller **140** outputs only the second processing control signal CP**2**, so that only the second detecting processing with the second processor **132** is executed.

(37) The ratio of each of the first sub-area SA**1** and the second sub-area SA**2** to the detecting area DA in each of the third cycle CY**3** and the fourth cycle CY**4** is the same as that of the first cycle CY**1** and the second cycle CY**2**, respectively. Accordingly, in this example, the first detecting processing with the first processor **131** and the second detecting processing with the second processor **132** are alternately executed every cycle of the object detecting processing.

(38) FIG. **5** illustrates another example of the ratio changing processing that can be executed by the

controller **140**. In this example, as a basic operation, only the first detecting processing is executed by the first processor **131** every cycle of the object detecting processing. On the other hand, in a specific cycle of the object detecting processing, only the second detecting processing with the second processor **132** is executed in an auxiliary manner. In this example, in the third cycle CY**3**, only the second detecting processing with the second processor **132** is executed. The timing at which the controller **140** executes the second detecting processing can be appropriately determined.
(39) Each of the first processor **131**, the second processor **132**, and the controller **140** can be implemented by an exclusive integrated circuit including a processor capable of executing each of the above-described processing. Examples of the exclusive integrated circuit include a microcontroller, an ASIC, and an FPGA. The controller **140** may be configured to include a general-purpose microprocessor operating in conjunction with a general-purpose memory. Examples of the general-purpose microprocessor include a CPU, an MPU, and a GPU. Examples of the general-purpose memory include a ROM and a RAM. The first processor **131** and the second processor **132** are provided as separate device packages. The controller **140** may share a device package with one of the first processor **131** and the second processor **132**.
(40) As the first detecting processing is executed, the first processor **131** generates heat. Similarly, in accordance with the execution of the second detecting processing, the second processor **132** generates heat. However, since the processing load in each processor can be suppressed by the object detecting processing being shared by the first processor **131** and the second processor **132**, the total amount of heat generation is suppressed as compared with the case where a single processor is driven non-intermittently. In addition, the ratio of each of the first detecting processing and the second detecting processing to the object detecting processing can be appropriately changed by the controller **140** according to the thermal environment wherein each of the first processor **131** and the second processor **132** is disposed. Accordingly, it is possible to more appropriately suppress the generation of heat during the execution of the object detecting processing.
(41) The timing at which the ratios of each of the first detecting processing and the second detecting processing to the object detecting processing is changed as described with reference to FIGS. **3** to **5** may be scheduled in advance according to the thermal environment wherein each of the first processor **131** and the second processor **132** is disposed, or may be changed at a timing when a prescribed condition is satisfied.
(42) For example, as illustrated in FIG. **1**, the information detecting device **101** may include a temperature detector **150**. The temperature detector **150** is configured to acquire a first operating temperature T**1** of the first processor **131** and a second operating temperature T**2** of the second processor **132**. The first operating temperature T**1** may be the temperature of the device package itself of the first processor **131**, or may be the temperature of a location where the first processor **131** is disposed. The second operating temperature T**2** may be the temperature of the device package itself of the second processor **132**, or may be the temperature of a location where the second processor **132** is disposed.
(43) The first operating temperature T**1** and the second operating temperature T**2** acquired by the temperature detector **150** are inputted to the controller **140**. Accordingly, the controller **140** may include an input interface for receiving the first operating temperature T**1** and the second operating temperature T**2**. The first operating temperature T**1** and the second operating temperature T**2** may be in the form of digital data or in the form of analog data. In a case where the first operating temperature T**1** and the second operating temperature T**2** are in the form of analog data, the input interface is provided with an appropriate conversion circuit including an A/D converter.
(44) In this case, the controller **140** may change the ratio of each of the first detecting processing and the second detecting processing to the object detecting processing based on the first operating temperature T**1** and the second operating temperature T**2**.
(45) As an example, in a case where the operation limiting temperature of the first processor **131**

and the operation limiting temperature of the second processor **132** are the same, the controller **140** may specify which of the first processor **131** and the second processor **132** is operating at a higher temperature based on the first operating temperature T**1** and the second operating temperature T**2**, and cause the specified processor to execute the object detecting processing.

(46) As another example, in a case where the operation limiting temperature of the first processor **131** and the operation limiting temperature of the second processor **132** are different from each other, the controller **140** may specify which of the first processor **131** and the second processor **132** has more margin to the operation limiting temperature based on the first operating temperature T**1** and the second operating temperature T**2**, and cause the specified processor to execute the object detecting processing.

(47) According to such a configuration, the ratio of each of the first detecting processing and the second detecting processing to the object detecting processing can be flexibly and immediately changed according to the thermal environment wherein the first processor **131** and the second processor **132** are actually disposed. Accordingly, the above-described heat generation suppressing effect can be further enhanced.

(48) FIG. **6** illustrates a functional configuration of an information detecting device **102** according to a second embodiment. The information detecting device **102** is also configured to be mounted at an appropriate position in the vehicle **200** illustrated in FIG. **2**. Components that are common to those of the information detecting device **101** according to the first embodiment are assigned with the same reference numerals, and repetitive descriptions for those will be omitted.

(49) As illustrated in FIG. **6**, the information detecting device **102** includes a first light emitter **111** and a second light emitter **112**. The first light emitter **111** includes a light source that emits first detecting light DL**1** toward the detecting area DA. The second light emitter **112** includes a light source that emits second detecting light DL**2** toward the detecting area DA. The light source may be, for example, a semiconductor light emitting element that emits infrared light. Examples of the semiconductor light emitting device include a light emitting diode and a laser diode. The first detecting light DL**1** and the second detecting light DL**2** respectively irradiate the first sub-area SA**1** and the second sub-area SA**2** illustrated in FIGS. **3** to **5**.

(50) As described with reference to FIG. **3** for the light emitter **110** of the information detecting device **101** according to the first embodiment, each of the first light emitter **111** and the second light emitter **112** may also include a reflective optical system that appropriately changes the traveling direction of each of the first detecting light DL**1** and the second detecting light DL**2**. Depending on the specification of the reflective optical system, each of the first light emitter **111** and the second light emitter **112** may include a plurality of light sources.

(51) As illustrated in FIG. **6**, the information detecting device **102** includes a first light receiver **121**. When the first detecting light DL**1** is reflected by an object OB located in the detecting area DA, first reflected light RL**1** is generated. The first light receiver **121** includes a light receiving element that detects the first reflected light RL**1**. Examples of the light receiving element include a photodiode, a phototransistor, and a photo resistor. The first light receiver **121** is configured to output a first detection signal S**1** corresponding to received light intensity of the first reflected light RL**1**. The first detection signal S**1** may be an analog signal or a digital signal.

(52) The information detecting device **102** includes a second light receiver **122**. When the second detecting light DL**2** is reflected by an object OB located in the detecting area DA, second reflected light RL**2** is generated. The second light receiver **122** includes a light receiving element that detects the second reflected light RL**2**. Examples of the light receiving element include a photodiode, a phototransistor, and a photo resistor. The second light receiver **122** is configured to output a second detection signal S**2** corresponding to received light intensity of the second reflected light RL**2**. The second detection signal S**2** may be an analog signal or a digital signal.

(53) Similarly to the light receiver **120** of the information detecting device **101** according to the first embodiment, each of the first light receiver **121** and the second light receiver **122** may also

include a plurality of light receiving elements.
(54) The first processor **131** according to the present embodiment is configured to execute the first detecting processing described above based on the first detection signal S**1** outputted from the first light receiver **121**.
(55) The second processor **132** according to the present embodiment is configured to execute the above-described second detecting processing based on the second detection signal S**2** outputted from the second light receiver **122**.
(56) That is, in a first cycle CY**1** illustrated in FIG. **3**, the first processor **131** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the first detecting light DL**1** scans a first sub-area SA**1** located uppermost. The second processor **132** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the second detecting light DL**2** scans a second sub-area SA**2** located below the first sub-area SA**1**. Similarly, the first processor **131** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the first detecting light DL**1** scans a first sub-area SA**1** located below the second sub-area SA**2**. The second processor **132** detects the presence or absence of the reflected light RL and a time length until the reflected light RL is detected while the second detecting light DL**2** scans a second sub-area SA**2** located lowermost. The same processing is repeated also in a second cycle CY**2** subsequent to the first cycle CY**1**.
(57) The controller **140** according to the present embodiment includes an output interface configured to output a first light emission control signal CL**1** for controlling the operation of the first light emitter **111** and a second light emission control signal CL**2** for controlling the operation of the second light emitter **112**. The first light emission control signal CL**1** may include information indicative of a scanning position of the first detecting light DL**1** in the detecting area DA. The first light emitter **111** is configured to emit the first detecting light DL**1** based on the first light emission control signal CL**1**. The second light emission control signal CL**2** may include information indicative of a scanning position of the second detecting light DL**2** in the detecting area DA. The second light emitter **112** is configured to emit the second detecting light DL**2** based on the second light emission control signal CL**2**.
(58) Each of the first light emission control signal CL**1** and the second light emission control signal CL**2** may be an analog signal or a digital signal. In a case where each of the first light emission control signal CL**1** and the second light emission control signal CL**2** is an analog signal, the output interface of the controller **140** is provided with an appropriate conversion circuit including a D/A converter.
(59) The controller **140** according to the present embodiment is also configured to be able to change the ratio of each of the first detecting processing and the second detecting processing to the object detecting processing. Specifically, the controller **140** changes a ratio of each of the first sub-area SA**1** and the second sub-area SA**2** to the detecting area DA.
(60) As the first detecting light DL**1** used in the first detecting processing is emitted, the first light emitter **111** generates heat. Similarly, in accordance with the emission of the second detecting light DL**2** used in the second detecting processing, the second light emitter **112** generates heat. However, since the operation load in each light emitter can be suppressed by the supply of the detecting light being shared by the first light emitter **111** and the second light emitter **112**, the total amount of heat generation is suppressed as compared with the case where a single light emitter is driven non-intermittently. Accordingly, it is possible to further suppress the generation of heat during the execution of the object detecting processing.
(61) In order to further enhance the capability of suppressing the heat generation, a cooling device such as a Peltier element, a heat pipe, an air cooling fan, or the like may be disposed in the vicinity of each of the first processor **131** and the second processor **132**.
(62) FIG. **7** illustrates a functional configuration of a road-surface drawing device **103** according to

a third embodiment. The road-surface drawing device **103** is configured to be mounted at an appropriate position in the vehicle **200** illustrated in FIG. **8**. The position is determined as a position at which a prescribed image IM can be drawn on a road surface RS located outside the vehicle **200**.

(63) As illustrated in FIG. **7**, the road-surface drawing device **103** includes a light source **160**. The light source **160** is configured to emit visible light VL. The wavelength of the visible light VL can be appropriately determined according to the image IM to be drawn. The light source may be a semiconductor light emitting element such as a light emitting diode, a laser diode, or an EL element.

(64) The road-surface drawing device **103** includes a projector **170**. The projector **170** includes an optical system that projects the visible light VL emitted from the light source **160** onto the road surface RS. As illustrated in FIG. **3**, the detecting area DA is spreading two-dimensionally in a front-rear direction and a left-right direction. The projector **170** may include a reflective optical system that changes the traveling direction of the visible light VL in the front-rear direction and the left-right direction so that the road surface RS is two-dimensionally scanned by the visible light VL.

(65) The configuration related to the combination of the light source **160** and the projector **170** can be appropriately changed. As an example, it is possible to adopt a configuration wherein the traveling direction of the visible light VL emitted from each of a plurality of light sources arranged in the up-down direction is changed in the left-right direction by the reflective optical system, so that the two-dimensional scanning of the road surface RS is realized. As another example, it is possible to adopt a configuration wherein the traveling direction of the visible light VL emitted from each of a plurality of light sources arranged in the left-right direction is changed in the up-down direction by the reflective optical system, so that the two-dimensional scanning of the road surface RS is realized.

(66) Since the configuration per se for realizing the two-dimensional scanning as described above is well known, detailed descriptions thereof will be omitted.

(67) As another example, the light source **160** may include a plurality of light sources arranged in the up-down direction and the left-right direction. The number of light sources corresponds to the resolution of the image IM to be drawn. In this case, the reflective optical system for scanning can be omitted.

(68) As illustrated in FIG. **7**, the road-surface drawing device **103** includes a first processor **181** and a second processor **182**. Each of the first processor **181** and the second processor **182** is configured to execute road-surface drawing processing for drawing a prescribed image IM on a road surface RS. The drawing of the image IM can be performed by combining the on/off control of the light source **160** and the control of the projecting direction of the visible light VL executed by the projector **170**. When the light source **160** is turned on, the visible light VL forms a point image PI on the road surface RS. By changing the direction of the visible light VL projected by the projector **170** at a high speed, a pedestrian or an occupant of another vehicle visually recognizes an image IM as an afterimage of the point image PI on the road surface RS. By turning off the light source **160** at an appropriate position, the shape of the image IM can be arbitrarily defined. In the example illustrated in FIG. **8**, a character “STOP” that can be visually recognized by a walker W is drawn as an image IM in an area ahead of the vehicle **200**.

(69) Accordingly, as illustrated in FIG. **7**, each of the first processor **181** and the second processor **182** includes an output interface capable of outputting a light emission control signal CL**0** for controlling the on/off operation of the light source **160**, and a projection control signal CR**0** for causing the projector **170** to control the projecting direction of the visible light VL. Each of the light emission control signal CL**0** and the projection control signal CR**0** may be an analog signal or a digital signal. In a case where each of the light emission control signal CL**0** and the projection control signal CR**0** is an analog signal, the output interface is provided with an appropriate

conversion circuit including a D/A converter.
(70) As illustrated in FIG. **9**, the road surface RS includes a first sub-area SA**1** and a second sub-area SA**2**. The first sub-area SA**1** is an area subjected to road-surface drawing processing executed by the first processor **181**. The second sub-area SA**2** is an area subjected to road-surface drawing processing executed by the second processor **182**. In the following descriptions, the road-surface drawing processing executed by the first processor **181** will be referred to as a “first drawing processing”. Similarly, the road-surface drawing processing executed by the second processor **182** is referred to as “second drawing processing”. That is, each of the first drawing processing and the second drawing processing is a part of the road-surface drawing processing.
(71) A period from the initiation to the completion of the drawing of an image IM with the visible light VL emitted from the light source **160** corresponds to one cycle of the road-surface drawing processing. By repeating plural cycles of the road-surface drawing processing for drawing the same image IM at a high speed, a still image can be visually recognized by a pedestrian or an occupant of another vehicle. By executing plural cycles of the road-surface drawing processing for drawing images IM that are different from cycle to cycle at a high speed, a moving image can be visually recognized by a pedestrian or an occupant of another vehicle.
(72) In the first cycle CY**1** illustrated in FIG. **9**, the projection of the visible light VL on the first sub-area SA**1** located at the foremost position and the on/off of the light source **160** are controlled by the first processor **181**. The projection of the visible light VL on the second sub-area SA**2** located behind the first sub-area SA**1** and the on/off of the light source **160** are controlled by the second processor **182**. Similarly, the projection of the visible light VL on the first sub-area SA**1** located behind the second sub-area SA**2** and the on/off of the light source **160** are controlled by the first processor **181**. The projection of the visible light VL on the second sub-area SA**2** located at the rearmost portion and the on/off of the light source **160** are controlled by the second processor **182**. The same processing is repeated also in a second cycle CY**2** subsequent to the first cycle CY**1**.
(73) As illustrated in FIG. **7**, the road-surface drawing device **103** includes a controller **190**. The controller **190** includes an output interface configured to output a first processing control signal CP**1** for controlling the operation of the first processor **181** and a second processing control signal CP**2** for controlling the operation of the second processor **182**. The first processor **181** is configured to execute the first drawing processing in response to receiving the first processing control signal CP**1**. The second processor **182** is configured to execute the second drawing processing in response to receiving the second processing control signal CP**2**.
(74) In other words, the controller **190** outputs the first processing control signal CP**1** while at least a portion of the image IM is drawn in the first sub-area SA**1**. Similarly, the controller **190** outputs the second processing control signal CP**2** while at least a portion of the image IM is drawn in the second sub-area SA**2**.
(75) The controller **190** is configured to change a ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing. Specifically, the controller **190** changes the ratio of each of the first sub-area SA**1** and the second sub-area SA**2** to the road surface RS.
(76) In the first cycle CY**1** and the second cycle CY**2** illustrated in FIG. **9**, the ratio of each of the first sub-area SA**1** and the second sub-area SA**2** to the road surface RS is equal. In the m-th cycle CYm, the controller **190** increases the ratio of the first sub-area SA**1** to the road surface RS. Accordingly, the ratio of the second sub-area SA**2** to the road surface RS is decreased. As a result, the ratio of the first drawing processing executed by the first processor **181** to the road-surface drawing processing is made higher than the ratio of the second drawing processing executed by the second processor **182** to the road-surface drawing processing.
(77) In the n-th cycle CYn illustrated in FIG. **9**, the controller **190** increases the ratio of the second sub-area SA**2** to the road surface RS. Accordingly, the ratio of the first sub-area SA**1** to the road surface RS is decreased. As a result, the ratio of the second drawing processing executed by the

second processor **182** to the road-surface drawing processing is made higher than the ratio of the first drawing processing executed by the first processor **181** to the road-surface drawing processing.
(78) The road surface RS subjected to the road-surface drawing processing of one cycle does not necessarily have to include both the first sub-area SA**1** and the second sub-area SA**2**. FIG. **10** illustrates another example of the ratio changing processing that can be executed by the controller **190**.
(79) In the first cycle CY**1**, the road surface RS includes only the first sub-area SA**1**. Accordingly, during the first cycle CY**1**, the controller **190** outputs only the first processing control signal CP**1**, so that only the first drawing processing with the first processor **181** is executed.
(80) In the second cycle CY**2**, the road surface RS includes only the second sub-area SA**2**. Accordingly, during the second cycle CY**2**, the controller **190** outputs only the second processing control signal CP**2**, so that only the second drawing processing with the second processor **182** is executed.
(81) The ratio of each of the first sub-area SA**1** and the second sub-area SA**2** to the road surface RS in each of the third cycle CY**3** and the fourth cycle CY**4** is the same as that of the first cycle CY**1** and the second cycle CY**2**, respectively. Accordingly, in this example, the first drawing processing with the first processor **181** and the second drawing processing with the second processor **182** are alternately executed every cycle of the road-surface drawing processing.
(82) FIG. **11** illustrates another example of the ratio changing processing that can be executed by the controller **190**. In this example, as a basic operation, only the first drawing processing is executed by the first processor **181** every cycle of the road-surface drawing processing. On the other hand, in a specific cycle of the road-surface drawing processing, only the second drawing processing with the second processor **182** is executed in an auxiliary manner. In this example, in the third cycle CY**3**, only the second drawing processing with the second processor **182** is executed. The timing at which the controller **190** executes the second drawing processing can be appropriately determined.
(83) Each of the first processor **181**, the second processor **182**, and the controller **190** can be implemented by an exclusive integrated circuit including a processor capable of executing each of the above-described processing. Examples of the exclusive integrated circuit include a microcontroller, an ASIC, and an FPGA. The controller **190** may be configured to include a general-purpose microprocessor operating in conjunction with a general-purpose memory. Examples of the general-purpose microprocessor include a CPU, an MPU, and a GPU. Examples of the general-purpose memory include a ROM and a RAM. The first processor **181** and the second processor **182** are provided as separate device packages. The controller **190** may share a device package with one of the first processor **181** and the second processor **182**.
(84) As the first drawing processing is executed, the first processor **181** generates heat. Similarly, in accordance with the execution of the second drawing processing, the second processor **182** generates heat. However, since the processing load in each processor can be suppressed by the road-surface drawing processing being shared by the first processor **181** and the second processor **182**, the total amount of heat generation is suppressed as compared with the case where a single processor is driven non-intermittently. In addition, the ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing can be appropriately changed by the controller **190** according to the thermal environment wherein each of the first processor **181** and the second processor **182** is disposed. Accordingly, it is possible to more appropriately suppress the generation of heat during the execution of the road-surface drawing processing.
(85) The timing at which the ratios of each of the first drawing processing and the second drawing processing described with reference to FIGS. **9** to **11** in the road-surface drawing processing is changed may be scheduled in advance according to the thermal environment wherein each of the first processor **181** and the second processor **182** is disposed, or may be changed at a timing when a

prescribed condition is satisfied.

(86) For example, as illustrated in FIG. **7**, the road-surface drawing device **103** may include a temperature detector **150**. The temperature detector **150** is configured to acquire a first operating temperature T**1** of the first processor **181** and a second operating temperature T**2** of the second processor **182**. The first operating temperature T**1** may be the temperature of the device package itself of the first processor **181**, or may be the temperature of a location where the first processor **181** is disposed. The second operating temperature T**2** may be the temperature of the device package itself of the second processor **182**, or may be the temperature of a location where the second processor **182** is disposed.

(87) The first operating temperature T**1** and the second operating temperature T**2** acquired by the temperature detector **150** are inputted to the controller **190**. Accordingly, the controller **190** may include an input interface for receiving the first operating temperature T**1** and the second operating temperature T**2**. The first operating temperature T**1** and the second operating temperature T**2** may be in the form of digital data or in the form of analog data. In a case where the first operating temperature T**1** and the second operating temperature T**2** are in the form of analog data, the input interface is provided with an appropriate conversion circuit including an A/D converter.

(88) In this case, the controller **190** may change the ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing based on the first operating temperature T**1** and the second operating temperature T**2**.

(89) As an example, in a case where the operation limiting temperature of the first processor **181** and the operation limiting temperature of the second processor **182** are the same, the controller **190** may specify which of the first processor **181** and the second processor **182** is operating at a higher temperature based on the first operating temperature T**1** and the second operating temperature T**2**, and cause the specified processor to execute the road-surface drawing processing.

(90) As another example, in a case where the operation-limiting temperature of the first processor **181** and the operation-limiting temperature of the second processor **182** are different from each other, the controller **190** may specify which of the first processor **181** and the second processor **182** has more margin to the operation-limiting temperature based on the first operating temperature T**1** and the second operating temperature T**2**, and cause the specified processor to execute the road-surface drawing processing.

(91) According to such a configuration, the ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing can be flexibly and immediately changed according to the thermal environment wherein the first processor **181** and the second processor **182** are actually placed. Accordingly, the above-described heat generation suppressing effect can be further enhanced.

(92) FIG. **12** illustrates a functional configuration of a road-surface drawing device **104** according to a fourth embodiment. The road-surface drawing device **104** is also configured to be mounted at an appropriate position in the vehicle **200** illustrated in FIG. **8**. Components that are common to those of the road-surface drawing device **103** according to the third embodiment are assigned with the same reference numerals, and repetitive descriptions for those will be omitted.

(93) As illustrated in FIG. **12**, the road-surface drawing device **104** includes a first light source **161** and a second light source **162**. The first light source **161** and the second light source **162** are configured to emit the first visible light VL**1** and the second visible light VL**2**, respectively. The wavelengths of the first visible light VL**1** and the second visible light VL**2** can be appropriately determined according to the image IM to be drawn. Each of the first light source **161** and the second light source **162** may be a semiconductor light emitting element such as a light emitting diode, a laser diode, or an EL element.

(94) The road-surface drawing device **104** includes a first projector **171** and a second projector **172**. The first projector **171** is configured to project the first visible light VL**1** emitted from the first light source **161** to the first sub-area SA**1** on the road surface RS illustrated in FIGS. **9** to **11**. The second

projector **172** is configured to project the second visible light VL**2** emitted from the second light source **162** to the second sub-area SA**2** on the road surface RS.
(95) As described with reference to FIG. **9** for the light source **160** and the projector **170** of the road-surface drawing device **103** according to the third embodiment, the configuration related to the combination of the first light source **161** and the first projector **171**, as well as the configuration related to the combination of the second light source **162** and the second projector **172** can also be appropriately changed.
(96) The first processor **181** according to the present embodiment is configured to execute the first drawing processing described above by controlling the on/off of the first light source **161** and the direction of the first visible light VL**1** projected by the first projector **171**. When the first light source **161** is turned on, the first visible light VL**1** forms a first point image PI**1** on the road surface RS. By changing the direction of the first visible light VL**1** projected by the first projector **171** at a high speed, a pedestrian or an occupant of another vehicle visually recognizes at least a part of the image IM as an afterimage of the first point image PI**1** on the road surface RS.
(97) The second processor **182** according to the present embodiment is configured to execute the above-described second drawing processing executed by controlling the on/off of the second light source **162** and the direction of the second visible light VL**2** projected by the second projector **172**. When the second light source **162** is turned on, the second visible light VL**2** forms a second point image PI**2** on the road surface RS. By changing the direction of the second visible light VL**2** projected by the second projector **172** at a high speed, a pedestrian or an occupant of another vehicle visually recognizes at least a part of the image IM as an afterimage of the second point image PI**2** on the road surface RS.
(98) Accordingly, in the first cycle CY**1** illustrated in FIG. **9**, the projection of the first visible light VL**1** on the first sub-area SA**1** located at the foremost position and the on/off of the first light source **161** are controlled by the first processor **181**. The projection of the second visible light VL**2** on the second sub-area SA**2** located behind the first sub-area SA**1** and the on/off of the second light source **162** are controlled by the second processor **182**. Similarly, the projection of the first visible light VL**1** on the first sub-area SAT located behind the second sub-area SA**2** and the on/off of the first light source **161** are controlled by the first processor **181**. The projection of the second visible light VL**2** on the second sub-area SA**2** located at the rearmost position and the on/off of the second light source **162** are controlled by the second processor **182**. The same processing is repeated also in a second cycle CY**2** subsequent to the first cycle CY**1**.
(99) The controller **190** according to the present embodiment includes an output interface configured to output a first light emission control signal CL**1** for controlling the operation of the first light source **161** and a second light emission control signal CL**2** for controlling the operation of the second light source **162**. The first light emission control signal CL**1** may include information indicative of a scanning position of the first visible light VL**1** on the road surface RS. The first light source **161** is configured to emit the first visible light VL**1** based on the first light emission control signal CL**1**. The second light emission control signal CL**2** may include information indicative of a scanning position of the second visible light VL**2** on the road surface RS. The second light source **162** is configured to emit the second visible light VL**2** based on the second light emission control signal CL**2**.
(100) Each of the first light emission control signal CL**1** and the second light emission control signal CL**2** may be an analog signal or a digital signal. In a case where each of the first light emission control signal CL**1** and the second light emission control signal CL**2** is an analog signal, the output interface of the controller **190** is provided with an appropriate conversion circuit including a D/A converter.
(101) The controller **190** according to the present embodiment is also configured to be able to change the ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing. Specifically, the controller **190** changes the ratio of each of the

first sub-area SA**1** and the second sub-area SA**2** to the road surface RS.
(102) As the first visible light VL**1** used in the first drawing processing is emitted, the first light source **161** generates heat. Similarly, in accordance with the emission of the second visible light VL**2** used in the second drawing processing, the second light source **162** generates heat. However, since the operation load in each light source can be suppressed by the supply of the visible light being shared by the first light source **161** and the second light source **162**, the total amount of heat generation is suppressed as compared with the case where a single light emitter is driven non-intermittently. Accordingly, it is possible to further suppress the generation of heat during the execution of the road-surface drawing processing.
(103) In order to further enhance the capability of suppressing the heat generation, a cooling device such as a Peltier element, a heat pipe, an air cooling fan, or the like may be disposed in the vicinity of each of the first processor **181** and the second processor **182**.
(104) The above embodiments are merely illustrative to facilitate understanding of the presently disclosed subject matter. The configuration according to each of the above embodiments can be appropriately modified or improved without departing from the gist of the presently disclosed subject matter.
(105) In the information detecting device **101** according to the first embodiment and the information detecting device **102** according to the second embodiment, the first sub-area SA**1** in the detecting area DA subjected to the first detecting processing with the first processor **131** and the second sub-area SA**2** in the detecting area DA subjected to the second detecting processing with the second processor **132** may partially overlap.
(106) In the road-surface drawing device **103** according to the third embodiment and the road-surface drawing device **104** according to the fourth embodiment, the first sub-area SA**1** in the road surface RS subjected to the first drawing processing with the first processor **181** and the second sub-area SA**2** in the road surface RS subjected to the second drawing processing with the second processor **182** may partially overlap.
(107) The mobile entity on which the information detecting device and the road-surface drawing device as described above are installed is not limited to the vehicle **200**. Examples of other mobile entities include railways, flying objects, aircrafts, and ships. The mobile entity may not require a driver.
(108) The information detecting device and the road-surface drawing device as described above need not be installed in a mobile entity. As illustrated in FIG. **13**, each of the information detecting device and the road-surface drawing device may be installed in traffic infrastructure equipment such as a street lamp **300** and a traffic light **400**. In this case, the traffic infrastructure equipment may be an example of the monitoring device.
(109) In a case where the information detecting device is installed in the street lamp **300**, a pedestrian **500** or a vehicle located in an area A**1** can be detected. That is, the detecting area DA illustrated in FIGS. **1** and **6** is defined in the area A**1**. For example, when it is detected that the pedestrian **500** or the vehicle is about to enter an intersection, the information can be notified, via communication, to a vehicle **200** that is about to enter the intersection from another direction.
(110) For example, the notification can be made by a road-surface drawing device installed in the traffic light **400**. That is, the area A**2** is defined on the road surface RS illustrated in FIGS. **7** and **12**.
(111) Both the information detecting device and the road-surface drawing device may be installed in either the street lamp **300** or the traffic light **400**. Alternatively, the information may be notified by the road-surface drawing device installed in the street lamp **300** based on the detection result by the information detecting device installed in the traffic light **400**.
(112) The present application is based on Japanese Patent Application No. 2020-125574 filed on Jul. 22, 2020, the entire contents of which are incorporated herein by reference.

Claims

1. An information detecting device adapted to be installed in a monitoring device, comprising: at least one light emitter configured to emit detecting light to a detecting area located outside the monitoring device; at least one light receiver configured to detect reflected light that is generated in accordance with reflection of the detecting light by an object located in the detecting area; a first processor capable of executing first detecting processing that is a part of information detecting processing for detecting information of the object based on the reflected light; a second processor capable of executing second detecting processing that is a part of the information detecting processing, and is at least partially different from the first detecting processing; and a controller configured to change a ratio of each of the first detecting processing and the second detecting processing to the information detecting processing; wherein the at least one light emitter includes a first light emitter configured to emit first detecting light to the detecting area and a second light emitter configured to emit second detecting light to the detecting area; wherein the at least one light receiver includes a first light receiver configured to detect first reflected light that is generated in accordance with reflection of the first detecting light by the object and a second light receiver configured to detect second reflected light that is generated in accordance with reflection of the second detecting light by the object; wherein the first detecting processing is processing for detecting the information of the object based on the first reflected light; and wherein the second detecting processing is processing for detecting the information of the object based on the second reflected light.
2. The information detecting device according to claim 1, further comprising: a temperature detector configured to detect a first operating temperature of the first processor and a second operating temperature of the second processor, wherein the controller is configured to change the ratio based on the first operating temperature and the second operating temperature.
3. The information detecting device according to claim 1, wherein the monitoring device is a mobile entity.
4. A road-surface drawing device adapted to be installed in a monitoring device, comprising: at least one light source configured to emit visible light; a projector configured to project the visible light on a road surface located outside the monitoring device; a first processor capable of executing first drawing processing that is a part of road-surface drawing processing for controlling on/off of the light source and a projecting direction of the visible light; a second processor capable of executing second drawing processing that is a part of the road-surface drawing processing, and is at least partially different from the first drawing processing; and a controller configured to change a ratio of each of the first drawing processing and the second drawing processing to the road-surface drawing processing.
5. The road-surface drawing device according to claim 4, wherein the at least one light source includes a first light source configured to emit first visible light and a second light source configured to emit second visible light; wherein the first drawing processing is processing for controlling on/off of the first light source and a projecting direction of the first visible light; and wherein the second drawing processing is processing for controlling on/off of the second light source and a projecting direction of the second visible light.
6. The road-surface drawing device according to claim 4, further comprising: a temperature detector configured to detect a first operating temperature of the first processor and a second operating temperature of the second processor, wherein the controller is configured to change the ratio based on the first operating temperature and the second operating temperature.
7. The road-surface drawing device according to claim 4, wherein the monitoring device is a mobile entity.