produced in the sewage pipeline to affect a human body and a risk from immersion at the time of sudden rainfall. In the method of arranging the television camera in the pipe, there are also problems that a sufficient inspection speed is not obtained and a vehicle is difficult to control when a water level in the sewage pipeline rises.

[0004]

In flying an unmanned aerial vehicle in not only the sewage pipeline but also an environment where a collision with any boundary surface such as a wall surface or a ceiling may occur, controllability of the unmanned aerial vehicle may be deteriorated by the collision with the boundary surface, or an vehicle body may be damaged in some cases.

Citation List

Patent Literature

[0005]

Patent Literature 1:Japanese Patent Laid-Open No. 2017-087917
Patent Literature 2: Japanese Patent Laid-Open No. 2017-226259
Patent Literature 3: Japanese Patent Laid-Open No. 2018-001967
Patent Literature 4: Japanese Patent Laid-Open No. 2014-239665
Patent Literature 5: Japanese Patent Laid-Open No. 2014-236728
Patent Literature 6: Japanese Patent Laid-Open No. 2013-000059

Summary

[0006]

The present disclosure is to provide an apparatus configuration, a method, and the like for performing shooting inspection in an inspection space including the inside of a sewage pipeline using an unmanned flying object.

In an aspect, the present disclosure refers to an unmanned flying object comprising:

a frame having a shape elongated along a forward direction;

four rotary wings, wherein a first pair of the four rotary wings is positioned on a front-half side of the frame and a second pair of the four rotary wings is positioned on a back-half side of the frame, and wherein the four rotary wings are positioned inside the frame;

a driver that drives the four rotary wings;

a control signal generation unit that is configured to generate a control signal for causing the driver to drive the four rotary wings, wherein the control signal generation unit is positioned between the first pair of the four rotary wings and the second pair of the four rotary wings,

wherein the first pair of the four rotary wings and the second pair of the four rotary wings are arranged apart from each other in the forward direction inside the frame and the control signal generation unit is positioned in an area between the first pair of the four rotary wings and the second pair of the four rotary wings, the area resulting from the apart arrangement, so that the first pair of the four rotary wings, the control signal generation unit, and the second pair of

the four rotary wings are arranged apart from each other in the forward direction in the order of the first pair of the four rotary wings, the control signal generation unit, and the second pair of the four rotary wings,

wherein openings are formed at respective positions corresponding to the respective four rotary wings at the upper and bottom surfaces of the frame,

wherein the unmanned flying object comprises an inspection camera and a traveling direction shooting camera which are placed at positions on a vehicle body of the unmanned flying object, the positions being different from each other and between the openings formed at the positions on the upper surface of the frame and corresponding to the two rotary wings positioned on the front-half side of the frame and the openings formed at the positions on the upper surface of the frame and corresponding to the two rotary wings positioned on the back-half side of the frame, where the unmanned flying object flies while the at least four rotary wings are at least partially preventing scattered liquid from reaching a position of the inspection camera or the traveling direction shooting camera when the unmanned flying object is flying above a surface on which a liquid at least partly exists,

wherein the unmanned flying object further comprises an unmanned flying object-side communicator transmitting externally traveling direction image data obtained by shooting in a traveling direction by means of the traveling direction shooting camera while the unmanned flying object is flying,

wherein resolution of moving image or still image obtained from the traveling direction image data is lower than resolution of moving image or still image obtained from image data of the inspection camera.

[0007]

The present disclosure provides, in an example, an unmanned flying object comprising at least four rotary wings and a control unit controlling rotations of the at least four rotary wings, wherein: the unmanned flying object comprises an inspection camera which is placed at a position on the vehicle body of the unmanned flying object, the position being between one or more rotary wings from the at least four rotary wings positioned at a traveling direction-side and one or more rotary wings from the at least four rotary wings positioned at a side opposite to the traveling direction-side, where the unmanned flying object flies while the at least four rotary wings are at least partially preventing scattered liquid from reaching a position above the vehicle body when the unmanned flying object is flying above a surface on which a liquid at least partly exists,

wherein the unmanned flying object further comprises a thrust generation propeller and the unmanned flying object is propelled by rotations of the thrust generation propeller while floating by rotations of the at least four rotary wings. In an example, there is an unmanned flying object comprising at least four rotary wings and a control unit controlling rotations of the at least four rotary wings, wherein the unmanned flying object comprises an inspection camera which is placed at a position on the vehicle body of the unmanned flying object, the position being between one or more rotary wings from the at least four rotary wings positioned at a traveling direction-side and one or more rotary wings from the at least four rotary wings positioned at a side opposite to the traveling direction-side, where the unmanned flying object flies while the at least four rotary wings are at least partially preventing scattered liquid from reaching a position above the vehicle body when the unmanned flying object is flying above a surface on which a liquid at least partly exists.

[0008]

The unmanned flying object may further comprise a thrust generation propeller, and the unmanned flying object may be propelled by rotations of the thrust generation propeller while floating by rotations of the at least four rotary wings.

[0009]

The unmanned flying object may further comprise a traveling direction shooting camera which is placed at a position on the vehicle body of the unmanned flying object, the position of the traveling direction shooting camera being between one or more rotary wings from the at least four rotary wings positioned at the traveling direction-side and one or more rotary wings from the at least four rotary wings positioned at the side opposite to the traveling direction-side, where the position of the traveling direction shooting camera is different from the position of the inspection camera and an unmanned flying object-side communication unit, and the unmanned flying object can fly inside an inspection space while shooting inside the

## Claims

[Claim 1]

An unmanned flying object comprising ~~at least four rotary wings and a controller controlling rotations of the at least four rotary wings~~:

a frame having a shape elongated along a forward direction;

four rotary wings, wherein a first pair of the four rotary wings is positioned on a front-half side of the frame and a second pair of the four rotary wings is positioned on a back-half side of the frame, and wherein the four rotary wings are positioned inside the frame;

a driver that drives the four rotary wings;

a control signal generation unit that is configured to generate a control signal for causing the driver to drive the four rotary wings, wherein the control signal generation unit is positioned between the first pair of the four rotary wings and the second pair of the four rotary wings,–

wherein the first pair of the four rotary wings and the second pair of the four rotary wings are arranged apart from each other in the forward direction inside the frame and the control signal generation unit is positioned in an area between the first pair of the four rotary wings and the second pair of the four rotary wings, the area resulting from the apart arrangement, so that the first pair of the four rotary wings, the control signal generation unit, and the second pair of the four rotary wings are arranged apart from each other in the forward direction in the order of the first pair of the four rotary wings, the control signal generation unit, and the second pair of the four rotary wings,

wherein openings are formed at respective positions corresponding to the respective four rotary wings at the upper and bottom surfaces of the frame,

wherein~~:~~ the unmanned flying object comprises an inspection camera and a traveling direction shooting camera which ~~is~~are placed at ~~a~~ positions

on ~~the~~ a vehicle body of the unmanned flying object, the positions being different from each other and between ~~one or more rotary wings from the at least four rotary wings positioned at a traveling direction-side and one or more rotary wings from the at least four rotary wings positioned at a side opposite to the traveling direction-side~~the openings formed at the positions on the upper surface of the frame and corresponding to the two rotary wings positioned on the front-half side of the frame and the openings formed at the positions on the upper surface of the frame and corresponding to the two rotary wings positioned on the back-half side of the frame, where the unmanned flying object flies while the at least four rotary wings are at least partially preventing scattered liquid from reaching a position ~~above the vehicle body~~of the inspection camera or the traveling direction shooting camera when the unmanned flying object is flying above a surface on which a liquid at least partly exists,

wherein the unmanned flying object further comprises an unmanned flying object-side communicator transmitting externally traveling direction image data obtained by shooting in a traveling direction by means of the traveling direction shooting camera while the unmanned flying object is flying,

wherein resolution of moving image or still image obtained from the traveling direction image data is lower than resolution of moving image or still image obtained from image data of the inspection camera.

~~wherein the unmanned flying object further comprises a thrust generation propeller and the unmanned flying object is propelled by rotations of the thrust generation propeller while floating by rotations of the at least four rotary wings.~~

[Claim 2]

The unmanned flying object according to claim 1, further comprising a thrust generation propeller, the unmanned flying object being propelled by

rotations of the thrust generation propeller while floating by rotations of the four rotary wings~~:~~

~~a traveling direction shooting camera which is placed at a position on the vehicle body of the unmanned flying object, the position of the traveling direction shooting camera being between one or more rotary wings from the at least four rotary wings positioned at the traveling direction-side and one or more rotary wings from the at least four rotary wings positioned at the side opposite to the traveling direction-side, where the position of the traveling direction shooting camera is different from the position of the inspection camera; and~~

~~an unmanned flying object-side communicator,~~

~~wherein the unmanned flying object flies inside an inspection space while shooting inside the inspection space in the traveling direction by means of the traveling direction shooting camera and while transmitting traveling direction image data obtained by shooting in the traveling direction from the unmanned flying object-side communicator~~.