

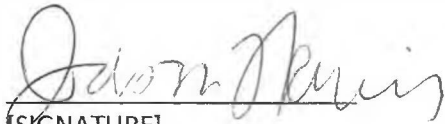
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(73) Patent Assignee(s) Han's Laser

Technology Industry Group Co.,
Ltd.

Address Han's Laser Building, No. 9 Xixi
Road, High-Tech Park North, Nanshan
District, Shenzhen, Guangdong
Province 518055

Patent Holder: Shenzhen Han's Lidar Technology Co.,
Ltd

(72) Inventor(s) Cai Xinrong, Zhang

Hankui, Yang Yong, Gong

Haitao, Gao Yunfeng

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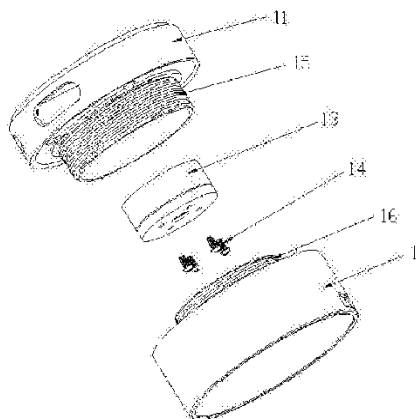
Attached Drawings 3 page(s)

(54) Title of utility model

Laser distance measuring module

(57) Abstract

The present utility model discloses a laser distance measuring module comprising a rotary disk, a base, and a motor as well as a first coil wound in a vertical direction on rotary disk and a second coil wound in a vertical direction on base. The first coil and second coil are unequal in diameter so that when the rotary disk and the base are mounted together, first coil and second coil partially or completely overlap in a vertical direction. The laser distance measuring module disclosed by the examples of the present utility model improves the conversion efficiency of the induction current by winding the first coil and the second coil in a vertical direction on the rotating disk and the base, respectively, so that the first coil and the second coil can overlap each other in a vertical direction and be at a closer distance to each other.



1. A laser distance measuring module (1), comprising a rotating disk (11), a base (12), and a motor (13) is characterized in that: It further comprises a first coil (15) wound in a vertical direction on the rotating disk (11) and a second coil (16) wound in a vertical direction on the base (12), with first coil (15) and second coil (16) having an unequal diameters so that when the rotating disk (11) and the base (12) are mounted together, the first coil (15) and the second coil (16) partially or completely overlap in a vertical direction.

2. The laser distance measuring module (1) of Claim 1 is characterized in that: The diameter of first coil (15) is greater than the diameter of second coil (16).

3. The laser distance measuring module (1) of Claim 1 is characterized in that: The diameter of first coil (15) is smaller than the diameter of second coil (16).

4. The laser distance measuring module (1) of any of Claims 1 to 3 is characterized in that: The rotating disk (11) includes an upper cover (111), a rotating disk body (112), and a first circuit board (113), and first coil (15) is wound on an annular structure formed at the lower end of the rotating disk body (112).

5. The laser distance measuring module (1) of Claim 4 is characterized in that: The base (12) comprises a lower cover (121), a base body (122), a coil wrap mechanism (123), and a second circuit board (124), and second coil (16) is wound on the coil wrap mechanism (123).

6. The laser distance measuring module (1) of Claim 5 is characterized in that: The first circuit board (113) and second circuit board (124) are mounted with signal transceivers (17). The center of motor (13) forms a through hole (131). The signal transceivers (17) of first circuit board (113) and second circuit board (124) receive and send signals through the through hole (131).

7. The laser distance measuring module (1) of Claim 6 is characterized in that: The signal transceiver device (17) is an infrared light emitting diode.

Laser Distance Measuring Module

Technical Field

[0001] The present utility model relates to the field of laser distance measuring, and particularly to a laser distance measuring module.

Background Art

[0002] Laser distance measuring can measure the distance from an object to the observation point by triangulation distance or TOF. Currently, it is widely used in the navigation and obstacle avoidance of mobile robots. Since the laser distance measuring module needs to scan the surrounding environment within a range of 360° during use, the power supply system of the general laser distance measuring module uses a wire slip ring to connect the power supply. Because the long-term rotation of the laser distance measuring module causes the slip ring to wear rapidly during use, the life of the laser distance measuring module is limited.

[0003] As disclosed in Chinese Patent Application No. 201110100477.3 of the patent literature, a contactless power transmission structure of a laser distance measuring device uses a coil induction method based on the principle of a transformer, which generates an induction current to power the rotating disk by virtue of a fixed primary coil and a rotating secondary coil. However, the literature discloses in the scheme that the primary coil and secondary coil are placed above and below at a long distance from each other, and the conversion efficiency of the induction current is low.

Summary of the Utility Model

[0004] The purpose of the present utility model is to overcome defects in the background art and provide a laser distance measuring module that is wirelessly powered and that has high power conversion efficiency.

[0005] The technical solution of the present utility model for achieving the above aims is as follows:

[0006] A laser distance measuring module comprises a rotary disk, a base and a motor, a first coil wound in a vertical direction on rotary disk, and a second coil wound in a vertical direction on base. The first coil and second coil are unequal in diameter so that when the rotary disk and the base are mounted together, first coil and second coil partially or completely overlap in a vertical direction.

[0007] Optionally, the diameter of first coil is greater than the diameter of second coil.

[0008] Optionally, the diameter of first coil is smaller than the diameter of second coil.

[0009] Further, rotating disk includes an upper cover, a rotating disk body, and a first circuit board, and first coil is wound on an annular structure formed at the lower end of the rotating disk body.

[0010] Further, base includes a lower cover, a base body, a coil wrap mechanism, and a second circuit board, and second coil is wrapped on a coil wrap ring.

[0011] Further, first circuit board and second circuit board are mounted with signal transceivers. The center of motor forms a through hole. The signal transceivers of first circuit board and second circuit board receive and send signals through the through hole.

[0012] Further, signal transceiver device is an infrared light emitting diode.

[0013] The laser distance measuring module disclosed by the examples of the present utility model improves the conversion efficiency of the induction current by winding the first coil and the second coil in a vertical direction on the rotating disk and the base, respectively, so that the first coil and the second coil can overlap each other in a vertical direction and be at a closer distance to each other.

Explanations of Attached Drawings

[0014] In order to more clearly explain the technical solution in the examples of the present utility model, the attached drawings required in the examples or prior art description will be briefly introduced below. It is readily apparent that the attached drawings in the following description are only some examples of the present utility model. For those of ordinary skill in the art, other attached drawings can be obtained according to these attached drawings without the need for creative labor.

[0015] Fig. 1 is a schematic diagram of a preferred example of the present utility model.

[0016] Fig. 2 is an exploded view of Fig. 1.

[0017] Fig. 3 is an exploded view of the rotating disk of Fig. 2.

[0018] Fig. 4 is an enlarged view of the motor of Fig. 2.

[0019] Fig. 5 is an exploded view of the base of Fig. 2.

[0020] Fig. 6 is view of Fig. 5 from another perspective.

[0021] Fig. 7 is a front view of Fig. 1.

[0022] Fig. 8 is an enlarged cross-sectional view of Fig. 7.

Description of Embodiments

[0023] In order to clarify the purpose, the technical solution, and the advantages of the present utility model, the present utility model is further explained in detail below making use of the attached drawings and examples. It should be understood that the specific examples described herein are only used to explain the present utility model and are not used to define the present utility model.

[0024] Refer to Figs. 1–8 for a preferred example of the present utility model.

[0025] The laser distance measuring module (1) in this example comprises a rotating disk (11), a base (12), a motor (13), a first coil (15), and a second coil (16). One end of the motor (13) is fixed on the rotating disk (11) by screws (14), and the other end of the motor is fixed on the base (12) by screws (14). The rotating disk (11) can rotate relative to the base (12) within a range of 360° (a brushless motor can also be used to directly achieve 360° rotation). The first coil (15) and the second coil (16) are formed by wire winding around the rotating disk (11) and the base (12).

[0026] As shown in Fig. 3, the rotating disk (11) includes an upper cover (111), a rotating disk body (112), a first circuit board (113), a laser transmitter (not shown), and a laser sensor (not shown). In this example, the lower end of the rotating disk body (112) extends to form a ring structure (not shown). The first coil (15) is wound in a vertical direction, and the two ends of the wire of the first coil (15) are connected to the power input end of the first circuit board (113). The first circuit board (113) provides electrical energy to the laser transmitter and the laser sensor. Of course, the ring structure can also be a separate piece that is fixed on the rotating disk (11) by bolting, etc.

[0027] As shown in Fig. 4, the central position of the motor (13) forms a through hole (131), and the motor (13) also has a threaded hole (132) that mate with the screws (14). Of course, both ends of the motor (13) can also each be fixed on the rotary disk (11) and the base (12) by other means.

[0028] As shown in Fig. 5 and Fig. 6, the base (12) in this example includes a bottom cover (121), a base body (122), a coil wrap mechanism (123), and a second circuit board (124). The coil wrap mechanism (123) has a circular ring structure with a certain height and is fixed on the base body (122). The second coil (16) is wound on the coil wrap mechanism (123) in a vertical direction, and both ends of the wires of the second coil (16) are connected to the power output end of the second circuit board (124). Of course, the coil wrap mechanism (123) may also be integrally formed with the base body (122).

[0029] In this example, the coil wrap mechanism (123) has a diameter smaller than the diameter of the ring structure formed by the extension of the lower end of the rotating disk body (112). Thus, the diameter of the second coil (16) formed by being wound on the coil wrap mechanism (123) is smaller than the diameter of the first coil (15) formed by being wound on the ring-shaped structure of the rotating disk (112). When the rotating disk (11) and the base (12) are mounted together, the coil wrap mechanism (123) will extend into the ring structure formed by the extension of the lower end of the rotating disk (112), so that the second coil (16) will be partially or fully accommodated within the first coil (15), i.e., partially or fully overlapping in the vertical direction. When the rotating disk (11) [rotates], the first coil (15) will cut the magnetic field formed by the current within the second coil (16), which will produce induction current in the first coil (15). Through this method, power is supplied to the laser emitter and laser sensor on the rotating disk (11). The

distance between the first coil (15) and the second coil (16) is closer, and the electromagnetic induction current can be increased by adjusting the height of overlap of the two coils in the vertical direction. Of course, the diameter of the second coil (16) may also be larger than the diameter of the first coil simply by setting the coil wrap mechanism (123) diameter to be smaller [sic: greater] than the diameter of the annular structure of the rotating disk body (112).

[0030] As shown in Fig. 8, the first circuit board (113) is installed with a signal transceiver device, and the second circuit board (124) is also installed with a signal transceiver device (17). In this example, the signal transceiver device is an infrared light emitting diode. The signal transceiver devices (17) on the first circuit board (113) and the second circuit board (124) transmit and receive signals through the through hole (131) set at the center position on the motor. In this way, even when the rotating disk (11) is rotated relative to the base (12), the position of the signal transceiver device (17) on the first circuit board and the second circuit board (124) can be guaranteed to be relatively unchanged, thereby providing reliable signal transmission. What needs to be explained is that the signal transceiver device transmitted here includes the data received by the laser sensor and can also include distance sensor data (such as the distance sensor installed on the rotating disk (11) preventing the rotating disk (11) from hitting obstacles).

[0031] The above contents are a further detailed explanation of the present utility model making use of the specific preferred implementation method, but it cannot be understood as the specific implementation of the present utility model being limited to these explanations. For those of ordinary skill in the technical field to which the present utility model belongs, certain equivalent substitutions or obvious variations are made without departing from the concept of the present utility model, and the same performance or use shall be deemed to fall within the scope of patent protection determined by the submitted claims of the present utility model.

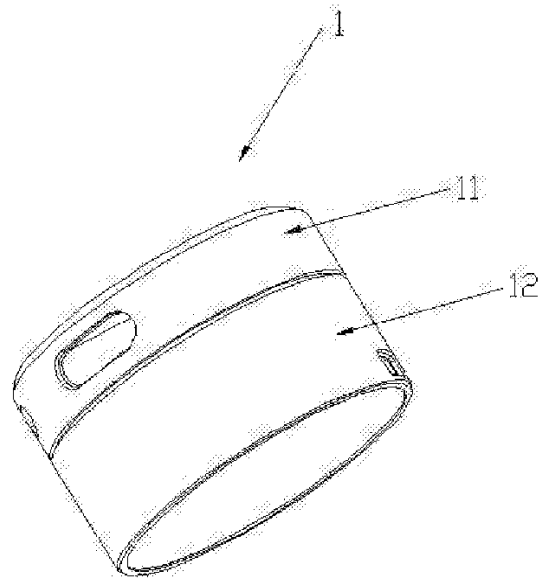


Figure 1

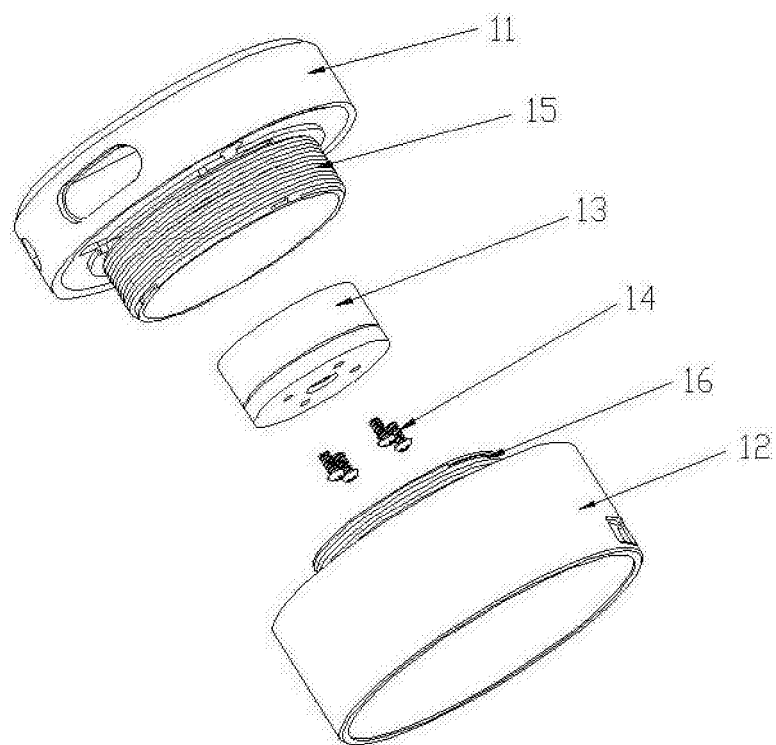


Figure 2

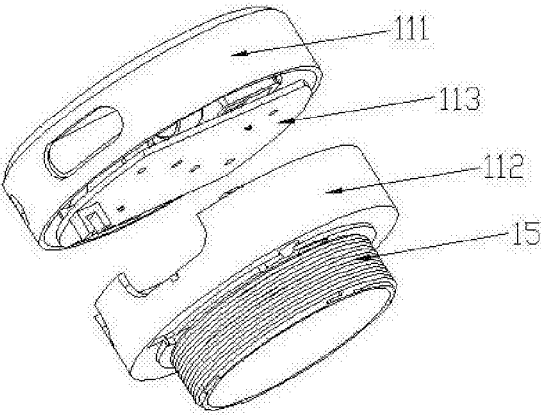


Figure 3

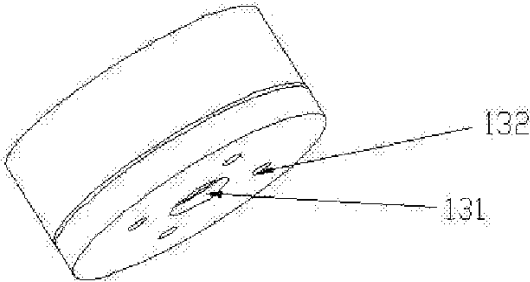


Figure 4

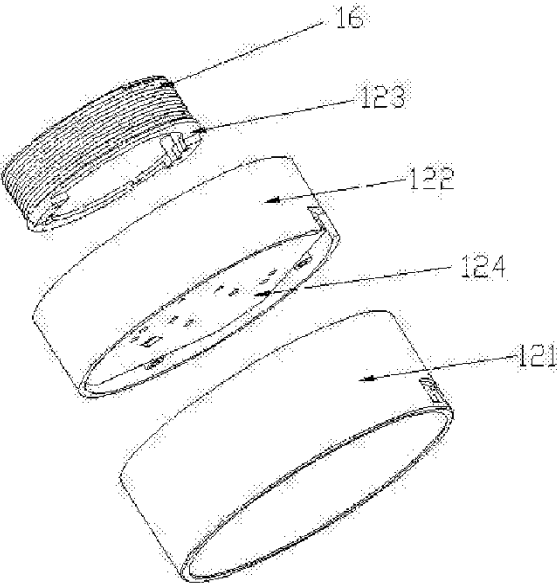


Figure 5

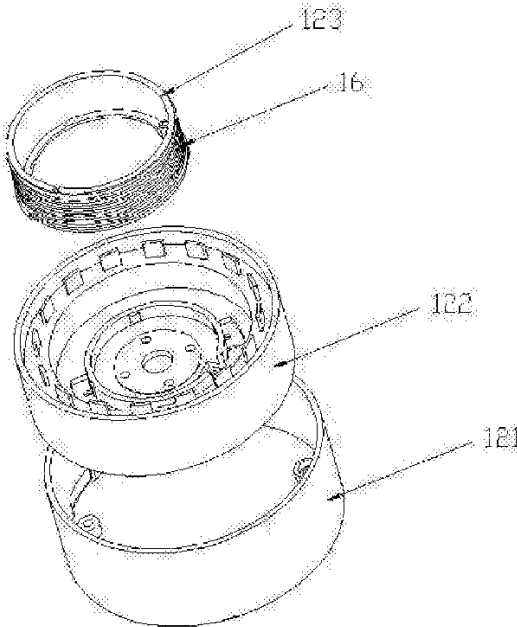


Figure 6

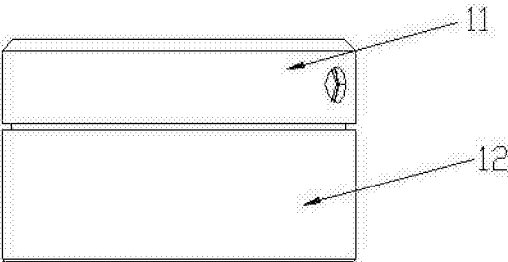


Figure 7

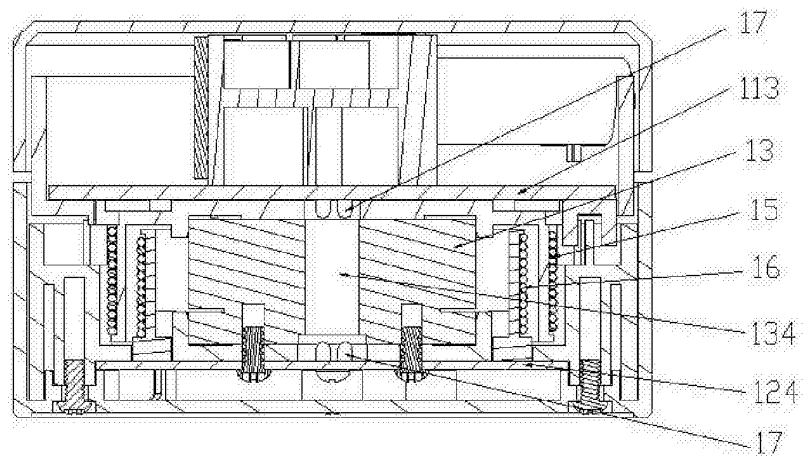


Figure 8