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YAW CONTROL MECHANISM FOR COMPACT UNMANNED TRICOPTER

FIELD OF THE INVENTION

The invention relates to the yaw control mechanism design of compact unmanned tricopter. The particular concerns of this invention are to enable a wider angle of rotation around the axis, allowing the compact unmanned tricopter to manoeuvre sharper turns; to provide a simpler yet more effective and well-tuned method of installation for the yaw control device, thereby allowing users to do away with the complexity of screwing, gluing, tying and adjusting the centre of gravity of the yaw control device.

10 BACKGROUND OF THE INVENTION

Currently, most compact unmanned tricopters are designed with a yaw control mechanism which are restricted in their angle of rotation. Such restrictions are usually due to either the mechanical design of the yaw control, or the method by which servo and rotor are fixed to the tail arm of the tricopter. As a result, the angle of turn of the tricopter is less sharp, resulting in less nimble maneuvering where directional control is concerned.

At the same time, in an attempt to maximize rotational angle of the yaw control mechanism, the problem of cost surfaces as tradeoff. There are compact unmanned tricopters that come with yaw control components which allow wider angle of rotation; these however are very precisely calibrated parts, requiring close fit of an end-point tube mounted with yaw control device to be fitted into the tail arm of a compact unmanned tricopter. While such design does allow excellent rotational angle to the tricopter, it has little tolerance for any form of crash, bump, or bend, often resulting in the replacement of the entire end-point tube. This makes the cost of such component prohibitive. Other designs attempt to cut down the cost by replacing such precise-fitting design with ones using combinations of conventional screws, nuts, bolts, glue, tape ... etc., making installation a time consuming task and a challenge to balance the centre of gravity of the entire tricopter as a whole.

Taking these into consideration, the current invention aims to find a balance between rotational angle, cost, and ease of installation for the yaw control component, by using a bearing, gear and servo set that can be easily installed to the tail arm of a compact unmanned tricopter.

STATEMENTS OF INVENTION



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The yaw control mechanism of a compact unmanned tricopter according to the present invention comprises of a gear fixed to the tricopter tail arm. This gear is stays stationary and will not rotate, and is positioned slightly away from the end of the tricopter tail arm to allow room for other parts of the yaw control component set. Behind the stationary gear is a pair of bearings, which will rotate on the end of the tricopter tail arm. In this case, the tricopter tail arm serves as an axis to the pair of bearings. Below the pair of bearings is the compartment for servo. The servo compartment consists of two small rectangular platforms fixed to bottom two legs of each bearing by nut and bolt at each corner. The two small rectangular platforms are positioned parallel to one another, with space in between to accommodate the servo. At one end of the servo, facing the centre of the tricopter, is a small gear. This small gear is attached to the servo, positioned exactly below the stationary gear, and closely engages the stationary gear. Directly above the pair of bearings is another small rectangular platform of equal dimension to those forming the servo compartment. This small rectangular platform is fixed to the top two legs of each bearing by nut and bolt at each corner. Fixed above the small rectangular platform is the rotor component that gives the lift and directional control to the tricopter. The rotor blades are mounted at the top end of the rotor component. During flight, the yaw control is realized by the servo controlling the speed and direction of the small gear fixed to the servo. The small gear, which closely engages the larger stationary gear, will rotate and therefore crawl on the larger gear, resulting in the entire yaw control device to rotate around the axis, tilting the rotor on top to the left or right and causing the tricopter to turn accordingly. Depending on the speed of rotation of the small gear, the turn can be a slow turn or a quick, sharp turn.

DESCRIPTION OF THE DRAWINGS

Figure 1 is the perspective view from the tricopter tail end of the Yaw Control Mechanism for Compact Unmanned Tricopter.

Figure 2 is the perspective view from tricopter centre side of the Yaw Control Mechanism for Compact Unmanned Tricopter.

Figure 3 is the side view of the Yaw Control Mechanism for Compact Unmanned Tricopter.

DESCRIPTION OF PREFERRED EMBODIMENTS

The drawing in Figure 1 shows the yaw control mechanism with a pair of bearings **1a** and **1b**. Each bearing has four legs, two at the top and two at the bottom, shown as **2a, 2b, 2c, 2d, 3a, 3b, 3c, 3d**, to which the servo compartment and the rotor component are attached. The servo **4** is housed in between the two rectangular platforms forming the servo compartment. The rotor blades are to be installed to the top end **5** of the rotor component. The relationship between the large and small gears can be seen in the drawing in Figure 2, where the larger stationary gear **1**, and the smaller

rotating gear **2** attached to the servo compartment, are closely engaged with one another. The same can be viewed from the drawing in Figure 3.

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CLAIMS

1. A yaw control mechanism for compact unmanned tricopters, with a stationary gear mounted
5 on the tail arm of the tricopter a distance away from the centre.
2. A yaw control mechanism for compact unmanned tricopters as claimed in claim 1, and
having a pair of bearings mounted on the tail arm of the tricopter, closely against the
stationary gear, towards the end of the arm.
3. A yaw control mechanism for compact unmanned tricopters as claimed in claim 2, with two
10 small rectangular platforms attached below the pair of bearings, positioned in parallel to one
another, held in place by nuts and bolts in the 4 corners, and housing the servo in between.
4. A yaw control mechanism for compact unmanned tricopters as claimed in claim 3, with a
small rotational gear attached to the servo and closely engaged with the stationery gear.
5. A yaw control mechanism for compact unmanned tricopters as claimed in claim 4, with rotor
15 component mounted on top the pair of bearings.
6. A yaw control mechanism for compact unmanned tricopters as claimed in claim 5, which
maneuvers direction of a compact unmanned tricopter by controlling the rotational speed
and direction of the small rotational gear, which in turn crawls around the stationary gear,
thereby effecting turning of the compact unmanned tricopter.