Safety rotor for remote pilot aircraft systems (RPAS)

Key features

- Retrofittable safety feature 'safety rotor' can halt spinning blades n a fraction of a second
- Triggered when an object interferes with the rotation of a hoop enclosing the blades
- The lightweight (< 20 g) hoop does not interfere with the normal operation of the system

Technology overview

Quad rotors and other remote pilot aircraft systems (RPAS) are increasingly accessible to consumers, with an estimated 2.8 million units sold globally in 2017. These systems are often operated by people with little or no training. The spinning blades can cause grievous injury or death and the lack of user protection is a major public safety concern. Researchers at The University of Queensland have patented a safety feature for RPAS that substantially reduces the risk of injury from the spinning blades. In this design, the blades are enclosed by a hoop that passively rotates around the same axis as the blades. When an object interferes with the hoop – indicating an imminent collision with the rotor blades – a decrease in speed at which the hoop is spinning is sensed, and a safety circuit immediately decelerates all rotors. This renders the rotor blades harmless by the time the object (e.g. human hand) would contact it, or else changes the motion of the aircraft away from the object to avoid a major collision.

This safety feature can be retrofitted to existing systems or integrated into new systems.

Features and specifications

The hoop that is fitted around the blades is made of rigid or semi-rigid material. Its rotation speed is fast enough to effectively form an enclosed shell around the blades, but not too fast to be considered an additional hazard. A sensor measures the rotation speed of the hoop and any slowdown in rotation triggers the immediate braking of all rotors.

Applications

- Civilian/hobby RPAS flying in populated areas
- Commercial RPAS flying in populated areas
- Retrofitted onto existing systems
- Integrated into the design of new systems

Benefits

- Reduced risk of injury
- Reduced risk of property damage
- Simple and effective

Commercialisation strategy

We are seeking to licence the patented safety rotor to an RPAS manufacturing company. The safety rotor can be designed for integration into any RPAS platform within the company's portfolio.

Market potential

More than 2.8 million quadrotors are sold a year. With the very real public safety hazard, consumer guidelines may expand to make such rotor safety features mandatory.

The safety rotor system can be implemented quite simply, using low-cost off-the-shelf components combined with a low-cost plastic manufacturing process achieving a price per unit of less than $5 for large-volume manufacturing. This is a particularly attractive price point given the price range of RPAS is of the order of $100-$1,000 for hobby platforms and $10,000+ for commercial platforms.

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RESEARCH TEAM

The safety rotor has come out of **Dr Paul Pounds'** Robotics Design Laboratory in the School of Information Technology and Electrical Engineering. Dr Pounds' research focuses on dynamics, control and propulsion of RPAS, specialising in rotorcraft. Along with the safety rotor Dr Pounds has 10

patents including a unique design for an energy-efficient RPAS and a force-sensing pad for improved motion control of RPAS.

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