

# Variable Center of Gravity for Coaxial Aircraft

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## A mechanism for controlling unmanned aerial vehicles by shifting their center of mass

Inventors at Georgia tech have developed a controller to achieve pitch and roll control of a coaxial rotorcraft by shifting the center of mass. The moving-mass system is used to decouple the control moments from the propulsion system, allowing for increased efficiency of the vehicle. This design also allows for pitch and roll without the need for varying speed or changing the pitch of any of the propellers. It involves not only an approach to efficiently and rapidly shift the center of gravity, but also unique control algorithms in order to operate the vehicle. In the long term, this may lead to a significant reduction in the mechanical complexity of the coaxial rotorcraft.

### Summary Bullets

- **Efficient**- improved payload capacity and increased efficiency
- **Cheaper**- reduction in maintenance cost per flight hour due to decreased complexity of rotating components
- **Simpler**- reduction in the mechanical complexity

### Solution Advantages

- **Efficient**- improved payload capacity and increased efficiency
- **Cheaper**- reduction in maintenance cost per flight hour due to decreased complexity of rotating components
- **Simpler**- reduction in the mechanical complexity
- **Versatile**- enables a UAV to fly in more austere environments/locations

### Potential Commercial Applications

- Full size rotorcraft
- Urban air mobility
- Service providing UAVs

### Background and More Information

Unmanned Aerial Vehicles (UAVs) have increased in popularity over the recent years. The current method of controlling efficient types of UAVs, coaxial rotorcraft, results in complicated swashplate mechanism that not

only increases weight and drag, but also introduces a large amount of mechanical complexity that can easily break. There is a need to improve the mechanism for controlling these vehicles that addresses these inefficiencies.

## **Inventors**

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- Michael Miller  
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- John Mains  
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## **IP Status**

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## **Publications**

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## **Images**

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<https://s3.sandbox.research.gatech.edu//index.php/print/pdf/node/3451>