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RC Jet for Data Collection

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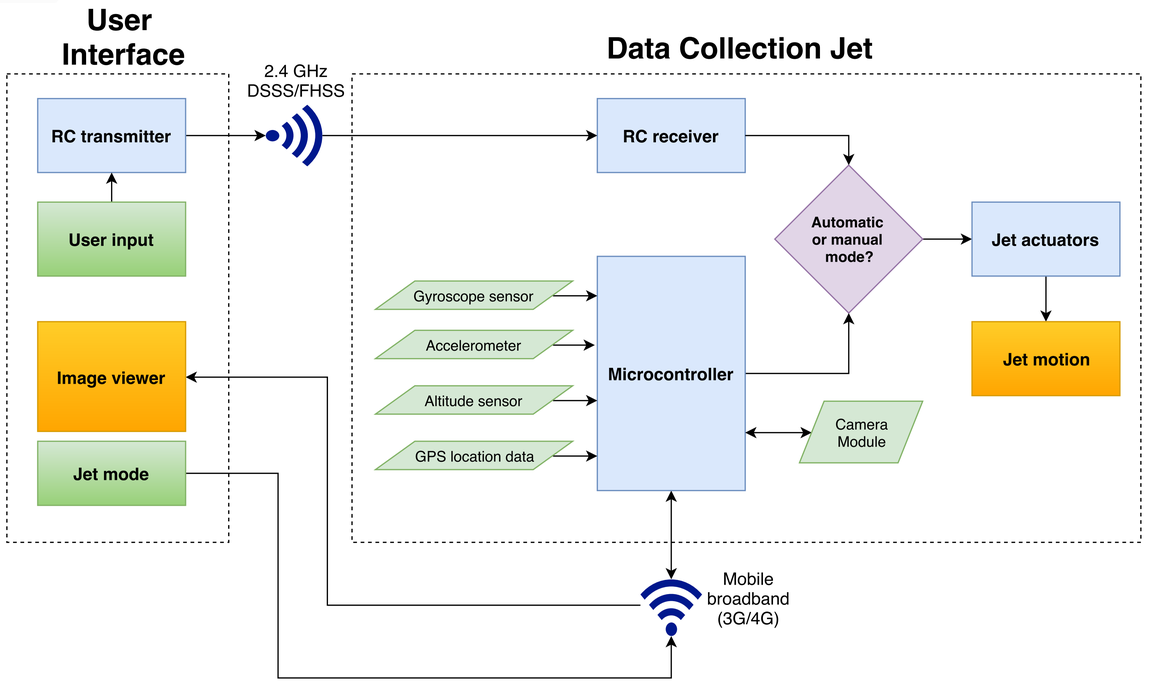
Background

Natural disaster response, search and rescue missions and agricultural monitoring require aerial photographs to be captured for a given landscape. Advances in radio-controlled (RC) technology and integrated circuit technology make a hobby-grade RC jet equipped with environmental sensors and an embedded processor a viable and low cost option for capturing aerial images.

Problem Statement

Design an RC jet which can capture aerial images of a given landscape with little to no intervention from the user. The jet should support autopilot and automatic image capture, and should be able to transmit images to the user while in flight. Additionally, it should be possible to deploy the aircraft in a confined space where no runway is available.

System Overview



Motor Placement

Two additional motors are added to the jet and are oriented to provide vertical thrust so that the jet can perform vertical takeoff. Circular cutouts are created at the wings to secure the placement of the motors. The motors are placed symmetrically, at equal distance from the centre of the jet so that equal lift force is provided at both sides of the plane.

Solidworks Model

Jet Aerodynamics

The jet is shaped to provide maximum performance while consuming minimal power. The aerodynamic efficiency of the jet is evaluated using ANSYS simulation software. The lift force is calculated as a function of the angle of attack, which is used to determine the precise orientation of the vertical motors.

Future Recommendations

- Completion of physical prototype
- Further optimization of the placement of vertical motors to improve aerodynamics
- Integrate RC receiver, environmental sensors, microcontroller and camera module into a single System on Chip (SoC) to reduce costs
- Develop mobile or desktop application to display images as they are received from the jet

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