**First Flight Drone**

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**Introduction**

This drone allows a person who has never flown a drone before to learn to fly indoors. Learning to fly inside is less risky than outside with no risk of wind or trees. The design was kept simple by following typical drone layout and communication protocols, while utilizing a custom flight controller programmed using the STM32407VG (shown below).

**Flight Controller**

- **Beginner (Angle mode):** Inputs control how far the drone rotates from horizontal; buffers allow only a small degree of rotation.
- **Intermediate (Angle mode):** Same as Beginner but with no buffer
- **Expert (Acro mode):** Inputs control how fast the drone rotates.
- Each Axis (pitch, roll, and yaw) has its own PID loop, constants, and limits; all had to be tuned individually to achieve every mode.

**Final Product**

- Carbon Fiber body and aluminum mounting bracket are strong but lightweight.
- Tin foil shielding around the IMU to prevent interference and the crystal from seizing. Nylon bolts and rubber grommets used to prevent high frequency vibration.
- Open-cell foam padding added to protect the microcontroller from dangerous crashes.