

# **IPRO 317: VTOL Aircraft for the Masses**

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The students of IPRO 317 dedicate their time and efforts to design a vertical take off and landing aircraft for the general public. Currently, the small-scale prototype, known as the Volar © is in the fourth semester of development. The primary objective of this semester's project was to gain complete control of the VTOL aircraft with its newly developed gimbal control system (GCS). The GCS is used for the steering of the aircraft once in flight. It consists of two high-torque bidirectional servo motors used for forward / reverse and lateral movement of the VTOL aircraft. Throughout the semester, the IPRO 317 Team worked diligently and efficiently to accomplish this goal.

The Volar © consists of a twin-rotor configuration in which the two rotors comb into one another. Due to this configuration, the VTOL aircraft does not need a tail rotor because the torque is compensated by the opposite rotation of the rotors. The Volar © currently operates off of a 10,000 RPM combustion engine. To this point, we have full control over the movement of the VTOL aircraft and a limited take-off sequence has been conducted. Full flight and operation of the Volar © is on the horizon. Theoretically, the Volar © operates flawlessly as demonstrated by the simulation conducted using X-Plane Version 8.0. Both a small-scale and full-scale prototype simulation has been successfully executed.

Though, the team has accomplished a great deal during the semester, a few obstacles were encountered. One of the major obstacles encountered was that the rotors would lock up if the GCS moved past a certain angle. To overcome this quandary the angle of exact lock up was found and metal stoppers were placed appropriately. Another obstacle encountered was that upon startup heavy vibrations would occur which engendered the VTOL aircraft to move in an unstable fashion. To overcome this problem, a special type of plastic molding was concocted to secure the bidirectional servo motors. Hence, though obstacles did exist, the team worked together to solve them in order to achieve the final goal of the project.

The Volar © team is currently attempting to procure funds in order to initiate the construction of the full-sized prototype. At present the Volar © team is applying for a grant from the National Collegiate Inventors & Innovators Alliance (NCIIA). A website has been created in order to allow potential customers and investors to see the progress of the Volar © project. It can be seen at <http://www.iit.edu/~ipro317s05>. The overall aim of the continuing project is to put the Volar © on the market for an affordable price so that the average person can reach for the solar with the Volar ©.