

I PRO 317
Project Plan
Fall 2006

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Objectives

The first and primary objective of IPRO 317 is to continue advancing the existing prototype towards full flight worthiness. This will be achieved through several overhauls of existing parts, as well as through consultation with outside experts in the radio control field. The team will also implement many new safety features as the prototype progresses toward the ultimate goal of free flight.

The second objective of this semester's IPRO 317 is to pick up where the previous semester left off on the construction of a second prototype design. Many parts have been ordered and are awaiting assembly; however several others must be developed and fabricated. The end result of this objective will produce a second viable alternative vehicle for use in marketing the idea of a VTOL aircraft to the public.

The final objective of IPRO 317 is to review and analyze the results of previous semesters regarding the objectives, design goals, and feasibility of a full-scale prototype, including any existing models. Once the design goals of the aircraft are made firm a new model will be created from parts available on the current market.

Background

Our Vertical Take-Off and Landing (VTOL) "flying car" initiative enters its second consecutive year. For the Fall 2006 semester, the focus will be on the design of a full-scale prototype capable of transporting two persons and their luggage, and in promoting the concept to the point where a business plan can be developed. Sponsorship and public relations will be important aspects of the project.

During Fall 2006, the "Volar" vehicle team will use its knowledge acquired from experiments in a scaled prototype in order to begin construction of a micro-size prototype. Parts acquired during the summer will be assembled and a testing protocol defined, with safety as a primary consideration. Also, the team will work on tweaking the previous scale model to achieve flight.

While the construction team carries out this function, our development team will continue seeking funding sources and promoting the Volar through Web, mail and direct contact. This will include discussions with various regulatory and standards authorities to obtain the necessary permits. A third focus will be to do a market study that identifies the best strategy for introducing the Volar.

Methodology

The majority of the work to be completed this semester by IPRO 317 will revolve around the design and construction of scale models. To achieve this, various prototyping techniques will be discussed and implemented, with emphasis on an iterative approach to refine our functionality. Teams will also consult professionals outside of the project for aid in meeting their objectives.

In order to complete our objectives, the team has divided into 3 groups, each focusing on a particular objective. Individual group objectives are as follows:

Group 1: Existing Model Testing

The primary objectives of the testing group are to:

1. Tighten and thread-lock every fastener on the VTOL.
2. Assess and implement necessary safety precautions, e.g. safety screens, safety procedures, reversing throttle.
3. Consult with “expert” to assess engine performance and tuning.
4. Learn to fly a Remote Control helicopter.
5. Verify the ability of the VTOL to successfully complete vertical take off and landing.
6. Verify the ability of the VTOL to transition from vertical to horizontal flight.
7. Demonstrate free flight of the VTOL.

Group 2: Assembly of New Prototype

The primary objectives of the assembly group are to:

1. Brief the team members on the concepts of design.
2. Establish individual goals for members that lead to the production of the second prototype.
3. Hold regular discussions on solving problems as they arise.
4. Develop CAD drawings for the synchronizing gears to be manufactured.
5. Develop CAD drawings for the power train assembly to be manufactured.
6. Assemble and test the prototype.
7. Verify that the prototype meets the requirements set forth by the design statement.

Group 3: Full-scale Design

The primary objectives of the Full-Scale Model Design Group are to:

1. Explore the capabilities of the X-Plane software as well as its limitations.
2. Review, assess, and revise the design statements and objectives set forth by previous semesters.
3. Review, assess, and revise the feasibility of previous full-scale designs.
4. Research availability of critical parts to the aircraft.
5. Using CAD software, design and blueprint required components.
6. Using the X-Plane software, evaluate the effectiveness of the new design in meeting the design statements and objectives.
7. Promote team communication by compiling sub-team documentation into final deliverables.

Expected Results

IPRO 317 will achieve the following results this semester:

1. Demonstrate the capabilities of the existing scale prototype.
2. Demonstrate the capabilities of the newly created scale prototype.
3. Solidify and document the design goals of the vehicle.
4. Finalize the design of a full-scale prototype.

The sub-teams of IPRO 317 have compiled the following milestones for gauging the progress of their respective end results:

Group 1: Existing Model Testing

- Thread-lock all fasteners (9/18/06)
- Consult with RC “expert” (9/20/06)
- Assess safety precautions (9/25/06)
- Implement safety precautions (9/27/06)
- Learn to fly RC helicopter (10/4/06)
- Have engine tuned and ready for tests (10/11/06)
- Demonstrate and verify vertical, tethered flight (10/25/06)
- Demonstrate and verify vertical to horizontal, tethered flight (11/8/06)
- Demonstrate free flight (11/22/06)

Group 2: Assembly of New Prototype

- Brief the team members on the concepts of design (8/24/2006)
- Establish individual goals for members that lead to the production of the second prototype (9/4/2006)
- Hold regular discussions on solving problems as they arise (Ongoing)
- Develop CAD drawings for the synchronizing gears to be manufactured (10/2/2006)
- Develop CAD drawings for the power train assembly to be manufactured (10/23/2006)
- Assemble and test the prototype (11/1/2006)
- Verify that the prototype meets the requirements set forth by the design statement (11/22/2006)

Group 3: Full-scale Design

- Familiarization with software (9/22/2006)
- Review and assess previous work (9/29/2006)
- Define or revise mission statement (10/6/2006)
- Plan for distributing work of full-scale design (10/6/2006)
- Finalize design of full-scale prototype (11/10/2006)
- Evaluate the completed design (11/17/2006)
- Compile and produce deliverables required for IPRO (11/22/2006)

Team Structure

Group 1: Existing Model Testing

- Paul Rozier (Lead)
- Daniel Oh
- Robert Whittlesey

Group 2: Assembly of New Prototype

- Mohammed Qadir (Lead)
- William Pajak
- Anthony Cerra
- David Poli

Group 3: Full-scale Design

- Alan Patek (Lead)
- Matt Misurac
- Jason Howard

Deliverables

- Midterm Project Report - October 20, 2006
- Project Abstract - November 22, 2006
- Exhibit and Poster - November 22, 2006
- Final Presentation - November 29, 2006
- Final Report - November 30, 2006
- Team Information - November 30, 2006
- Comprehensive Deliverables CD - December 1, 2006