IPRO 317

Midterm Progress

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Overview

Much has been accomplished in the first half of the semester. The team has been split into three groups, each of which is now progressing along fairly independently of one another. Regardless, inter-group communication is always present at the start of meetings where each group gives a status report. The following report is a collection of the work accomplished by each group towards completing the objectives set forth in the project plan.

Existing Model Testing

The objectives set forth by the group are as follows:

- 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)

The goals the group has set forth were ambitious but several problems have arisen along the way. The initial objectives of securing the structure of the model and implementing several safety precautions were completed on time. The model is currently more secure and thus safer to operate because of these modifications and procedural changes.

When consulting the RC expert for aid in tuning the model engine, many scheduling conflicts arose, delaying the completion date of the tuning. With regards to the goal of learning to properly pilot the model, the objective has been deemed unachievable. Given the difficulty in learning to fly a model helicopter, combined with the short time even in a full semester, it is impossible for a team member to flight test the model. However, the team has secured a Professor with model helicopter flight experience who is willing to pilot the model once it is airworthy.

The team continues to meet with the RC expert on a nearly weekly basis, continually improving the performance of the model. As such, we feel that we are on schedule to accomplish our initial tests in the coming weeks. Barring any particularly damaging crashes during these initial tests, we feel confident in meeting our November 22 deadline of demonstrating free flight.

Assembly of New Prototype

We began the semester with the following objectives:

- 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)

The preliminary objectives regarding team setup and task assignment were accomplished on time. The team exhibits strong subgroup communication regarding the direction of our model.

The development of CAD drawings has progressed slower than expected. Our initial design using beveled gears proved both to be a costly and uncertain path to follow. The supply of such gears was always known to be questionable, and the expected cost and delays associated with the Rapid Prototyping Machine in the machine shop finalized the need to redesign the power train assembly. As such, the development of the new assembly is slightly behind schedule at this point. In addition several other parts are needed and have yet to be ordered, making it unlikely that the group will meet the deadline for assembly and testing.

Full Scale Design Progress

Our initial timeline was as follows:

- 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)

We started the project by familiarizing ourselves with the X-Plane software, used in previous semesters for evaluation of aircraft design. There were several models already in place, and we reviewed them and examined them from a design perspective. Therefore, the first two objectives were completed nearly on time, though we continued

polishing our knowledge of the software and designs in the following weeks. Soon after, we sat down with our IPRO professor and with a former IPRO design team member to iron out the mission statement, and update it as necessary.

After we had the basic design principles on paper, we began to look at previous semesters' materials and records for reference. Initially, we used the iKnow system to compile whatever material and data we could; however, the project has been active for longer than the iKnow system has. Next, we contacted several team members from the previous semester for advice from their previous experience on the project. In this exchange, we also were able to secure a joystick for the entire semester, which is critical for thorough testing and demonstration of the X-Plane prototypes.

We then asked our IPRO professor for all the materials collected by previous semesters, and any other relevant materials. We have since begun reviewing and documenting this material, and have found several indispensable materials which will save us time and money.

While working alongside the development of a full-scale prototype, we feel that it is crucial to document all the previous materials to establish continuity among previous and future work. Continuity has been a problem for this IPRO historically. With each passing semester, detailed knowledge of the working models is lost or reduced, and barely held together by continuing team members. Also, it takes at least a month to become accustomed to the software and design process to the point of proficiency. Despite this added responsibility, we feel that we are on track for completing the basic design and parts list for the full-scale prototype by the given date, according to the above timeline.