2   Project Plan

Team: sdmay22-33

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2.1 Project Management/Tracking Procedures

We will be using a mix of waterfall and agile. For predefined and well understood requirements we will use waterfall, like the base level implementation of drone control and information gathering. Agile will be used for tasks that arise from constraints and revisions made while continuing to work on the project, such as training to operate and the drones. Agile will also be used for testing and small updates in the second semester, for issues such as battery drainage differing from expected during field tests.

Our group will be using a combination of GitHub, Trello, and Google Docs for this project. GitHub will mainly be used as a repository for code. Trello will be our main project management tool. It will allow us to track the progress of each stage of our project and mark them for completion. Google docs will be used as a repository for group documents. We will also use Slack and Discord as team communication platforms. In Slack, we will create distinct channels based on project tasks. Discord will be used for general communication.

2.2 Task Decomposition

Task #	Planned Completion Date	Task Description
1	10/9/2021	Finish research of various models and decide on a drone
2	10/24/2021	Finish research and selection of development software for the drone simulation application
3	11/01/2021	Preliminary design of simulation complete
4	12/10/2021	Complete the design document and presentation
5	01/30/2022	Complete role assignments of team members and begin simulation development
6	02/20/2022	Finish field testing of drones
7	03/6/2022	Complete alpha version of simulation software and gain user feedback
8	03/21/2022	Have finished beta of complete system
9	04/10/2022	Finish initial draft of final presentation
10	04/24/2022	Complete the final version of project
11	05/01/2022	Final touches on project and presentation

2.3 Project Proposed Milestones, Metrics, and Evaluation Criteria

Metrics/evaluation criteria:

Field Testing:

- Flight duration: How long can each drone fly on average? How long at different speeds? What types of weather do the drones operate the best in? Does the drone use more or less battery life hovering or moving?
- Flight speed: What are the maximum and minimum speeds of the drones? Is there a particular speed that maximizes battery life?
- Maneuverability: How long does it take the drones to spin? How long does it take the drones to reach a specified height?

Simulation/software:

- Unit tests: what percentage of tests pass
    - Line and branch coverage percentage for all tests
- Accuracy of data received from drones
- Scalability: Can the simulation scale to include more drones? Can the screen refresh quickly enough to present all information?

2.4 Project Timeline/Schedule

Semester 1:

	8-Oct	15-Oct	22-Oct	29-Oct	5-Nov	12-Nov	19-Nov	26-Nov	3-Dec	10-Dec	17-Dec
Task1:	Research Drones										
Task2:		Research/Selection of Dev software									
Task3:					Preliminary design completion						
Task4:									Completion of design document		

Semester 2:

	21-Jan	28-Jan	4-Feb	11-Feb	18-Feb	25-Feb	4-Mar	11-Mar	18-Mar	25-Mar	1-Apr	8-Apr	15-Apr	22-Apr	29-Apr	6-May	13-May
Task5:	Begin Sim. Dev.																
Task6:		Finish drone field testing															
Task7:			Alpha version of simulation release/Gather user feedback														
Task8:											Complete beta version of sim						
Task9:														1st draft final pres.			
Task10:														Complete final vers. of proj.			
Task11:																Present	

2.5 Risks And Risk Management/Mitigation

- Task 1) Drones on the market may exceed the budget constraints: 10%
    - Many modern drones cost less than $500. With a target of 3 drones and a budget of around $2000, this would cost around $1500 which is well within the budget
- Task 2) Applications may not be compatible with selected drone: 20%
    - There is a possibility that the drone may not function correctly with our selected development software. A workaround of selecting new software could be used.
- Task 3) Preliminary software design lacks many required simulation features: 70%
    - Required features will be added in future releases
- Task 4) N/A
- Task 5) Team members fall behind on tasks: 80%
    - Discuss any potential problems and adjust deadlines if necessary
- Task 6) Drone malfunctions or breaks during field testing: 30%
    - A drone could malfunction during field testing due to weather or user error. If this happens, more testing will occur between the remaining drones. If the budget permits it, another drone could be purchased
- Task 7) Simulation software is incredibly buggy or does not work as intended: 80%
    - Iron out bugs and rework code for next release
    - Some desired functionality is incompatible with the selected drones: 50%
    - Find some workaround if possible; otherwise, either find new software or remove the feature
- Task 8) Same as Task 7
- Task 9) N/A
- Task 10) Major bugs discovered or more testing required: 20%
    - Fix issues and implement tests quickly or remove features if necessary
- Task 11) N/A

2.6 Personnel Effort Requirements

Task #	Estimated Completion Time (hours)
1. Finish research of various models and decide on a drone	18 (3 hours * 6 people)
2. Finish research and selection of development software for the drone simulation application	30 (5 hours * 6 people)
3. Preliminary design of simulation complete	24 (4 hours * 6 people)
4. Complete the design document and presentation	27 (4.5 hours * 6 people)
5. Complete role assignments of team members and begin simulation development	16 (2.5 hours * 6 people)
6. Finish field testing of drones	18 (3 hours * 6 people)
7. Complete alpha version of simulation software and gain user feedback	30 (5 hours * 6 people)
8. Have finished beta of complete system	558 (93 hours * 6 people)
9. Finish initial draft of final presentation	12 (2 hours * 6 people)
10. Major systems fully implemented and tested	18 (3 hours * 6 people)
11. Complete the final version of project and presentation	Total :720 (120 hour* 6 people)

2.7 Other Resource Requirements

A set of 3 drones will be required for testing and simulations. A server will also be required. project required to be completed by May 2022. And it requires familiarity with FAA protocols for flying drones.The weekly load should not exceed 4 hours per person, or 720 total hours.