

ASE 379L Laboratory 1 Report

Simulating Quadrotor Dynamics

Susan Burling Ward

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1 Abstract

The abstract is a summary of the whole report. Out of respect for our busy readers, it gets right to the point. The first 2-3 sentences unpack the title and motivate the report. The remainder briefly offer context (if necessary) and describe the reports's method and main results.

A high-fidelity quadrotor dynamics simulator was designed from the theory of Newtonian dynamics and then implemented in Matlab code ...

2 Introduction

Put here a brief introduction to the lab's theme. Refer to relevant papers from our readings, or other papers you have found. This introduction need not be long: 2 paragraphs should be adequate.

Quadrotor motion can be described by a combination of linear and attitude dynamics and certain linear motion and attitude kinematics relationships. The governing equations for a simplified simulator can be found in [1]. However, a high-fidelity simulator must account for effects that [1] ignores ...

3 Theoretical Development

Put here any theoretical development (e.g., modeling) required to answer the boxed questions posed in the lab assignment. Then proceed to answer the theoretical boxed questions from the lab—those that do no depend on experimental results.

4 Implementation

Describe here your basic implementation strategy and any non-obvious implementation aspects. Include snippets of your code here to illustrate its features. Put the complete code in an Appendix to the lab report.

5 Results and Analysis

Perform all tests and experiments requested by the lab, and analyze the results of these experiments. Answer any remaining boxed questions that were not answered in the Theoretical Development section.

The `simulateQuadrotorDynamics` function was run on the three input structures `Stest` provided. The simulated attitude and position of the quad for each of these is shown in Figs. 1 and 2. ...

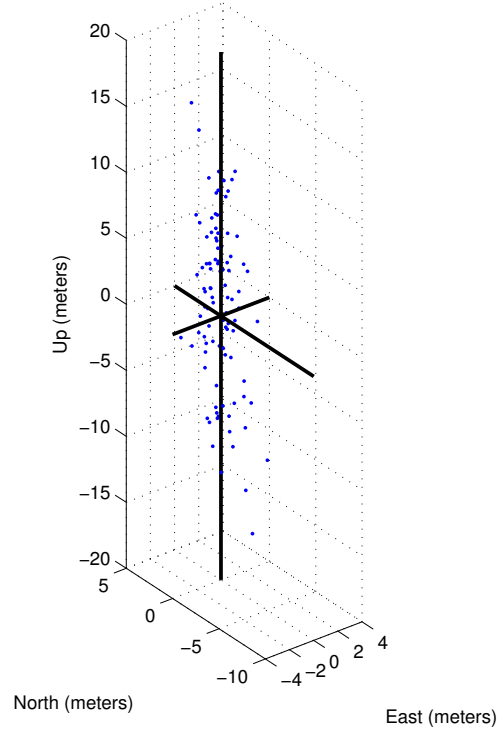


Figure 1: Quad attitude expressed as a time series of Euler angles.

Table 5 below shows...

Data Source	Sets, DOF	Nakagami-m	Rice
Wideband UHF	79, 8	11.8 ± 8.8	9.0 ± 4.3
GPS L ₁	33, 7	8.42 ± 5.9	7.7 ± 5.7

Table 1: [Table caption here.]

Further analyze the results here.

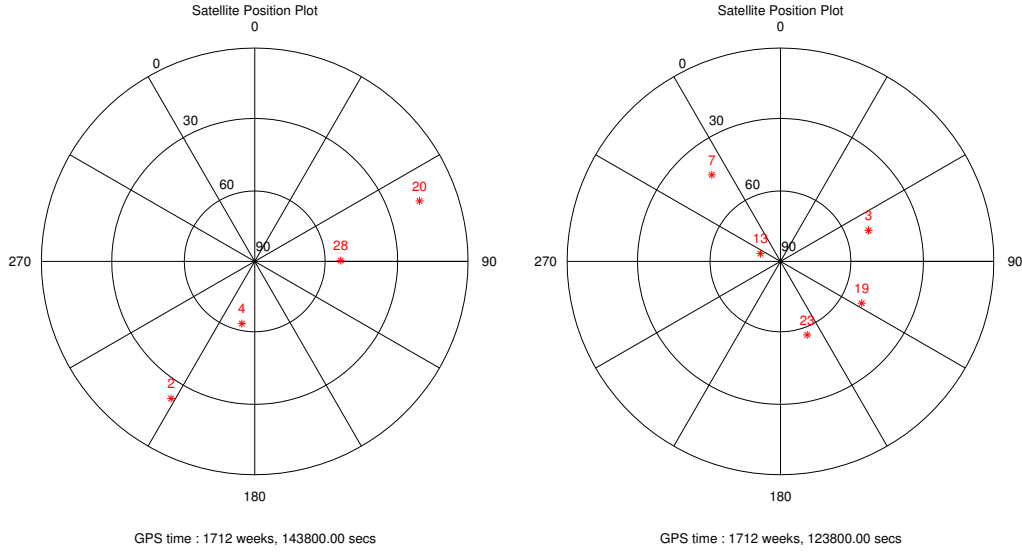


Figure 2: [Figure caption here]

6 Conclusion

Much like the abstract, the Conclusion summarizes the most important results of the report. It should be fairly short (one paragraph) and to the point.

An open-loop control strategy was developed to generate the rotor angular rates required to cause the simulated quadcopter to fly in a complete circle on a horizontal plane. The strategy was based on ...

References

- [1] D. Mellinger, N. Michael, and V. Kumar, "Trajectory generation and control for precise aggressive maneuvers with quadrotors," *The International Journal of Robotics Research*, vol. 31, no. 5, pp. 664–674, 2012.