**Tiny Avionics**

PRODUCT DESIGN SPECIFICATION

Version 1.0

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**1 PROJECT OVERVIEW**

1.1 BACKGROUND

This project will develop a rocket avionics system for small model rockets. After we design a working version, we plan to create sellable kits which others becoming interested in amateur rocketry can use. On the system, we will have sensors for attitude and acceleration during flight, which will be processed on board and stored in a memory chip. The data will be retrievable after flight, and can then be processed on a computer and displayed visually.

1.2 OVERVIEW

The goal of our project is to create a small flight computer which can collect data in flight and store it for later analysis. To achieve this, we will use a micro-processor with the Arduino bootloader, an accelerometer, gyroscope, and an on-board flash memory chip. During flight, the gyroscope and accelerometer will gather data and save data to the onboard flash-memory chip. After flight, data will be able to be pulled off the flash memory and viewed through programs such as MATLAB and Excel. The system will be powered by a single rechargeable lithium-ion cell.

**2 REQUIREMENTS**

2.1 FUNCTIONALITY:

* Deploy recovery system for reusability of rocket and board.
* Accurately sense acceleration, attitude, and rotation to at least 3 significant digits
* Must have ample power management to last at least 10 consecutive 30 second flights.
* Record flight data at a sample rate of 1 kHz (acceleration, attitude, rotation) for retrieval after flight
* Be able to transfer data to computer for processing and display

2.2 PHYSICAL RESTRICTIONS:

* Must be 1x3 inches or smaller to fit inside rocket nose
* Durable through indefinite number of uses and crash landings
* Easily removed and reinserted into different type of rocket noses

2.3 DOCUMENTATION:

* Thoroughly documented schematics, PCB layouts, and design sketches with revision tracking
* General test plan for basic functionality of accelerometer and gyroscope
* Comprehensive User’s Manual for device operation and set-up

2.4 ECONOMICS:

* Total cost under $60
* Must use easy to obtain parts from reputable vendor

2.5 MARKETING

* Boards assembled easily and cheaply
* Easy to use built in test-programs and Arduino libraries for code development
* Raw data easily converted to visual in form of 2-D or 3-D plot
* Have LED indications of functioning parts

2.6 GENERAL

* Be visually appealing
* Be modularly expandable
* Integratable into other amateur rocketry systems