F-16 Capstone

Sensor Noise Analysis

4/25/2021

Table of Contents

[1. IMU in PX4 4](#_Toc70920488)

[1.1 Velocity (PX4) 4](#_Toc70920489)

[a. Time Domain Plot 4](#_Toc70920490)

[b. Mean Value and Standard Deviation 5](#_Toc70920491)

[c. Power Spectral Density Plot 6](#_Toc70920492)

[d. Distribution Histogram 6](#_Toc70920493)

[1.2 Acceleration (PX4) 7](#_Toc70920494)

[a. Time Domain Plot 7](#_Toc70920495)

[b. Mean Value and Standard Deviation 8](#_Toc70920496)

[c. Power Spectral Density Plot 8](#_Toc70920497)

[d. Distribution Histogram 9](#_Toc70920498)

[1.3 Angular Velocity (PX4) 10](#_Toc70920499)

[a. Time Domain Plot 10](#_Toc70920500)

[b. Mean Value and Standard Deviation 11](#_Toc70920501)

[c. Power Spectral Density Plot 11](#_Toc70920502)

[d. Distribution Histogram 11](#_Toc70920503)

[2. IMU Sensor 13](#_Toc70920504)

[2.1 Acceleration (Sensor) 13](#_Toc70920505)

[a. Time Domain Plot 13](#_Toc70920506)

[b. Mean Value and Standard Deviation 14](#_Toc70920507)

[c. Power Spectral Density Plot 15](#_Toc70920508)

[d. Distribution Histogram 15](#_Toc70920509)

[2.2 Angular Velocity (Sensor) 16](#_Toc70920510)

[a. Time Domain Plot 16](#_Toc70920511)

[b. Mean Value and Standard Deviation 17](#_Toc70920512)

[c. Power Spectral Density Plot 18](#_Toc70920513)

[d. Distribution Histogram 18](#_Toc70920514)

[3. Airspeed 19](#_Toc70920515)

[a. Time Domain Plot 19](#_Toc70920516)

[b. Mean Value and Standard Deviation 20](#_Toc70920517)

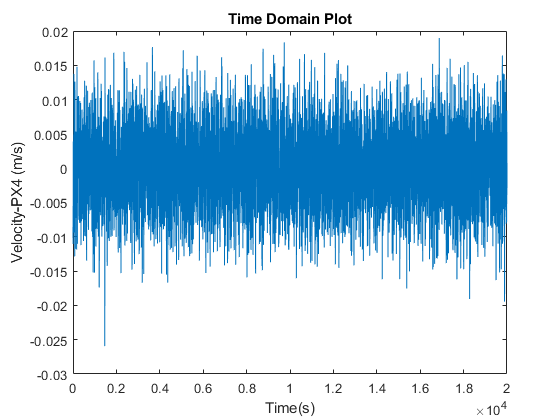
[c. Power Spectral Density Plot 20](#_Toc70920518)

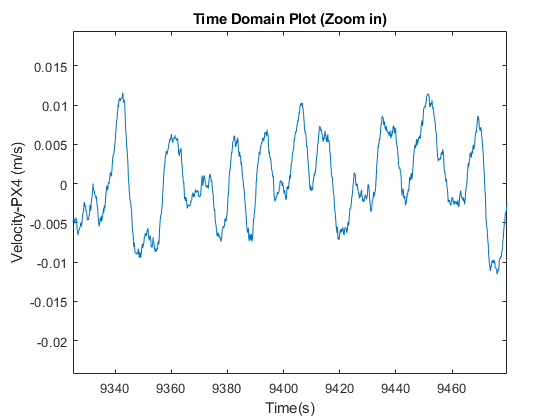
[d. Distribution Histogram 21](#_Toc70920519)

1. IMU in PX4
   1. Velocity (PX4)

**Sample frequency: 10 Hz**

a. Time Domain Plot

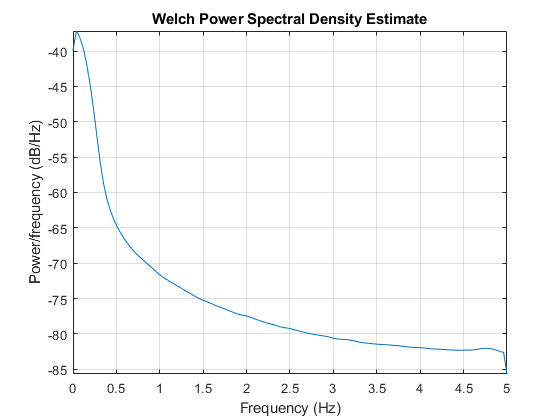




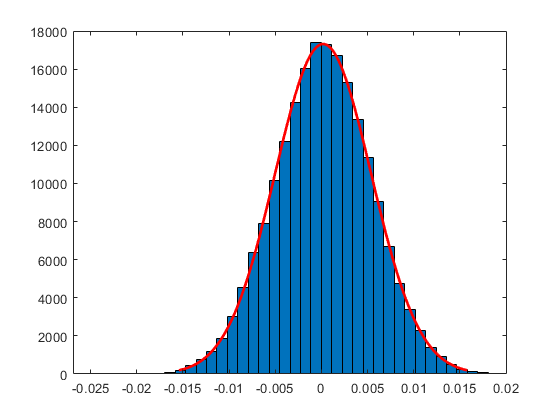
b. Mean Value and Standard Deviation

|  |  |
| --- | --- |
|  | Value |
| Mean Value | -1.87\*10-4 m/s |
| Standard Deviation | 0.0054 m/s |

c. Power Spectral Density Plot



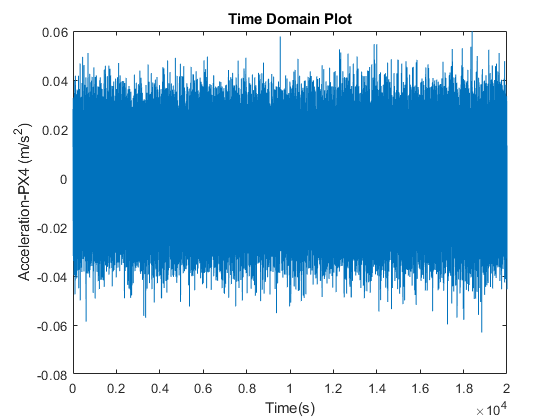
d. Distribution Histogram

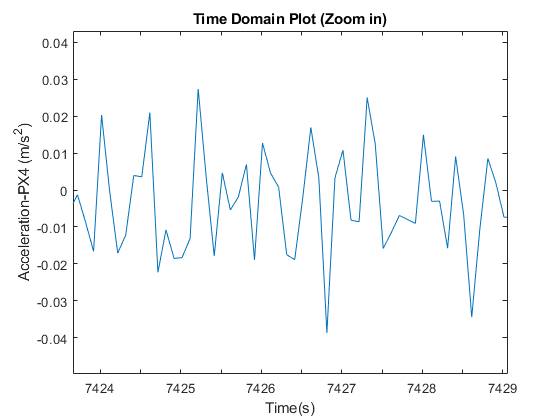


* 1. Acceleration (PX4)

**Sample frequency: 10 Hz**

a. Time Domain Plot

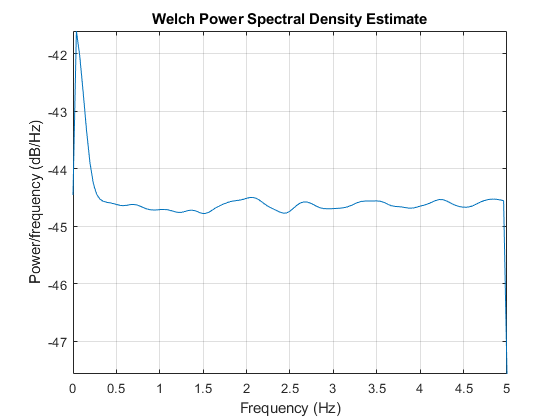




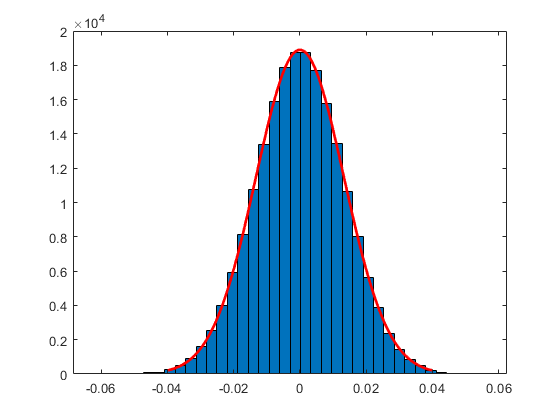
b. Mean Value and Standard Deviation

|  |  |
| --- | --- |
|  | Value |
| Mean Value | -1.20\*10-6 m/s2 |
| Standard Deviation | 0.0133 m/s2 |

c. Power Spectral Density Plot



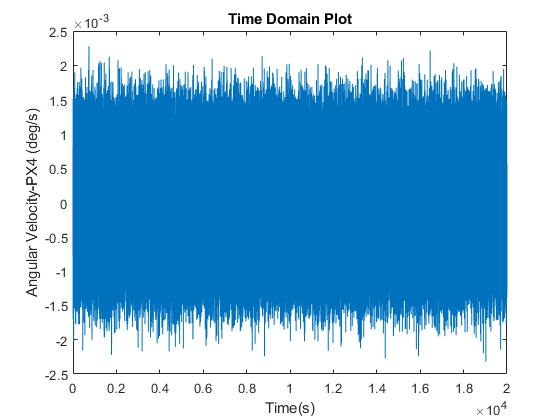
d. Distribution Histogram

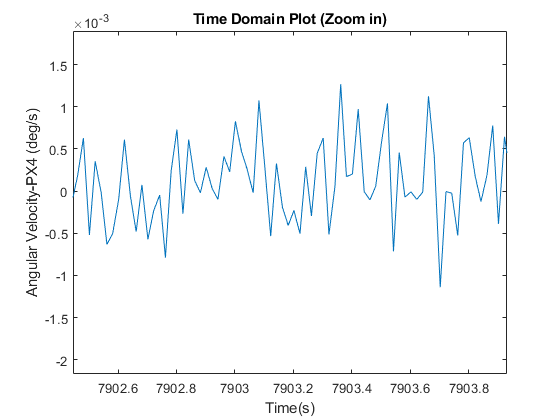


* 1. Angular Velocity (PX4)

**Sample frequency: 50 Hz**

a. Time Domain Plot

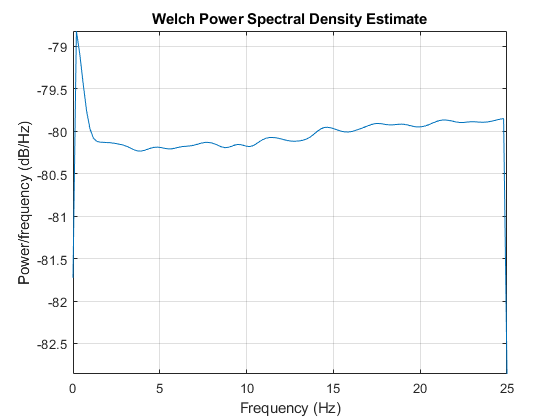




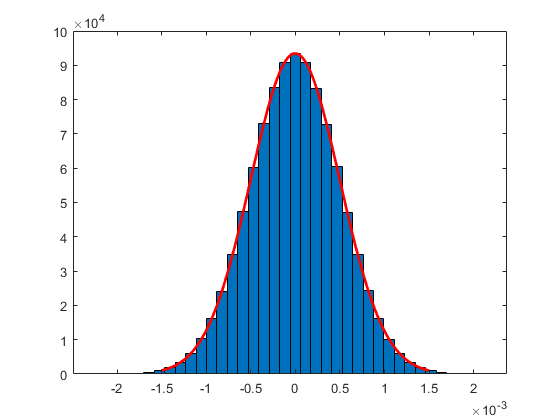
b. Mean Value and Standard Deviation

|  |  |
| --- | --- |
|  | Value |
| Mean Value | -1.74\*10-6 deg/s |
| Standard Deviation | 4.99\*10-4 deg/s |

c. Power Spectral Density Plot



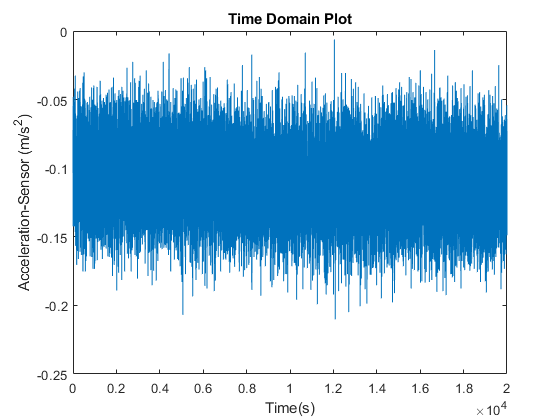
d. Distribution Histogram

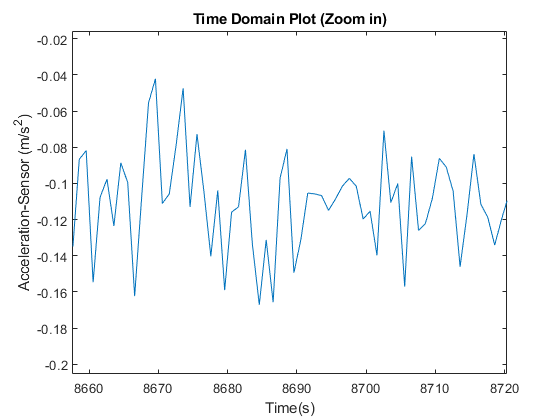


1. IMU Sensor
   1. Acceleration (Sensor)

Sample frequency: 1 Hz

a. Time Domain Plot

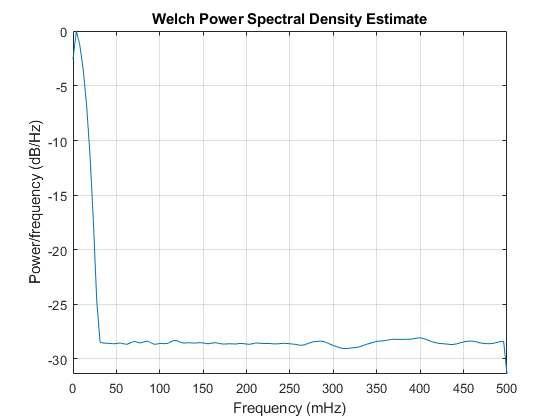




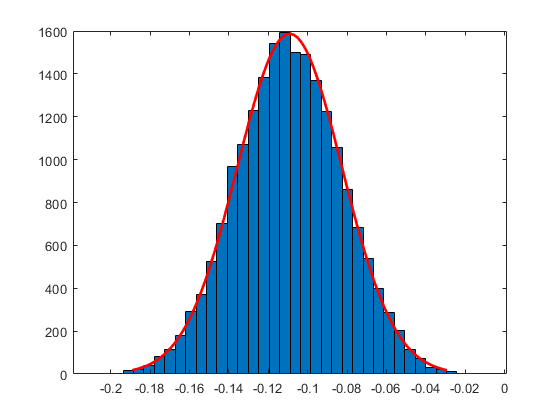
b. Mean Value and Standard Deviation

|  |  |
| --- | --- |
|  | Value |
| Mean Value | -0.109 m/s2 |
| Standard Deviation | 0.0266 m/s2 |

c. Power Spectral Density Plot



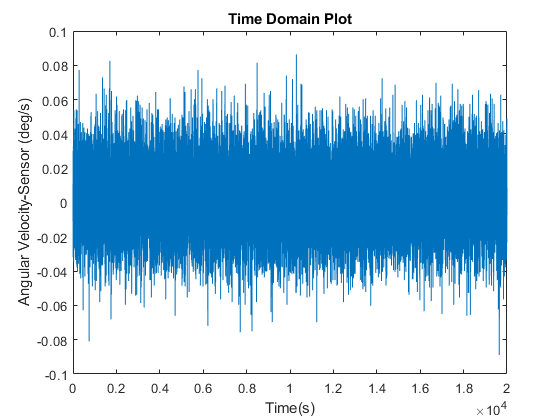
d. Distribution Histogram

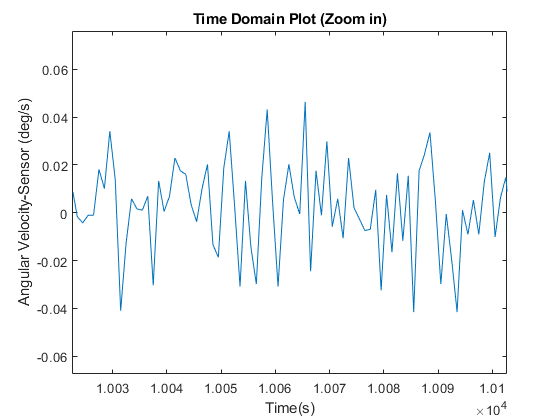


* 1. Angular Velocity (Sensor)

Sample frequency: 1 Hz

a. Time Domain Plot

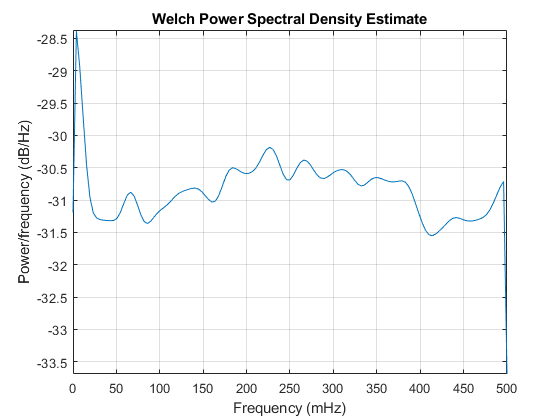




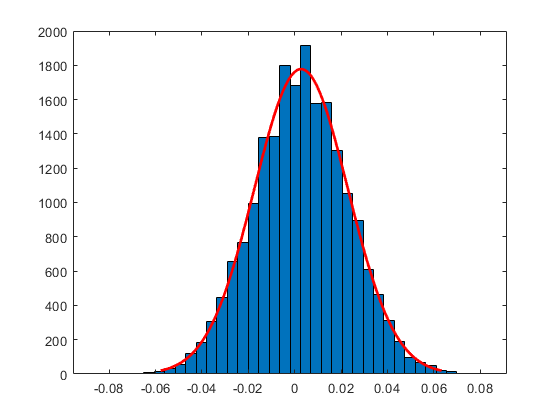
b. Mean Value and Standard Deviation

|  |  |
| --- | --- |
|  | Value |
| Mean Value | 0.0028 deg/s |
| Standard Deviation | 0.0202 deg/s |

c. Power Spectral Density Plot



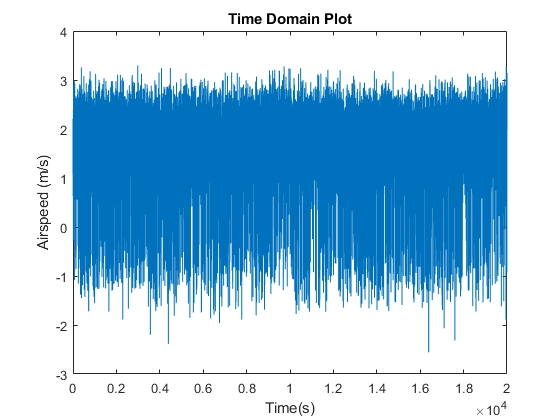
d. Distribution Histogram

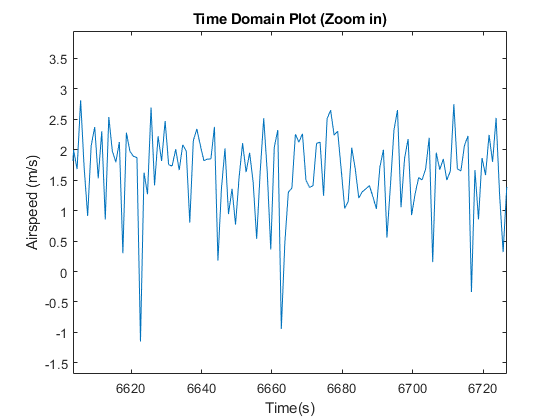


1. Airspeed

Sample frequency: 1 Hz

a. Time Domain Plot

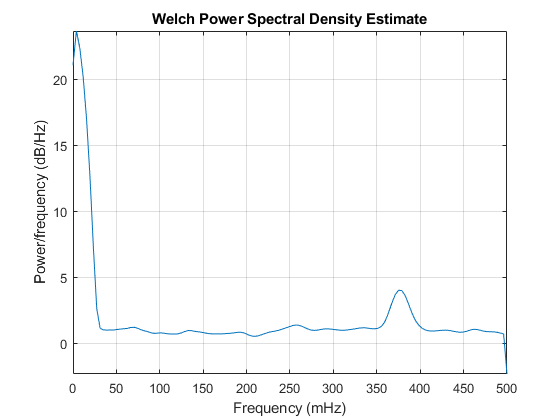




b. Mean Value and Standard Deviation

|  |  |
| --- | --- |
|  | Value |
| Mean Value | 1.657 m/s |
| Standard Deviation | 0.811 m/s |

c. Power Spectral Density Plot



d. Distribution Histogram

