Dear Stellar Science,

Included is a requested deliverable for your viewing pleasure. This product demonstrates a virtual satellite being propagated through 3D space and visualized, and was created for the sole purpose of being reviewed by Stellar Science.

**Screenshot**


**Date Created:** 01/19/2019 - 02/20/2019

**Basic Controls**

- Panning can be performed via a (left click + drag).
- Rotation can be performed via a (right click + drag)
- Zooming can be performed via (scroll)

**Orbit**

The orbit data is extracted from the following two-line orbital elements,

1 25544U 98067A  19021.08834435  .00016717  00000-0  10270-3 0  9038
2 25544  51.6398  12.8462 0004560 288.3162  71.7494 15.53175508 32391

| | |
|---|---|
| Epoch (UTC): | 21 January 2019 02:07:12 |
| Eccentricity: | 0.0004560 |
| inclination: | 51.6398° |

| | |
|---|---|
| perigee height: | 404 km |
| apogee height: | 410 km |
| right ascension of ascending node: | 12.8462° |
| argument of perigee: | 288.3162° |
| revolutions per day: | 15.53175508 |
| mean anomaly at epoch: | 71.7494° |
| orbit number at epoch: | 3239 |

**This Delivery Includes**

1. Stellar Science ReadMe
2. Source Code
3. Runnable Demo
    a. All Dependencies Included

**Dependencies**

1. Java 8
2. NASA WorldWind Java API
3. OreKit Java API
4. Hipparchus Java API
5. Swing Java API

**References**

NetBeans + Swing was used during the development of this demo. Auto generated code is inserted in the following Java Source Code:

1. src/org/jml/satellite/viewer/SatelliteViewer.java
2. src/org/jml/satellite/viewer/SatelliteViewer.form

**Usage Agreement**

No alteration, distribution, or use other than for the purpose of code review may be made to this product without the express written consent of John M. Lien.