Low-Earth Orbit Satellite Visualization Dashboard

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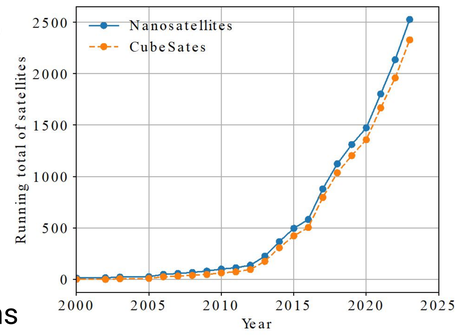
I BACKGROUND

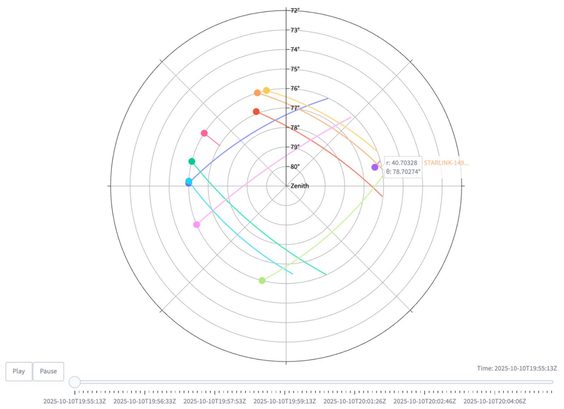
- Extreme growth in LEO satellites in space, which has fostered increased connectivity, implementations, scientific research



- Useful to easily calculate the field of view satellites for a ground station to answer research questions about interference, and connectivity

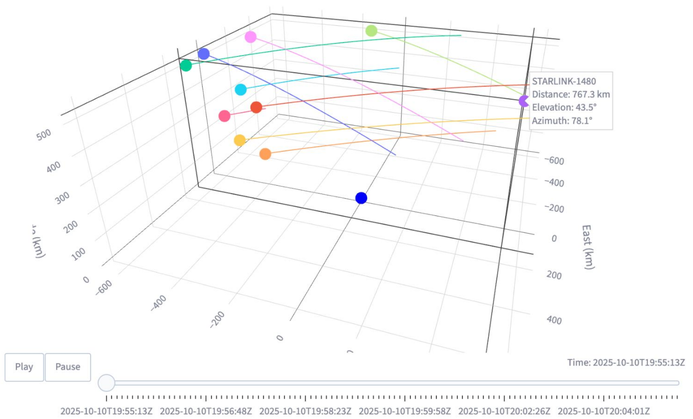
II RESEARCH QUESTIONS

- To aid in further research in this space, our visualisation aims to answer a simple, fundamental question: which satellites are within the field of view of an observer at any given time?
- This can give insights on the impact of the growth in LEO satellites with regards to internet connectivity, radio frequency interference, etc.



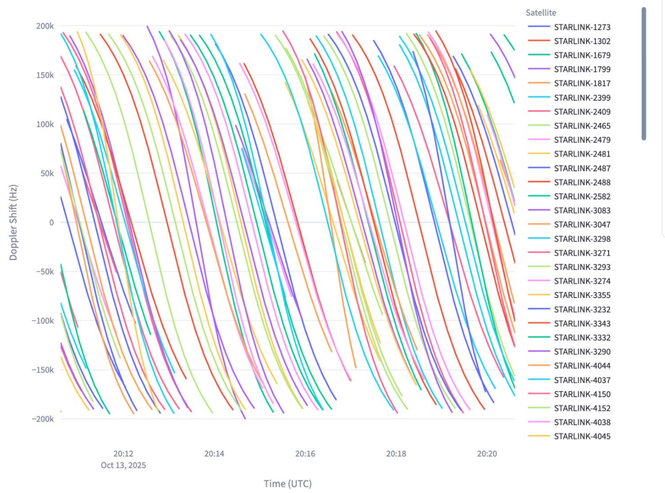
III METHODS AND MATERIALS

- To calculate the orbits and doppler profiles of the satellites, we determine the set of candidate satellites within our FOV and simulate their orbits using two-line elements (TLEs).
- The system processes this input and visualizes results through three main views:
  a. Doppler Shift Graph: plots frequency shift trends over time.
  b. Polar Plot: a 2D sky map showing visible satellites by azimuth and elevation, animated over time.
  c. Dome Plot: a 3D view of satellite orbits and tracks above the ground station, with static and animated options.
- The dashboard was built using streamlit (App Framework) and plotly (Python graphing library)
- With satellite filtering, time controls, and smooth animations, the dashboard makes it easy to visualize which satellites are visible from a ground station during a selected period.



IV RESULTS & CONCLUSION

- The dashboard is publically available on HuggingFace for researchers to use.
- The field of view satellites and their orbit information can be downloaded as a csv for usability.
- In conclusion, the dashboard provides a clean, accessible visualisation for the field of view satellites and their orbits given a ground station which can aid in future satellite research.



V ACKNOWLEDGEMENTS

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