Tracking the International Space Station

(celebrating slow)

The ISS, International Space Station, takes ninety minutes [1] to orbit the earth. Against the rush of modern life it obediently follows its invisible path over mountains, oceans and islands around the world. Watching its slow, looping steps from above (almost twenty times higher above [2] but a long way short of the moon) is an exercise in patience, punctuated by highlights of completing or crossing orbits and flying over a personally significant country.

A HTML/JavaScript page was created using a globe with only coastlines represented [3] because the more well-known WebGL globe [4] reported console errors and caused the laptop cooling fan to spin up. The coastline and background colours were changed to add warmth and visibility, and the globe spins underneath the ISS, centring on its current position provided by an API server [5] and updating co-ordinates every eight seconds to shift coastlines smoothly by one or two pixels. Every tenth co-ordinate pair displays an ISS icon spaced across the centre and bunching towards the horizons. The icon is formed of three overlapping rectangles, the middle one matches the blue on the globe below and the larger and smaller white rectangles form the distinctive silhouette of the ISS capsule bridging the massive solar panels.

A separate canvas [6] displays the ISS icon for it to be wiped and redrawn to avoid smearing and ‘alpha’ transparency is included so that icons fade cyclically as a position gets older. They also twist, but this is artistic licence.

Displaying historic ISS positions across a trailing dateline caused a lengthy delay. For example, if the ISS was over Hawaii anything further west beyond -180o towards China was not displayed. The problem was only resolved by removing a lower longitude limit in JavaScript: *if( ISSlongitude < -90)*worked but *if( -180 < ISSlongitude < -90)* did not. Another problem was that the ISS icons extended far into space at high latitudes, solved easily by artificially shortening the horizon and including latitude in a Pythagorean calculation.

The animation works well in its simplicity and it is matched by a short and plain introduction to be read before the main display begins. It proved difficult to use innerHTML for this introduction at a late stage and unsuccessful early attempts at using P5 placed the visual effects below the main body.

References

1. <https://www.nasa.gov/feature/facts-and-figures>

2. <https://www.nasa.gov/mission_pages/station/expeditions/expedition26/iss_altitude.html>

3. <https://www.multicians.org/thvv/gcw.html>

4. [https://www.webglearth.com](https://www.webglearth.com/)

5. <http://api.open-notify.org/iss-now>

6. <https://html5.litten.com/using-multiple-html5-canvases-as-layers/>

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