



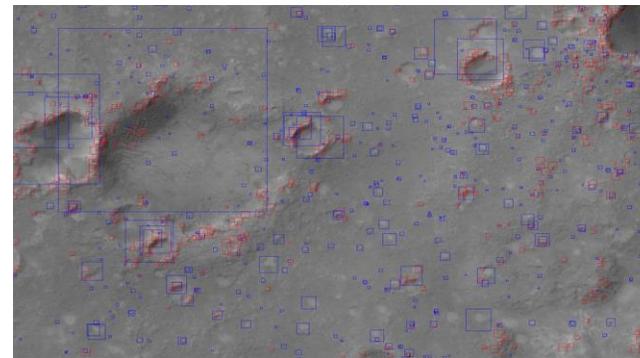
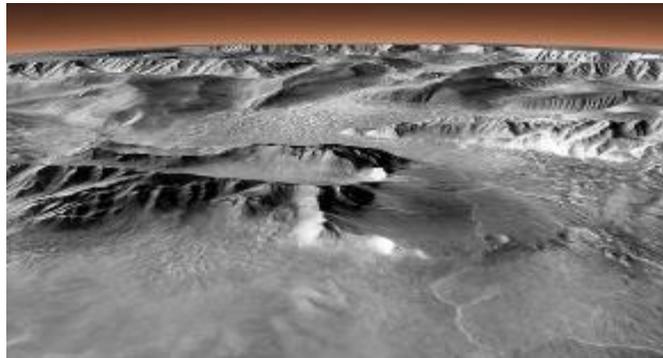
National Aeronautics and
Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Solar System Treks Project (SSTP)

AstroViz 2018

Emily Law



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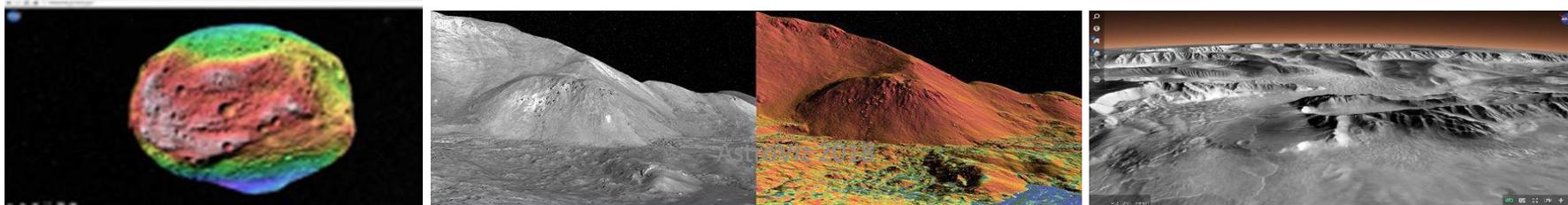


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Solar System Treks Project

- Development and operations at JPL
- An element of NASA's Solar System Exploration Research Virtual Institute (SSERVI)
- A family of web based interactive portals for mission planning, scientific research and public outreach
 - Planetary surface visualization and Analysis tools
 - GeoSpatial Data products based on PDS data collected by many past and current missions
- Standard GeoSpatial Data Access APIs
 - A variety of user interfaces (e.g., virtual reality goggles)
 - A variety of external platforms (e.g., Eyes on Solar System, planetariums)
- Publicly available portals
 - Mars (<https://marstrek.jpl.nasa.gov>)
 - Moon (<https://moontrek.jpl.nasa.gov>)
 - Vesta (<https://vestatrek.jpl.nasa.gov>)
 - More to come (e.g., Phobos, Ceres, Titan, IcyMoons)





Experience TrekVR

The screenshot displays the Experience TrekVR interface. The background is a dark, cratered moon surface. A modal window titled "Experience Trek Virtual Reality" is open in the center, containing the following text:

Experience Virtual Reality from iPhones(iOS 11+) or Android phones. A VR mobile headset such as Google Cardboard is required for VR experience.

1. Click on "Draw Path" button to draw a flight path on the map.
2. Scan the QR code from the mobile device. On iPhones, use the Camera app to scan the QR code. On Android phones, use Google Assist or any QR Code reader.
3. Once the QR code is scanned, a URL will be given. Go to the provided URL and follow the instructions. Make sure to unlock the orientation of the phone.

Below the text is a video player showing two side-by-side images of a hand holding a smartphone. The left image is labeled "iPhone" and shows the phone's camera app scanning a QR code. The right image is labeled "Android" and shows the phone's camera app scanning a QR code. A play button is centered between the two images. At the bottom of the modal are two buttons: "Draw Path" (blue) and "Cancel" (red).

On the right side of the interface is a "Tools" panel with a close button (red 'x'). The panel contains the following options:

- Generate 3D Print File
- Calculate Distance
- Calculate Elevation Profile
- Calculate Sun Angle
- Experience TrekVR** (highlighted with a red oval)

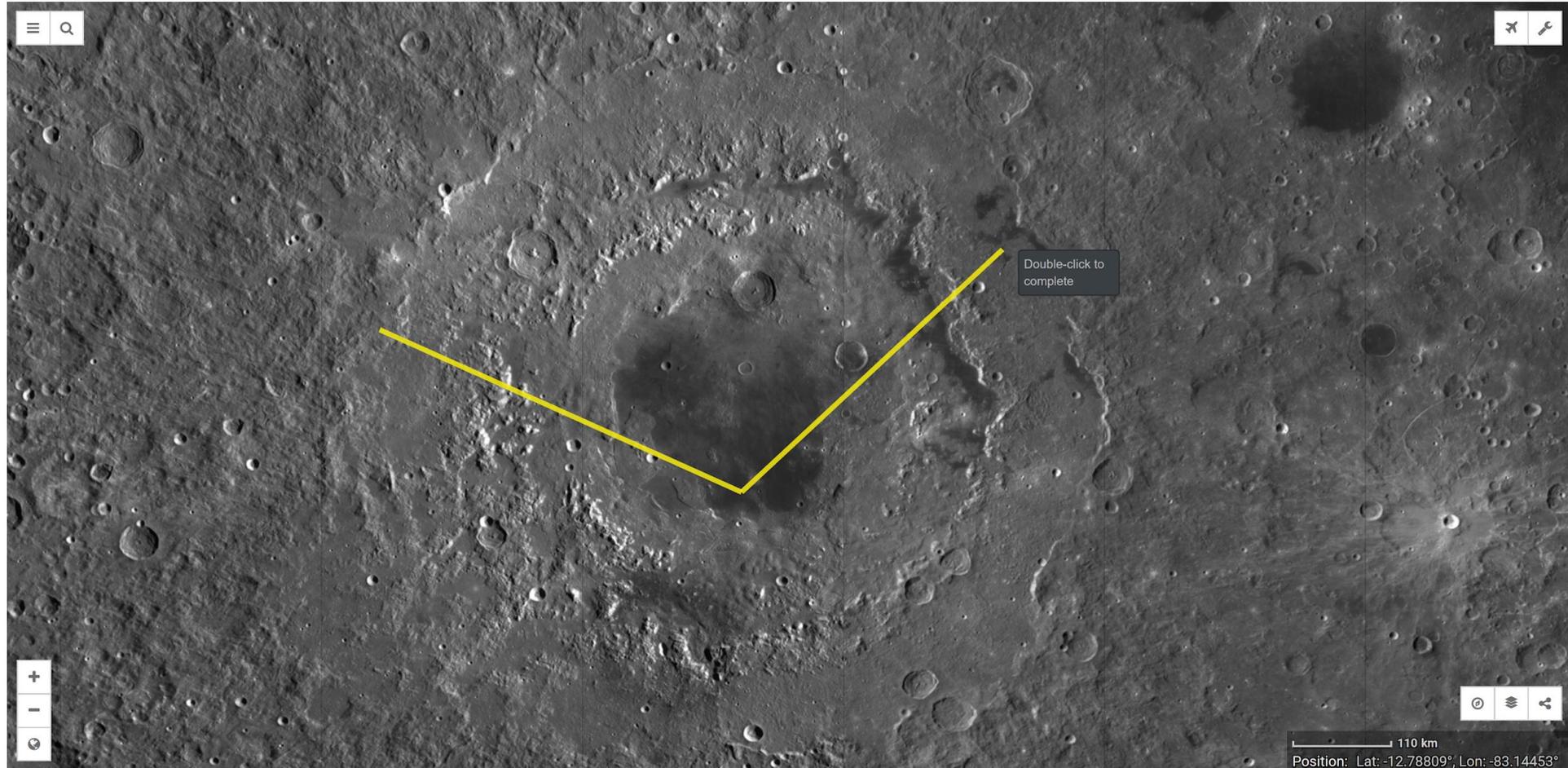
At the bottom of the interface, there is a scale bar showing "270 km" and a position indicator: "Position: Lat: 58.97461°, Lon: 131.48437°".



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Draw a path





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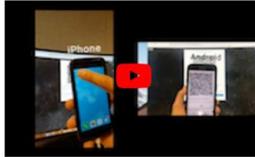
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Scan QR code or Email URL

Run TrekVR on Your Mobile Device



On iPhones with iOS 11+, use the Camera app to scan the QR code. On Android phones, use Google Assist's "What's on my screen?" to scan the QR code. Once the QR code is scanned, a URL will be given. Go to the provided URL and follow the instructions.



OR

Enter your email address to be sent a URL link to TrekVR. Open the link with Safari on iPhones and with Chrome on Android phones.

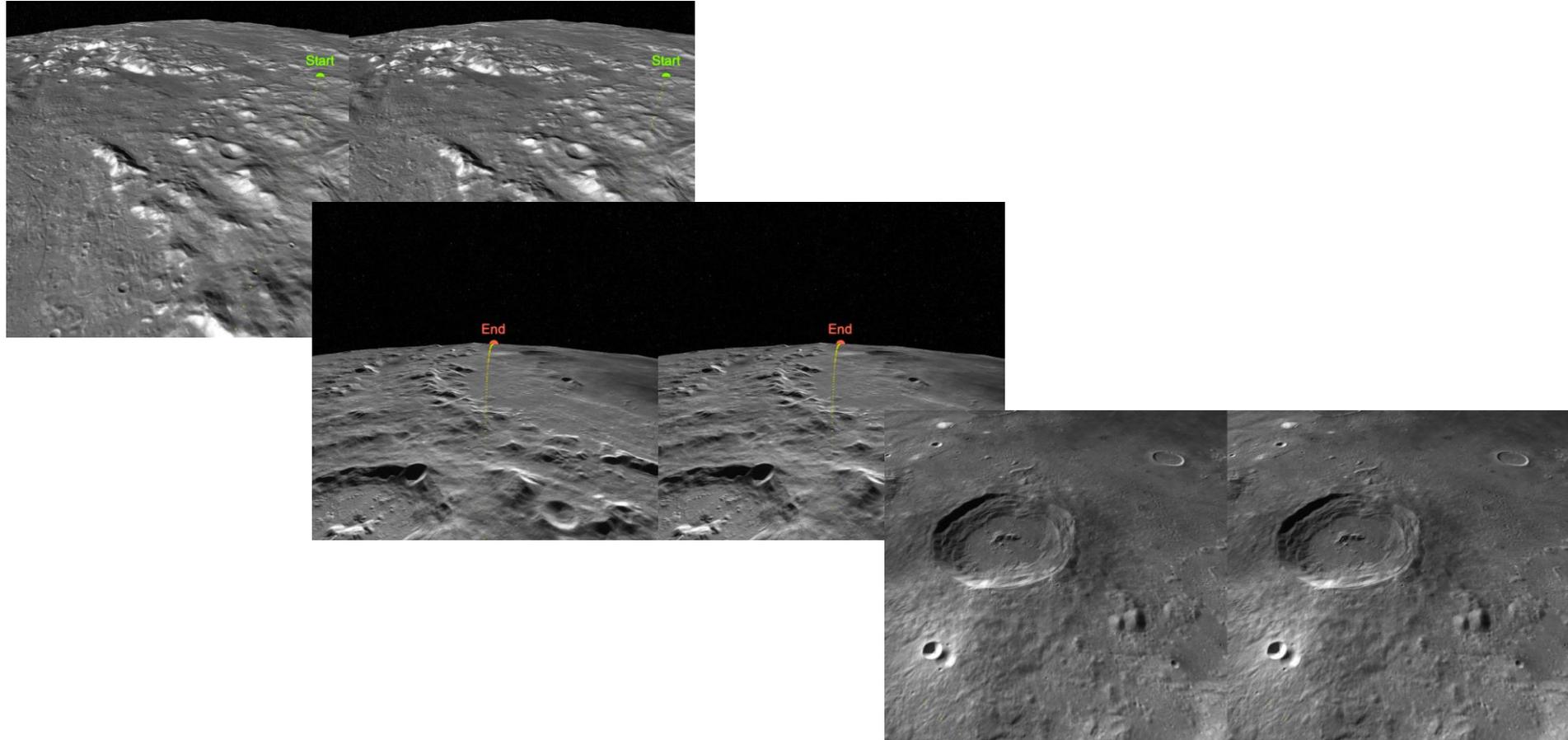
110 km
Position: Lat: -12.04102°, Lon: -85.03418



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Viewing with Cardboard Goggles





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SSTP Front-End Toolkits

dōjō
toolkit

HTML5 framework, widgets, and
plotting capabilities

2D Map Visualization



esri

 **CESIUM**

WebGL 3D Globe
Visualization



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SSTP Visualization Framework

- Use shared Common Mapping Client framework provides uniform modern portal interface
- Employ proven world class front end visualization toolkits
- Provide geospatial data processing pipeline transforming data into high precision and accurate visualization products
- Support by scalable cloud-enabled system/infrastructure architecture



CesiumJS

- <https://cesiumjs.org/>
- An open-source JavaScript Library for world-class 3D globes and maps”



Moon Trek

View imagery and perform analysis on data from the Moon.



Mars Trek

An app built to support both scientists and enthusiasts in exploring Mars.



Vesta Trek

Explore the asteroid Vesta using the highest resolution images available.



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More about Cesium

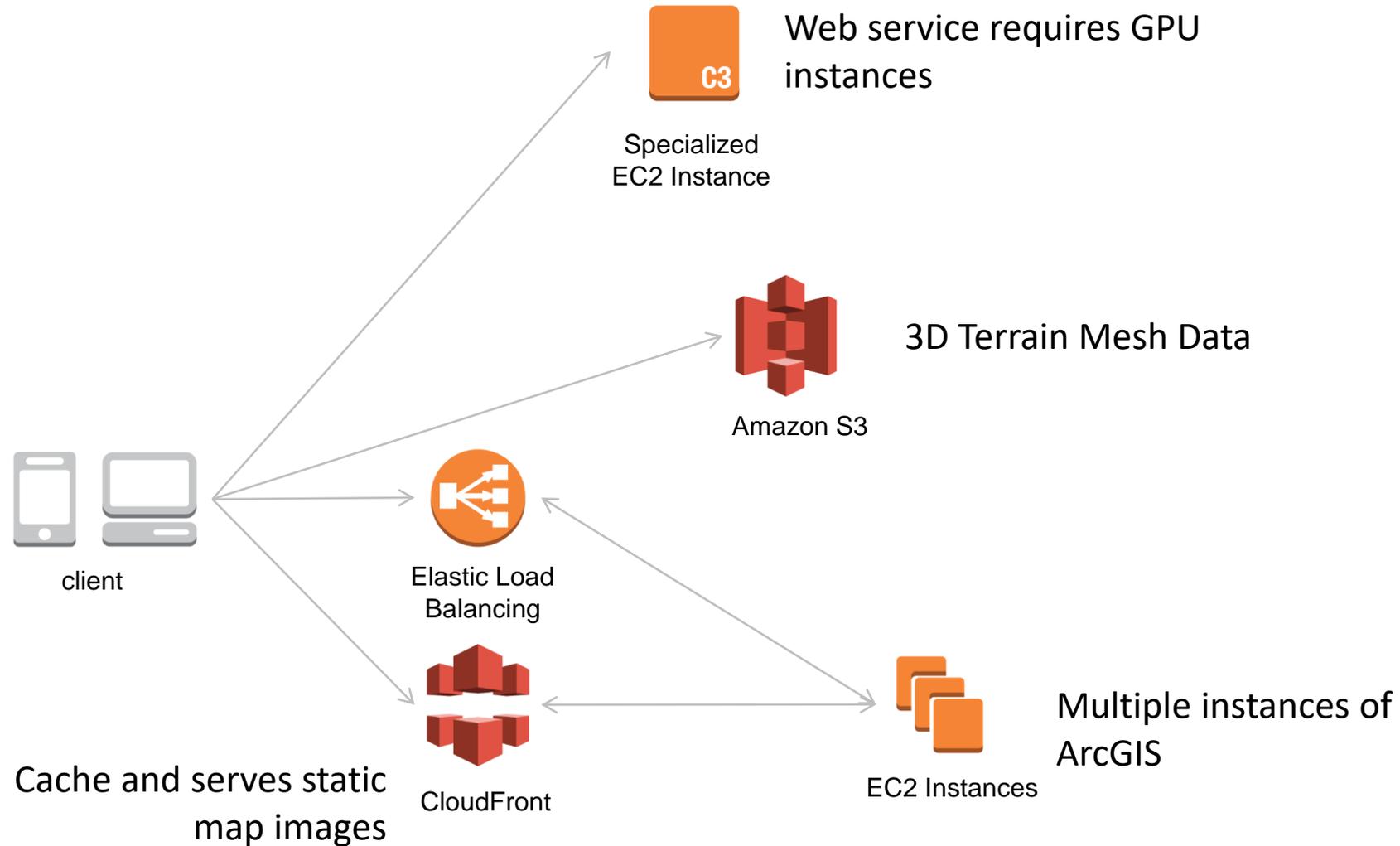
- CesiumJS is developed by an open-source community, with support from the Cesium Consortium
- Monthly releases
- Open Standards and Formats
- Browser based Javascript with Tutorials, API documentation and Code examples
- On-line Forum
- Easy to customize
- Features: 3D globe, 2D map, time controls, webVR, etc



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SSTP Cloud Infrastructure





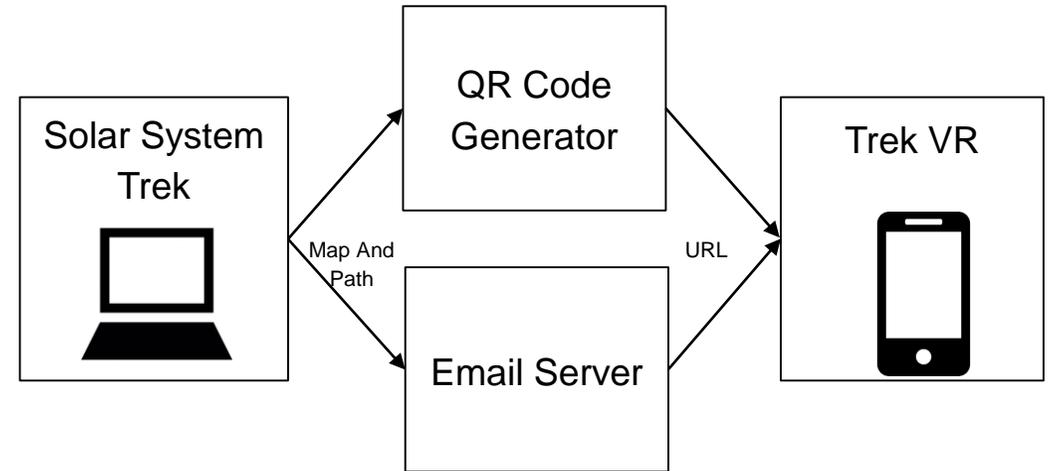
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Backup



Experience TrekVR Context



Select maps and
create path using
trek tools

Encode selection
of maps and path
into a URL and/or
QR Code

View Trek VR in
cardboard device.



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TrekVR inputs

- A list of textures for each map layer to be shown.
- A path for the viewer to fly over.
- Terrain data to build the surface.
- Body name to change between different solar system surfaces.