My Heavens

Lightning Talk April 10, 2017
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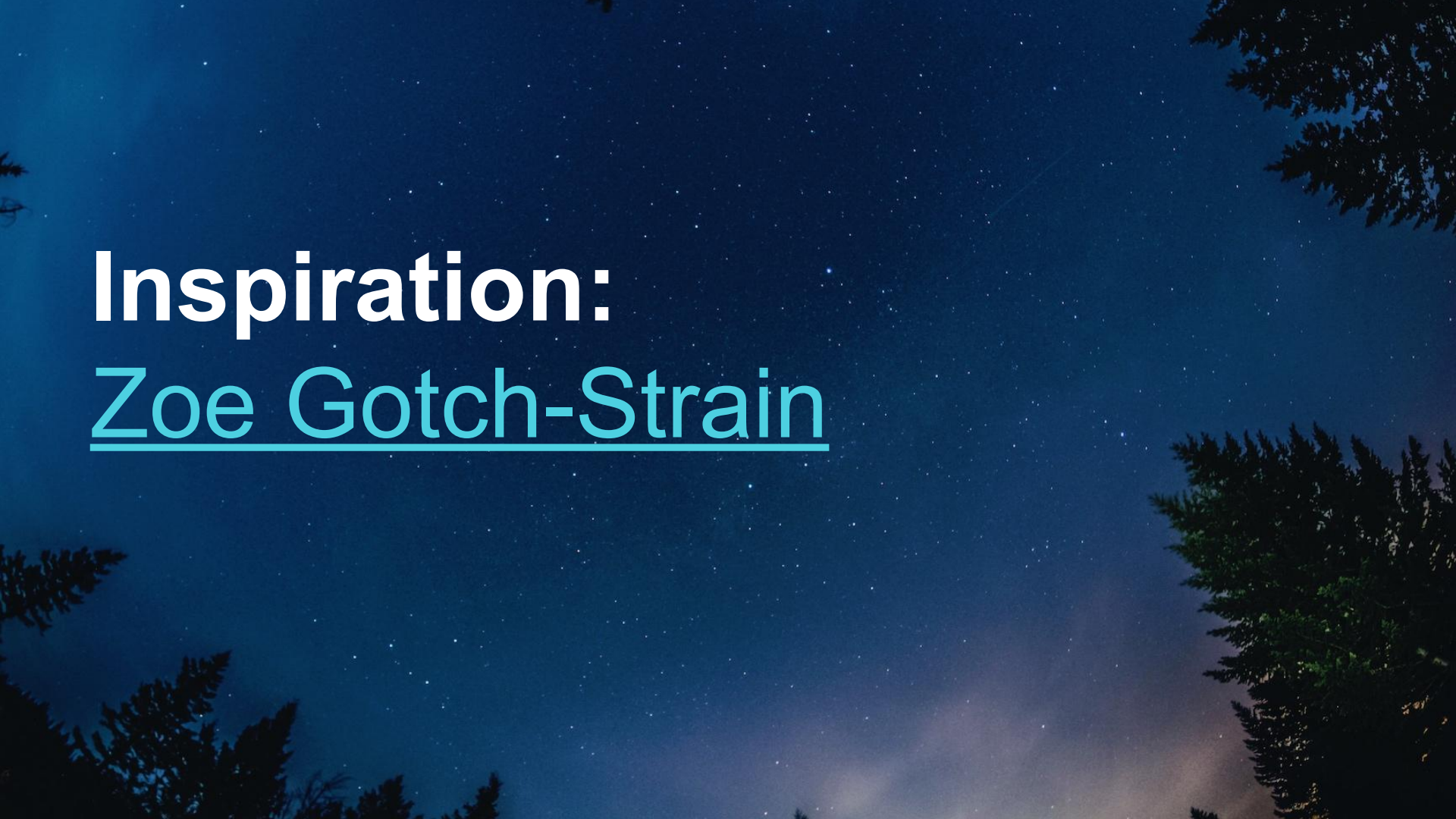
Inspiration:
Zoe Gotch-Strain

The Data

Star positions:

http://astronexus.com/files/downloads/hygfull.csv.gz

Constellation abbreviations:

https://ircatalog.gsfc.nasa.gov/constel_names.html

Constellation boundary coordinates:

http://pbarbier.com/constellations/boundaries.html#bnd18

Data, continued

Constellation lines:

http://observe.phy.sfasu.edu/SFAStarCharts/ExcelCharts/ConstellationLinesAll2002.xls

Star colors:

http://www.vendian.org/mncharity/dir3/starcolor/UnstableURLs/starcolors.txt

Planets:

Calculated in real time using pyEphem

The first attempt

- Get longitude and latitude
- Get date and time
- Use sidereal module to calculate polar coordinates
- Use good old math to calculate cartesian coordinates
- Render using d3 “three little circles” technique

The problem

- Very slow
- No way for real-time animations
  - Click-and-drag
  - Time-lapse

Enter d3.geo

- Mapped the stars onto a d3 sphere
- Load all stars up front
  - Already faster: no calculations
- Load in the background while user is on home page
- Rotate sphere into place for date / time / location
  - Bonus: animation!

Starfield Class

- Passing date / time / location around to lots of functions
- More sensible:
  - Make an object with instance attributes
  - Available to all methods

Most frustrating challenge: Moon phases

- Tried drawing moon phases flat, but easier to:
  - project onto a d3 sphere
  - rotate lit hemisphere
- NOT easy:
  - Making lit hemisphere point in the right direction
  - Got complicated equation from academic paper

Other challenges

- Polygon on d3 sphere: inside or outside?
  - Sometimes constellations would be inverted
- Can’t project a d3 sphere onto a d3 sphere
  - Use projections to determine what shows
  - Needed to make proxy point for moon, hide if not vis
- Placing constellation names
  - Still working on this one

Other features

- Planet / ecliptic reveal
- Star / planet info
- Clickable definitions
- D3 compass rose
- Night mode!
  - Not finished yet...

In the future

- Smooth out rotation
- Click and drag rotation
- Time lapse rotation
- Tests
- FAQ
  - e.g. Why night mode?
- Github readme
- Deploy!