Spatial Navigation on the Web

TPAC 2018

Breakout Session

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Overview

- Spatial Navigation
- Use cases
- Spec
  - Heuristic processing model
  - API
- Next Steps
- Demo
Spatial Navigation?

- Two-dimensional navigation within the pages of web app.
- Navigate around your pages in an intuitive and robust way in various devices. (TV, PC, IVI, etc)

TV Web Application

Grid-like Web Application
Use cases

Google’s Product (Image Search, Gmail, Google Docs)

Directional Cursor Navigation in Firefox

Spatial Navigation Feature in Vivaldi
Use cases

Pass the Remote: User Input on TV Devices

by Andrew Eichacker

The Netflix TV team works with device manufacturers to explore new input methods (like your phone!) and improve the screens we watch our favorite shows on. Beyond that, we’re testing the boundaries for content discovery and playback while bringing Netflix to more users around the world.
Need for Standard!

- Evolving navigation for evolving layout in the web
- Limitation of JS lib for handling iframe, shadow DOM
- Less customization for consistent UX
Introduce Spatial Navigation Spec Draft @CSS WG F2F

Contribute patch (#8) to Chromium upstream about the Heuristic Behavior of Spatial Navigation

Release polyfill
Find the Primitive Features

Processing Model

APIs
Spatial Navigation in WICG

- Processing Model
- APIs

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**Spatial Navigation**

Editor's Draft, 18 October 2018

This version:

http://wicg.github.io/spatial-navigation/

Issue Tracking:

GitHub
 Inline In Spec

Editors:

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Abstract

This specification defines a general model for navigating the focus using the arrow keys, as well as related CSS and JavaScript features.

Status of this document

https://wicg.github.io/spatial-navigation/
Spatial Navigation Container

- Scope for searching the focusable elements from the currently focused element
- Document, scrollable element (by default)
Basic Spatial Navigation Heuristics

1. Pressing from an element

2. Find candidates within the spatial navigation container

3. Select the best candidate

4. Focus the best candidate
Combining the UA-defined arrow key behaviors

1. Box 3 gains the focus
2. Pressing \[\text{↓}\] triggers the scrolling
3. Box 4 gains the focus when it comes into the view
Spatial Navigation Heuristic Behavior

Combining the UA-defined arrow key behaviors

4. Pressing moves down the scrollbar until the end

5. Pressing moves the focus out of the scroll area and Box 5 gains the focus

Diagram showing the movement of boxes with arrow key inputs.
APIs

- `window.navigate(direction)`
  - Move the focus to the best candidate in the corresponding direction
  - Mapping other key combinations

```javascript
const redContainer = document.getElementsByClassName("container cl")[0];
redContainer.addEventListener('keydown', function(e) {
const dir = WASD_KEY_CODE[e.keyCode];
if (window.navigate([e, dir]) {
window.navigate(dir);
e.preventDefault();
}, true);
```
APIs

- `element.focusables(option)`
  - Finds all the focusable elements inside the container
  - Directly move the focus without manually scrolling

```
enum FocusableAreaSearchMode {
  "visible",
  "all"
};

dictionary FocusableAreasOptions {
  FocusableAreaSearchMode mode;
};
```
APIs

- Customize finding the best candidate
  - `spatialNavigationSearch()`, `getSpatialNavigationContainer()`
  - Navigate Events
  - `spatial-navigation-contain` CSS property

Infinite scroll

Grouped elements
APIs

- Customize finding the best candidate

  - CSS UI nav-* properties
    - Auto
      “The user agent determines which element to navigate the focus to in response to directional navigational input.”

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Spatial Navigation Heuristics

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https://drafts.csswg.org/css-ui/#nav-dir
Try the Spatial Navigation!

https://wicg.github.io/spatial-navigation/demo/

https://www.npmjs.com/package/spatial-navigation-polyfill
Next Steps

- Implementation
  - Google
    - Chromium Open Source, Accessibility
  - Vewd
    - Chromium Patch and Spec Reviews
  - Vivaldi
    - Investigating about applying the Spatial Navigation
Next Steps

- Spec Extension
  - Handling the various focusable elements
  - Improving the distance function
  - Managing the focus

https://allyjs.io/data-tables/focusable.html
Discussion

- **Open Questions**
  - [https://github.com/WICG/spatial-navigation/blob/master/explainer.md#open-questions](https://github.com/WICG/spatial-navigation/blob/master/explainer.md#open-questions)

- **Github issues**
  - [https://github.com/WICG/spatial-navigation/issues](https://github.com/WICG/spatial-navigation/issues)
Thank you! :)