



AI-IoT 2023

# Aspects of VR Web components

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# Outline

Motivation

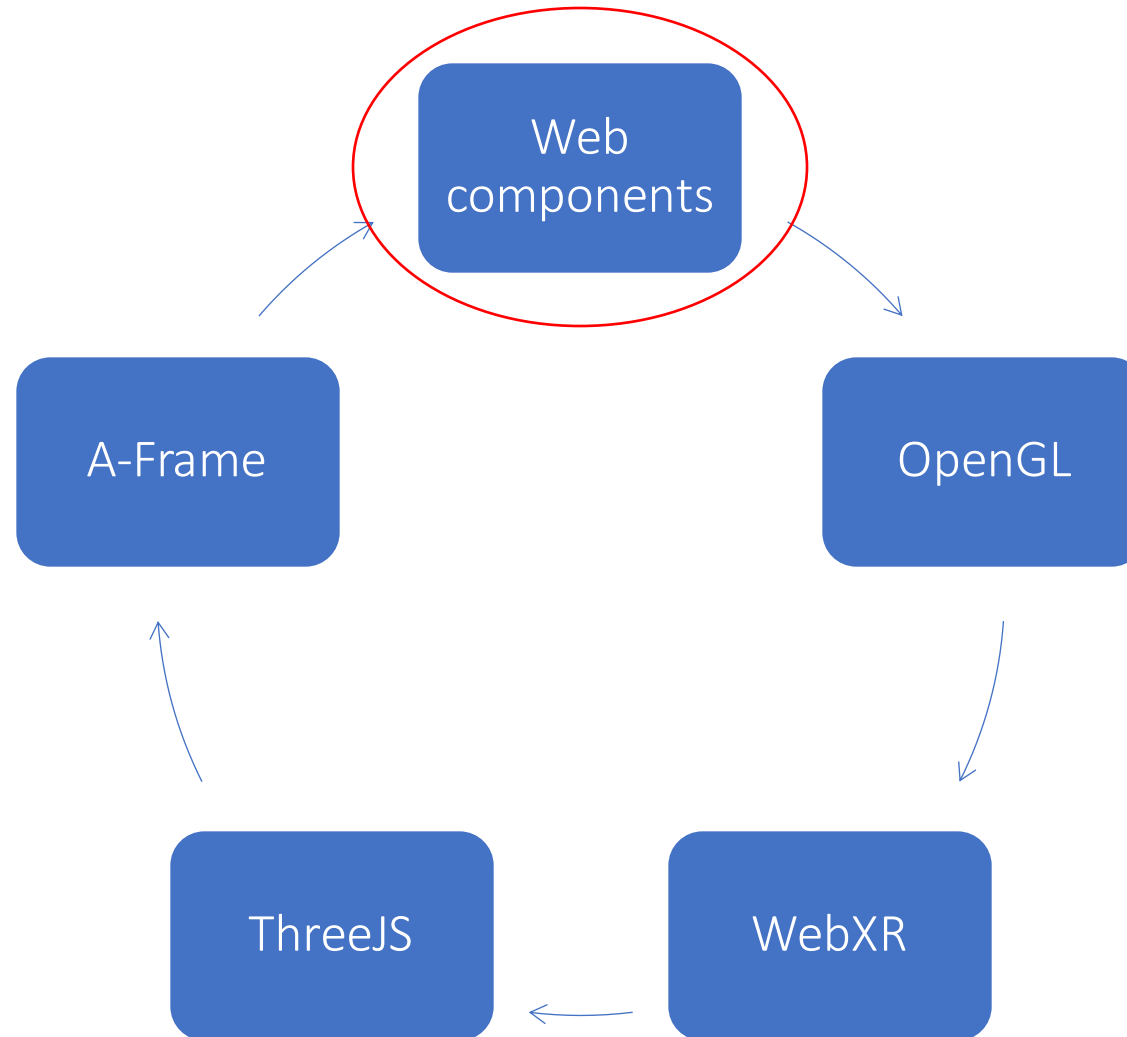
High level view and learning path

What are web components?

*Really, HTML and VR?*

Examples

# High level view and learning path



# What are web components?

Reusable and sharable parts for web pages – used in web frameworks

HTML – Hypertext Markup Language

DOM – document object model

DOM elements as HTML tags

Examples from: Mozilla Dev Network

<https://github.com/mdn/web-components-examples>

**See also: Ben Farrell: Web components in action, Manning, 2019**

# *Really, HTML and VR?*

Ultimately, VR is presented on a screen

HTML/JS/CSS do a lot for screen presentation

- Hook to APIs

- Interactive

- Good separation of duties

Can leverage sophisticated libraries, e.g., OpenGL

# DOM is a tree

---

```
<document>
  <html>
    <header>
    </header>
    <body>

    </body>
  </html>
```



# Shadow DOM

Challenges with CSS over-riding your components?

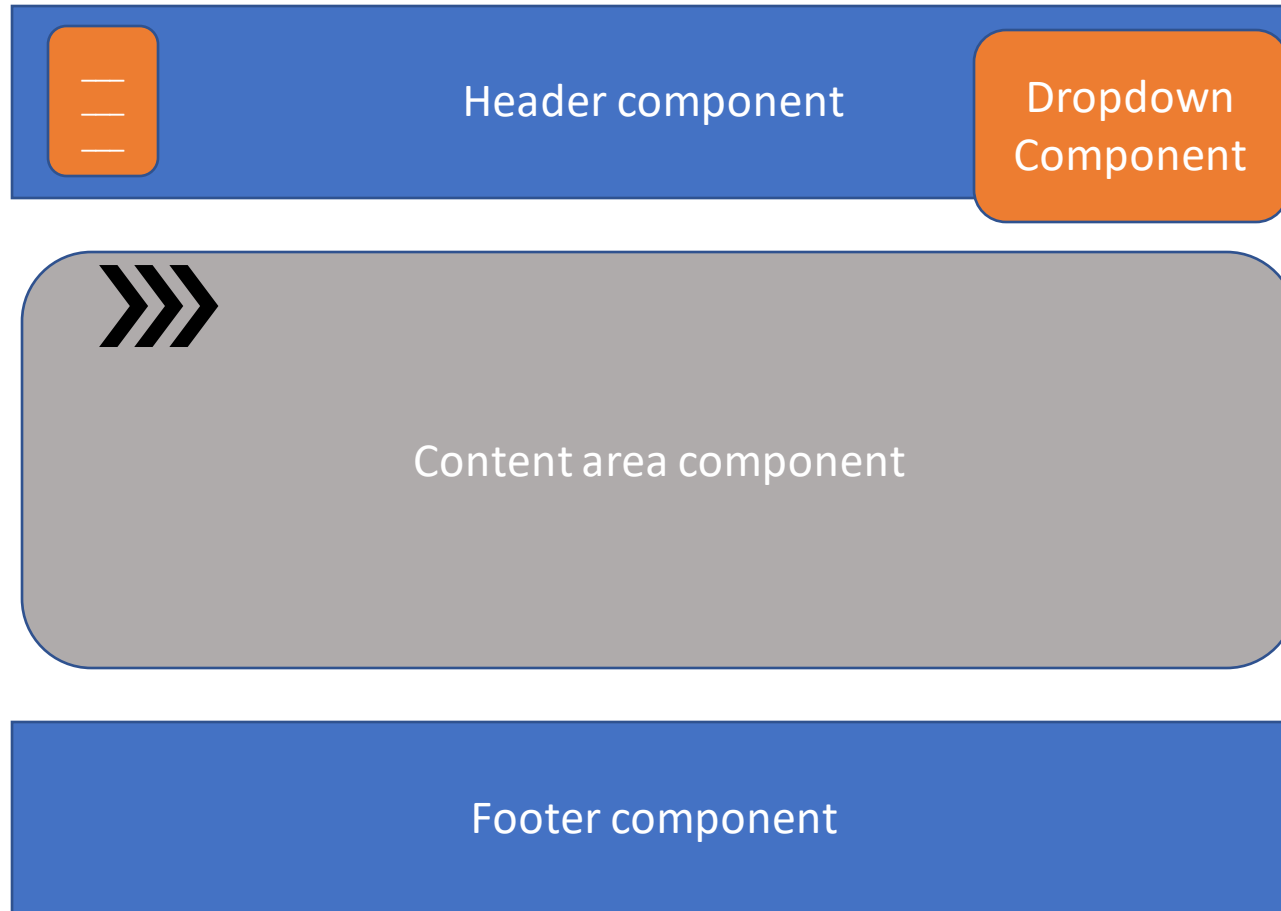
Inheritance in the DOM tree

Do we want CSS or other info inheriting down the DOM tree?

Always?

`Element.attachShadow()`

# Component based development





# Object oriented-ness of web components

```
customElements.define('a-new-frame', class extends HTMLElement {});

if (!customElements.get('a-new-frame')) {
    customElements.define('a-new-frame',
        class extends HTMLElement {});
}
```

# MDN Word count example

Computer> git clone <https://github.com/mdn/web-components-examples.git>

Let's explore their WordCount subclass of HTMLParagraphElement

**web-components-examples/edit-word**

index.html

main.js

# Two important attribute sets

Standard attributes – class, etc.

[https://www.w3schools.com/tags/ref\\_standardattributes.asp](https://www.w3schools.com/tags/ref_standardattributes.asp)

Event attributes – window, mouse, keyboard, media, etc.

[https://www.w3schools.com/tags/ref\\_eventattributes.asp](https://www.w3schools.com/tags/ref_eventattributes.asp)

# Objective

Put up a component that counts words in the parent element

## **Word count rating widget**

Hello! Count these words.

Words: 4

# index.html

```
<html>
  <head>
    <meta charset="utf-8">
    <title>MDN Simple word count web component</title>
  </head>
  <body>
    <h1>Word count rating widget</h1>
    <article contenteditable="">
      <h2>Sample heading</h2>

      <p> three </p>
      <p> four   five </p>

      <p is="word-count"></p> // is – global attribute saying this HTML TAG should behave like a custom object
    </article>
    <script src="main.js"></script>
  </body>
</html>
```

# main.js

```
class WordCount extends HTMLParagraphElement { // HTMLElement!?
  constructor() {
    super();

    const wcParent = this.parentNode;

    function countWords(node) { // method
      const text = node.innerText;
      return text.trim().split(/\s+/g).filter(a => a.trim().length > 0).length;
    }
    const count = `Words: ${countWords(wcParent)}`;
    const shadow = this.attachShadow({mode: 'open'});
    const text = document.createElement('span');
    text.textContent = count;
    shadow.appendChild(text);
  }
}
```

# main.js

```
setInterval(function() {  
    const count = `Words: ${countWords(wcParent)}`;   
    text.textContent = count;  
}, 200);
```

```
customElements.define('word-count', WordCount, { extends: 'p' });
```

```
setTimer( fcn, 1000 );
```

<https://developer.mozilla.org/en-US/docs/Web/API/setInterval>

# Web Components Lifecycle

```
<html>
<head>
  <meta charset="utf-8">
  <title>MDN Life cycle callbacks test</title>
  <style>
    custom-square { margin: 20px; }
  </style>
  <script defer src="main.js"></script>
</head>
<body>
  <h1>Life cycle callbacks test</h1>

  <div>
    <button class="add">Add custom-square to DOM</button>
    <button class="update">Update attributes</button>
    <button class="remove">Remove custom-square from DOM</button>
  </div>

</body>
</html>
```



# main.js

See main.js in

<https://github.com/mdn/web-components-examples/tree/main/life-cycle-callbacks>