How to make a website with sound?

Joanna Luberadzka
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Before I talk about websites with sound...

...how to create any website?

DEMO1 (SMILEY):
1. Simple website – one picture, one button, moving…
2. Developer tools in our browser.
3. HTML code – elements of the website (static).
4. Javascript code – modifying parameters, assigning actions to buttons and in general to control what's happening.

Motivation:

- We want to run our **auditory** experiments online.

- There are many various experiment builder software packages.

- Do we have to use them, or can we create experiments by building our own website from scratch, using what is typically used for building websites – **html** and **javascript** code? How easy/hard is it?

- Focus: Audio (for auditory experiments)

- Problem: Processing audio in the web is still not that straightforward...

Audio in the web:

- **1995**: Internet Explorer 2 for the first time supported a tag called **<bgsound>** (no visual element). Netscape browser supported the **<embed>** tag, which allowed for the mutlimedia to be embedded in the page.

- **1996**: Flash software, allowed users to add audio to their websites (for the first time with some time control, which was good for developing games). It was used across many platforms.

- **2011**: iPhone release and Steve Jobs writing an open letter criticizing Flash. But at that time already **HTML5** was in development.

- **2014**: **HTML5** release with the **<audio>** tag (nice, but it does not have all the functions of Flash).

- **Currently**: <audio> tag and Web Audio Application Programming Interface **(Web Audio API)**

How to create a website with sound using the ‹audio› tag?

DEMO 2 (EXPERIMENT):
1. Experiment website – 1 image, 3 audio files, button to display answer/play next sound example.
2. HTML code – audio elements, image, button.
3. Javascript code – not really related to audio processing, but all what is 'around' that.

How to create a website with sound using the ‹audio› tag?
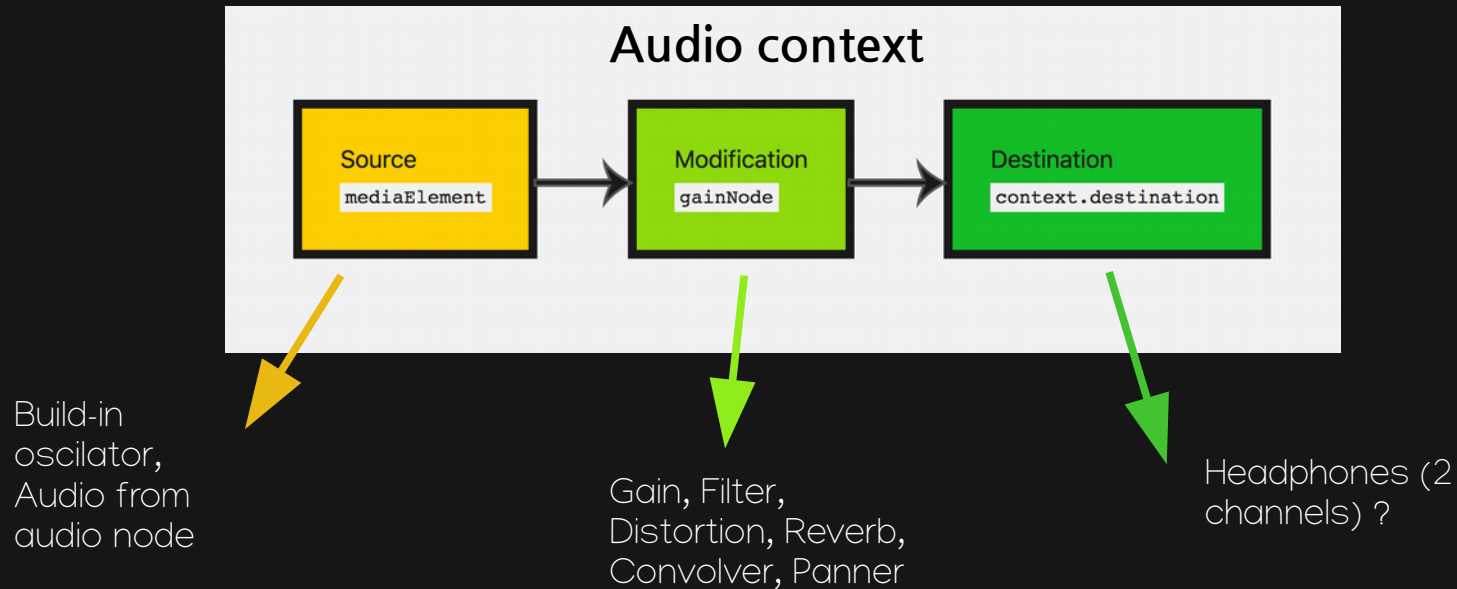
DEMO2 (EXPERIMENT):
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How to create a website with sound using the Web Audio API?

- Problem with the <audio> tag: not much control over timing, no sound modifications.

- The Web Audio API is a high-level JavaScript API for processing and synthesizing audio in web applications.

- Handled by Assembly/C/C++ code in the browser, but we control it with JavaScript.

How to create a website with sound using the Web Audio API?

Basic architecture:

Audio context

Source
`mediaElement`

Modification
`gainNode`

Destination
`context.destination`

Build-in oscilator, Audio from audio node

Gain, Filter, Distortion, Reverb, Convolver, Panner

Headphones (2 channels) ?

How to create a website with sound using the Web Audio API?

DEMO3 (EFFECTS):
1. Experiment website – play/stop button and three sliders.
2. HTML code – sliders, button.
3. Javascript code – Web Audio API, assigning parameters to sliders.

Summary:

- Websites can be created by combining HTML and Javascript coding.

- We can put audio on our Website either via **<audio> node (HTML)** or via **Web Audio API (Javascript)**.

- Audio element is quite limited and Web Audio API is quite complicated to use.

(My) Conclusions

It's not worth programming experiments on your own because:

- Web Audio API is not as straightforward for sound editing as matlab or python.

- For online experiments, apart from audio we need all additional things like data collection, instructions, etc.

It's worth learning basics of HTML and Javascript because:

- Building websites with audio is great for all kinds of demos, where we want to present our work in a compact way, for example as additional material to papers.

- Making small changes in Javascript code generated by experiment builder software might be needed.

Useful links:

Documentation:
https://developer.mozilla.org/en-US/docs/Web/API/Web_Audio_API

Tutorials:
https://www.html5rocks.com/en/tutorials/webaudio/intro/

https://middleearmedia.com/web-audio-api-basics/

Demos:
https://webaudio.github.io/demo-list/

https://webaudiodemos.appspot.com/