

# The Creation of a Project Website with Bootstrap

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**Abstract**—In this technical paper I will describe and explain the creation of a project website as well as its benefit and use for the project TraVis. The project homepage serves as modern and accessible way of presentation with which a big amount of prospective clients can be reached out to. In terms of our courses of studie courses computer science and digital media, which contain a combination of informatics and artistic design, the creation of a project homepage achieved a good learning effect.

**Index Terms**—Bootstrap, HTML, CSS, JavaScript, parallax effect, grid-system, responsive web design, compatibility, self-contained system

## I. INTRODUCTION

Choosing a website as type of presentation for our project had several reasons. As already mentioned the building of a website offers a conducive learning process in terms of design and computer science. Significant information and results of the project can be structured with the different components and pages of a website. It can be chosen in which visual and informative way the user is led into the project. Text, images, 3D models and any kind of data can be stored and embed in the right context. The building of a website is both an artistic and informatic task. Some artistic criteria for the creation of a good website are the following:

- a design which is as well
- visually appealing and aesthetic
- appropriated and adjusted to the content
- an interface which offers an intuitive and easy exploitation
- a contextually coherent and precise presentation of the content

In the working process we came to the decision to focus on the design work to fulfill these criteria. Becoming acquainted with the markup language *HTML* and the style sheet language *CSS* took us some time. The online course website *codecademy* [1] helped us acquire a basic knowledge of HTML and CSS. After the free standard course offered by *codecademy* learning by doing was the best way for us to expand these newly acquired skills. Simultaneously to coding the framework of the website in HTML our primary reference works were the Online Web Tutorial website *w3schools.com* [2] and the internet documentation *wiki.selfhtml.org* [3]. After finishing the basic framework we started designing a first layout of the final page. After getting a basic understanding of *CSS* we began coding the visual framework concurrently looking up and researching the elements we needed for our

website on the internet and especially on the both websites in the CSS-section.

### A. Animations

Because of the underwater theme and sea bed landscape coming along with our task to visualize the trajectory of a autonomous underwater vehicle of the *Marum* [4]<sup>1</sup> we wanted to stick to this theme on our project website, too. The banner which holds the logo of the project was animated so it would look like the logo surfaces out of the deep see. [Fig. 1] For this purpose we used a javascript plugin called *AOS* [5] which includes an animation library. The animations are triggered by scrolling.

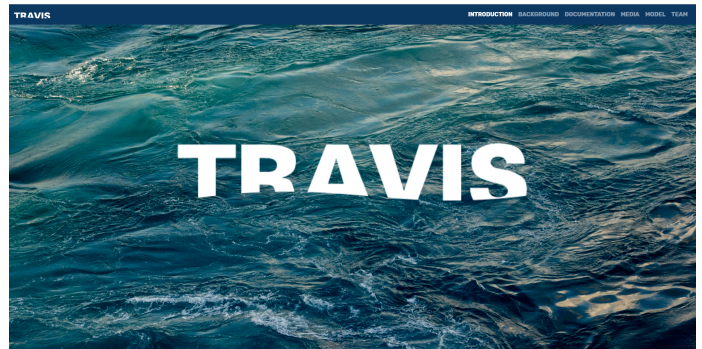


Fig. 1. Banner with animated TraVis Logo

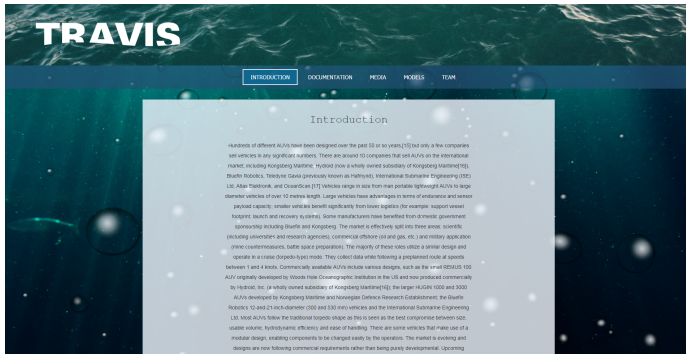
## II. WHY BOOTSTRAP

During the process of creating the basic framework for the website an unexpected amount of problems lead to the decision of using the FrontEnd-CSS-Framework *Bootstrap* for building our website. General reasons for this choice are its popularity and frequent use. A mass of plugins and tutorials are available and compatible with it, which simplifies the familiarization and provides many opportunities to work with it. It makes designing and developing websites easier and less time-intense. This helped us focusing on creative decisions and writing our own code. The *grid system* implemented in bootstrap facilitates creating a layout for the website. A significant problem we were able to fix by working with bootstrap was the placing and positioning of certain elements on the pages. While creating the media page where we decided to integrate a gallery there were issues with the positioning of

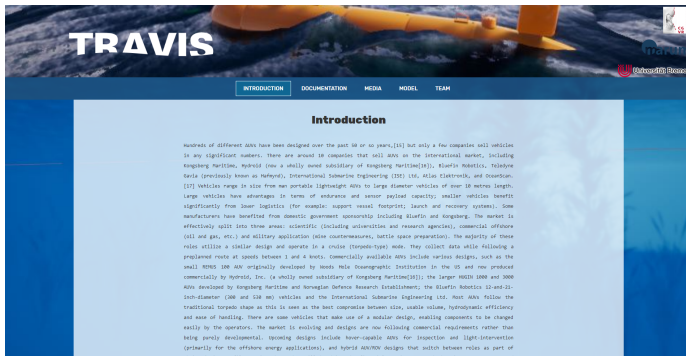
<sup>1</sup>the center of marine environmental science of our university

images. Opening the website on various devices or scaling the window relocated the elements or scaled the images in an undesirable way. The switch to bootstrap and use of the grid system helped us construct a responsive<sup>2</sup> and self-contained framework.

Intending to switch from the use of pure CSS to applying bootstrap we tried to rebuild the sections and elements we already had on our website with bootstrap and tried to stick to our old layout. It turned out that the best way to generate a good and working website with bootstrap is to orientate on their given elements and tools [6] and start off clean. So discarding our old website and its layout was the only way to work with bootstrap. [Fig. 2]



(a)



(b)

Fig. 2. Two versions of the discarded Layout before switching to bootstrap

### A. Grid System and Responsive Website Behaviour

As has been pointed out, using bootstrap helped us solve issues with the positioning of certain elements on the web pages. Using HTML and CSS to align and to position of content is a complex task and makes it hard to focus on the design aspect. The pre-implemented grid system [7] offered by bootstrap uses containers, rows and columns for positioning and aligning content. The responsiveness of the grid system ensures that the website is displayed right when opened in different browsers.

<sup>2</sup>Responsive web design ensures that a web pages is displayed right on different devices or screen sizes.

To displaying multiple pictures in the gallery or on the team member page we started to build a self-written layout with the elements of the grid system. [Fig. 3] Through some research we found a the plugin *Baguettebox* [8] including a tutorial for the integration [9]. It offers features like responsive image behaviour or modal images. Modal images are displayed in popup windows on the current page we then wanted to provide on our website. Implementing it on the gallery page served the expected effect. [Fig. 4 ]

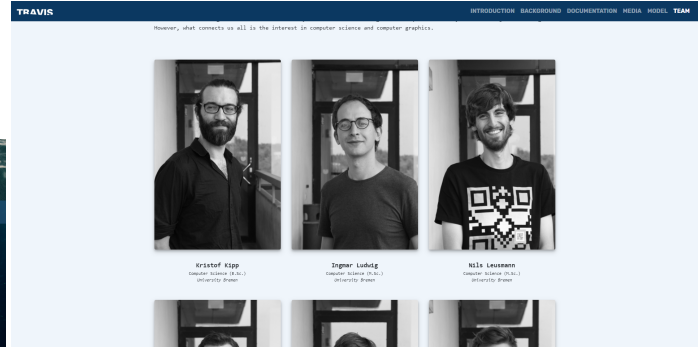
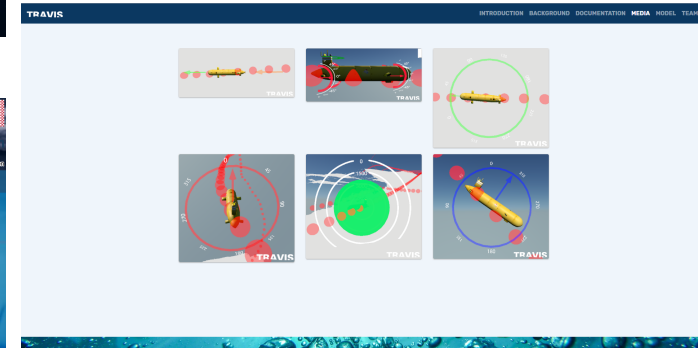
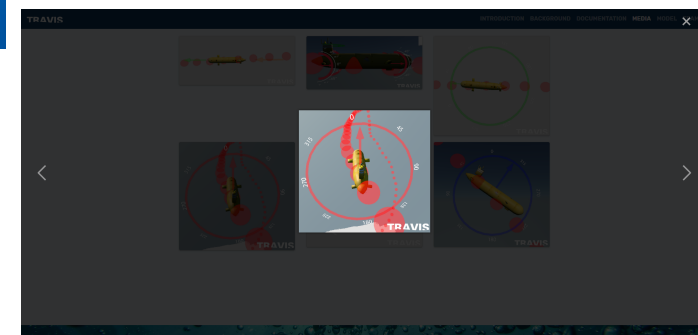


Fig. 3. Team gallery, built with grid system of bootstrap v4.1



(a) Gallery, implemented on media page



(b) Modal image feature

Fig. 4. Gallery built with Baguettebox-plugin

### B. Switching from Bootstrap 3.7 to 4.1

A choice we had to make was the decision between Bootstrap Version 3.7<sup>3</sup> [10] and the latest Bootstrap version

<sup>3</sup>The latest stable version of Bootstrap

4.1<sup>4</sup> [11]. Because Bootstrap v4.1 being a Beta version and therefore potentially being unstable we started our new build-up with Bootstrap v3.3.7. In the process of building we got inspired by some youtube tutorials and other bootstrap websites. Many interesting design ideas we found and wanted to implement, were created with bootstraps version 4.1. For example the customization of color and layout of the navigation bar was only possible with version 4.1 [12]. For these reasons we switched versions. A section on the bootstrap documentation about the migration from bootstrap 3 to 4 was useful to orientate by and watch out for features that have been modified and needed to be changed [13]. The column- and row-based grid system was one main modification in the version change which needed to be adjusted. That was a quite complex task because we needed to modify each section integrated in the website and implemented with the grid system separately. There were also some changes concerning the navigation bar we needed to adjust. For example the navbar was now structured with an unordered list and navigation elements implemented as list elements. This took some time but in the process we even achieved an even more fitting layout and functionality for our navigation.

Becoming familiar with bootstrap we started our research with some basic tutorials [15]. But they were quiet time-consuming and every so often too specific in certain concepts and elements not needed for our website. After creating a basic framework with the help of some of these tutorials we did most of the research in the bootstrap documentation while learning by doing on the fly coding. It was a more dynamic and flexible way of working and led us efficiently to a self-contained working website.

### C. Checking Compatibility and Responsiveness

After finishing the building of our project website, we had to check for two things:

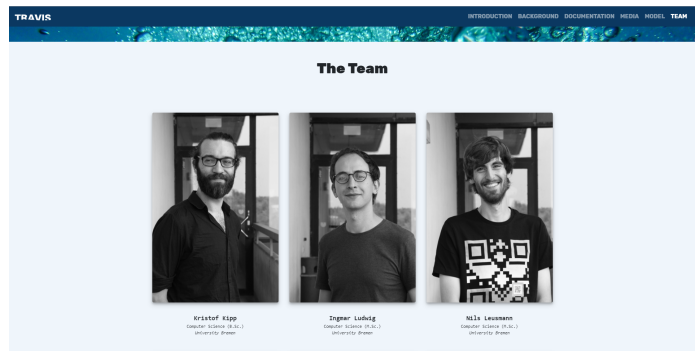
- the compatibility
- the responsiveness

of the website. For the compatibility check we used a website [14] to run an all-around-test for us. This saved us time because we did not have to open the website in all kinds of browsers and had all the bugs and compatibility issues at a glance. For this purpose we needed an URL that was accessible on the internet. After fixing issues with the compatibility of the website, such as minor display errors, we could test the responsiveness. We did this by manually opening the project website on different kinds of devices (in this case computer, laptop, tablet and smartphone) [Fig. 5] and checked for possible display and functionality errors. There were a few problems with the right displaying of the navigation bar which we were able to fix.

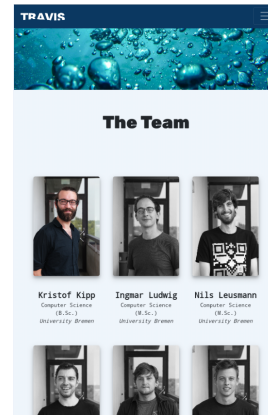
### III. THE PARALLAX EFFECT

The term *parallax effect* describes an interactive effect in web design which became quite popular in the last years [15].

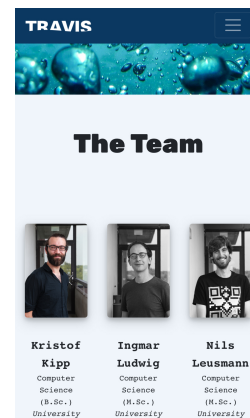
<sup>4</sup>The newest version of Bootstrap



(a) Computer/Laptop



(b) Tablet



(c) Smartphone

Fig. 5. Screenshots of display on different devices

By placing website elements on different layers, which move in different speed above each other, a three dimensional effect is generated. Like on our website the effect is usually triggered by scrolling. We decided to use this effect on one hand because of its popularity and modernness. On the other hand, the underwater theme of our project brought up the idea to create an effect like diving deeper while scrolling downwards. The speed difference is, like generally, triggered by scrolling. We tried different strategies to create this effect. One approach was a basic parallax effect coded with pure CSS [16]. A chosen



image is set as the background of a certain area on the website layout. The background attachment is set to fixed which would keep the image on its position while scrolling. The disadvantage of this attempt was that the speed at which one section is moving was not modifiable as well as the z-index, which preserves the three dimensional effect, characteristic for parallax. Another approach was a youtube tutorial [19]. This method uses the the 'transform-style' property which defines how nested elements are rendered in a three dimensional space. The value of this property was set on 'preserve-3d'. This value preserves a three dimensional position for the child elements of the section. We think the reason why this attempt did not achieve the desired effect was that the buildup of the code needed to be self-contained. The integration after already having a fixed framework does not work because the parameters are all complement each other. It makes this approach inflexible and too effortful. We tried to integrate this technique but after some failed attempts we decided to try a work approach applying JavaScript. We tried writing our own script getting inspired and orienting by a youtube tutorial [17]. Though adhering to the tutorial the requested effect did not work. The JavaScript controlling the effect seemed to be the problem but we could not figure out the cause. With the switch to bootstrap and therefore the initialization of jQuery and Popper.js we came across a jQuery plugin which produced the parallax effect and was besides flexible and dynamic. It is uploaded with a documentation on GitHub where we could learn how to use and integrate it [20]. After initializing and embedding the script we could define values like the speed at which a parallax section is moving and the z-index of the parallax elements easily and flexible. At first we wanted to take screenshots of our simulation environment as background images for the website but the screenshots turned out to be of bad quality and did not match the style and color mode of the website. So, for design reasons, we decided to use more fitting creative common pictures [21] [22] [23] to preserve the desired design of the website. [Fig. 6]

#### IV. DIRECTORY STRUCTURE

The html files are all in the main website folder. The subfolders divide into an image folder, a CSS folder and one for the JavaScript files. Located in the CSS folder is the self-written main CSS file as well as the imported CSS files like bootstrap.css, gallery-grid.css and aos.css. The JavaScript folder includes the AOS animation script and the parallax script. The image folder contains the background pictures, team photos and a sub folder for the screenshots of the model and the simulation.

#### V. CONCLUSION

Building the website was a good way to get used to working under time pressure. While becoming acquainted with HTML and CSS, learning the basics and researching one can easily get bogged down in details. Because of the huge amount of useful elements, concepts and possibilities that can be implemented but therefore need to be understood completely it is likely to

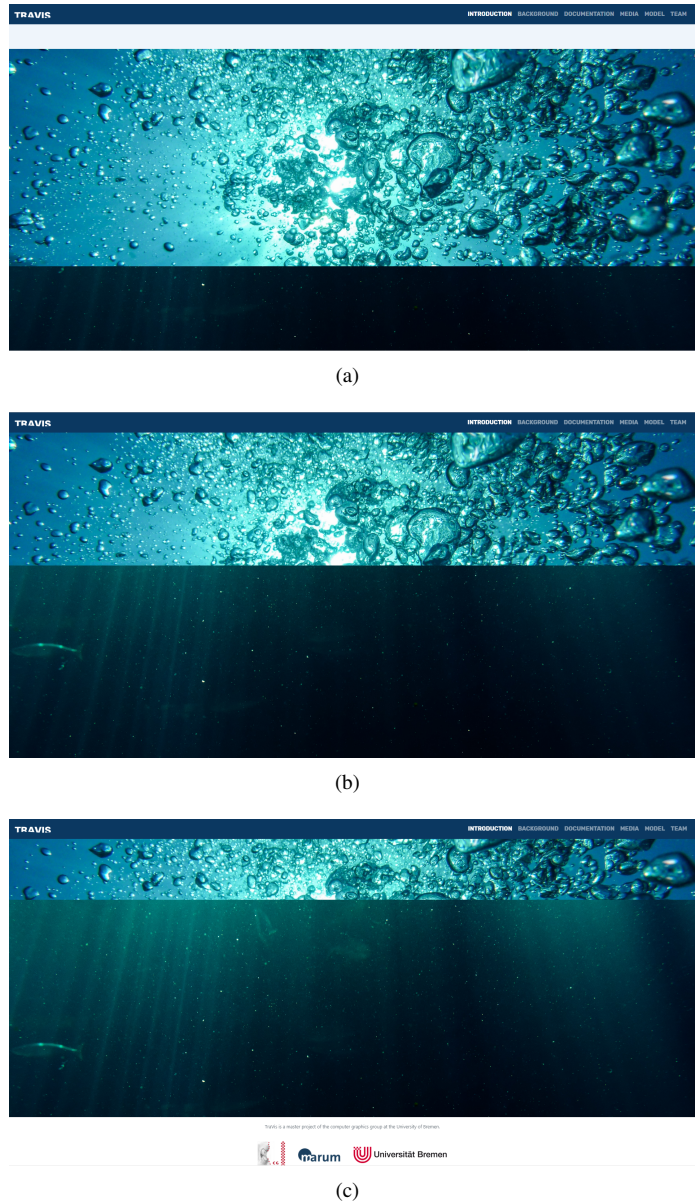


Fig. 6. An Example of the parallax effect on the TraVis website

lose track of your own ideas, preferences and what you really need and want for your website. For us the best approach to keep track of our concept was to immediately start coding after acquiring some basic knowledge. Furthermore learning by doing was a very good way for us because we could directly apply our theoretical knowledge about the program languages we were studying. A decision that should be made before coding is whether you want to use a CSS library for designing your website and if so, which one. Our decision to use bootstrap came quite late. A basic website in CSS was already set up which made the rearrangement of the code difficult. At first, we tried to integrate bootstrap in our primal website and keep some of our initial code but this only led to confusion within the code and elements not working or overwriting each other. The lack of time made us discard some



plans we initially had for our website. In the first version of our website before the switch to bootstrap the navigation bar did not only stick to the top of the page but also became transparent when scrolling down. [Fig. 7]

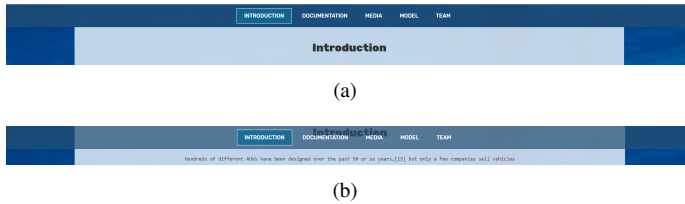


Fig. 7. Example of the transparent navigation bar

After the switch to bootstrap this stylistic effect did not work anymore and though trying several approaches found on the internet it could not be fixed in time. One feature we wanted to implement was a self written JavaScript to extend the customized behavior and visual appearance of the website. Our idea was to animate the water surface and the air bubbles on the background pictures and actuate them. Going hand in hand with it we wanted to integrate an animated parallax effect that would have looked like air bubbles floating up from the sea bed while scrolling down. But the implementation of a simple parallax effect took enough time and time so we had to dismiss this plan. The implementation of the self-written JavaScript was not possible because we did not have enough time to understand, aside from HTML and CSS, JavaScript well enough to program a reasonable and working script.

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