ISSN NO. 2320-5407

*Journal Homepage: -* www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

**Article DOI:** 10.21474/IJAR01/15702
**DOI URL:** http://dx.doi.org/10.21474/IJAR01/15702

*RESEARCH ARTICLE*

# DEVELOPMENT OF A SCRIPT FOR VISUAL ACCESSIBILITY ON THE WEB WITH A FOCUS ON PEOPLE WITH LOW VISION

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## *Manuscript Info*

*Manuscript History*
Received: 15 September 2022
Final Accepted: 19 October 2022
Published: November 2022

*Key words:-*
HTML, Script, Technology, Accessibility Policies, Standards, Low Vision, Contrast

## *Abstract*

The Internet is an extremely powerful technology to disseminate information and promote and facilitate interactions among members of society. To maximise its impact and scope, it should have availability of access to the general public, including ad aptitudes for people with disabilities or inability to use them. This article presents an application model that aims to increase the levels of accessibility on the web for users with a focus on the visual part of contrast on the web page, providing theopportunity to control the visualization of any web page that the user is using.

## Introduction:-

The introduction of new technologiesand techniques for processing and using information makes our society more complete and capable of development [Martins, Gonçalves, Oliveira, Pereira, & Cota, 2014; J. Pereira, Martins, Gonçalves and Santos, 2014]. Over the past decades, information and communication technologies have contributed significantly to profound changes in economic and social activity, including improving the quality of life of citizens and increasing the competitiveness and productivity of companies [Gonsalves, Martins, Pereira, Oliveira & Ferreira, 2012 ; Martins, Gonçalves & Cota, 2011].

The fundamental concessions of information and communication technologies (ITTs) and the conceptualization and practical use of these technologies have proven to offer users a range of possibilities that would otherwise be difficult to achieve. According toSánchez-Gordón and Moreno [2014], this concept is even more important when we consider citizens with some functional limitations to use these technologies.

With the rapid advanceof technology, the population had the need to use the internet more and more to search for information. Often, the information is not available to visually impaired users, because the sites are not prepared for them. Due to the lack of depth in the accessibility requirement in most sites, a javascript was performed focused on this gap for users with low vision ownership.

Considering the importance of criticalityof a web accessible at the global level, the eMAG project was initiated, whose objective was to characterize the various perspectives on Web accessibility in Brazil and the definition of a model to facilitate the continuous improvement of the level of web accessibility of websites in Brazil.

The presente article focuses on the presentation of a script for web with the objective of improving accessibility with the focus focused on the visually impaired in the area of people with eye difficulty, presenting an option to control how to view the web page being used.

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### Theoretical Reference

Thischapter aims to present the theoretical framework of the research and base the contributions to the study processes. Thus, the main references in the definition of the concept, dimensions and elements, as well as theirapplications, were sought in the field of knowledge.

### Accessibility Model

In addition to following web standards, there are other specific guidelines to ensure accessibility, present in documents such as the WCAG (Web Content Accessibility Guidelines ), at the international level, and eMAG (Accessibility Model in Electronic Government), a Brazilian document.

### HTML

HTML or HyperText Markup Language allows you to create the (base) body of an Internet site. Although not quite a programming language, it uses code tags called "Tags" thatallow data to be formatted and organized to structure and shape the page.

The firstlayer is built in HTML because it is the most basic. He is responsible for adding and presenting the textual information of the content and making sense of the page as a whole, so that the other layers can accomplish their tasks.

### CSS (Cascating Style Sheets)

CSS's job is to separate a site's content from its visual presentation, changing elements such as text color, font, and block spacing, as well as the overall aesthetics of the site.

### JavaScript (Script)

JavaScript is a layer ofgenuine programming l inguagem. Your task is to give objects dynamism, life and movement. This language enables interaction and action between visitors and pages. It allows websites to receive data through email signatures, forms, etc.

### Docker

Docker is a set of platform services products that use operating system-level virtualization to deliver software in packages called containers that provide a complete view of the network or its internal storage, iincluding all the dependencies required to run your application.

## Materials And Methods:-

Andthis work aimed to develop a script with the aim of following accessibility standards in the visually impaired on the web.

The classification of the research according to its objectives is divided into three major groups: exploratory, descriptive and explanatory (KIPNIS, 2005). The option that most closely approached the type of study was descriptive.

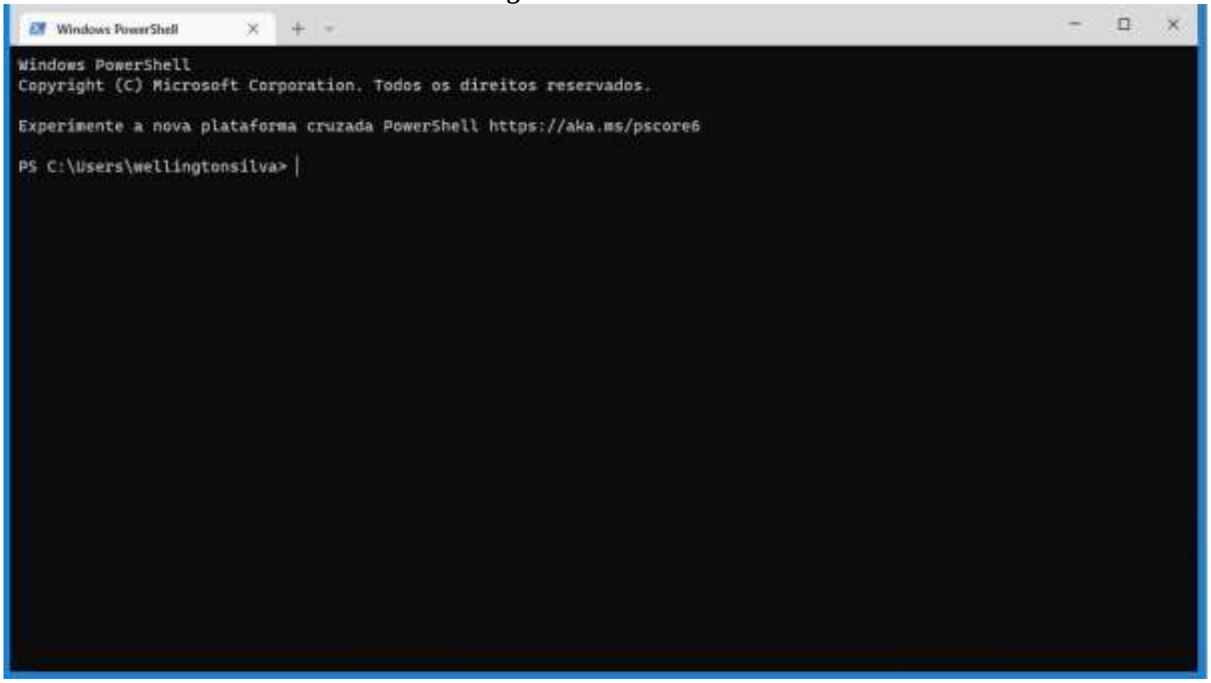
Descriptive research aims to descrever the characteristics of a phenomenon, and uses standardized data collection techniques, through tests on websites. This study presented has a qualitative approach and focused on the web case study in general.

## Materials:-

WSL served to use the linux environment in Windows 10 because it aims to provide compatibility to run programs natively on linux. We used docker to virtualize Ubuntu as an operating system so that we could havean am biente in which we have the availability to work within the linux environment, Wordpress to be able to have faster and more practical code when making a website and its database. And MySQL as a database in packages called containers, storing the data of our site, thus forming the SQL database. We employed the use of windows terminal so that we could get a better view of the terminals we would use, as it can run any command-line application on a separate tab, thus giving a cleaner code.

## Methods:-

**Figure 1:-** Powershell.

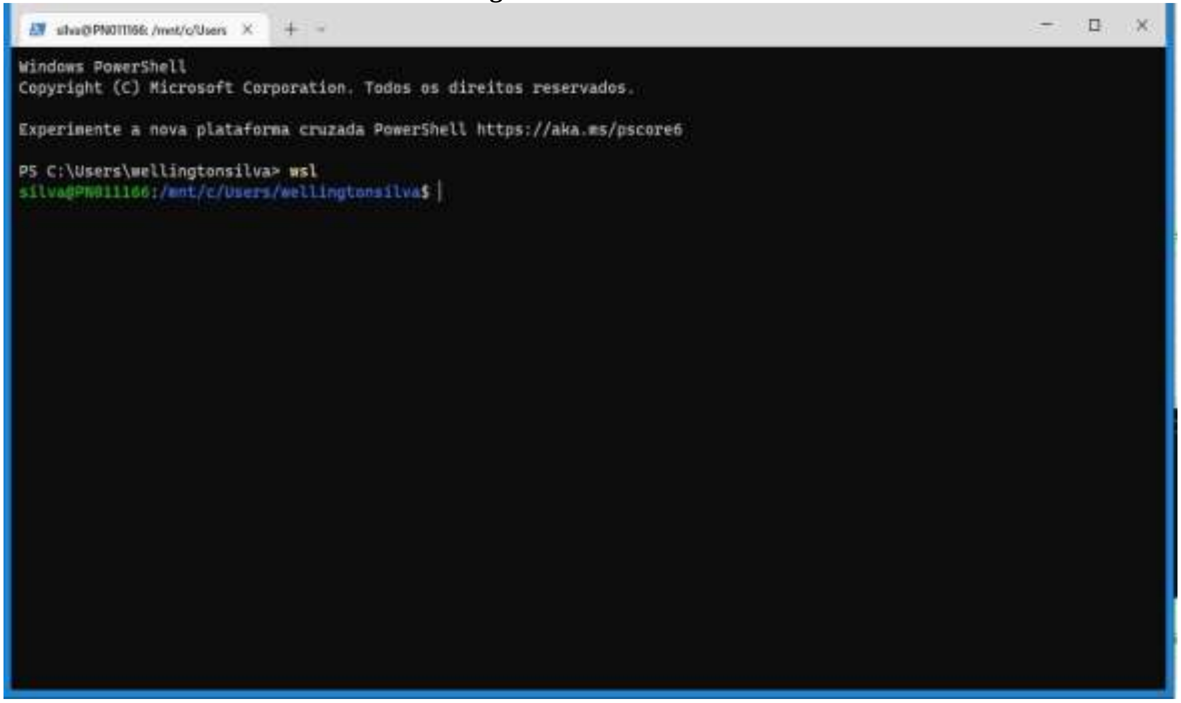


```
Windows PowerShell
Copyright (C) Microsoft Corporation. Todos os direitos reservados.

Experimente a nova plataforma cruzada PowerShell https://aka.ms/pscore6

PS C:\Users\wellingtonsilva> |
```

**Source:** Own Authorship, (2022).

In Figure 1, we are using the terminal to open the powershell, with wsl 2 installed and we will open Ubuntu by powershell.

**Figure 2:-** Powershell.

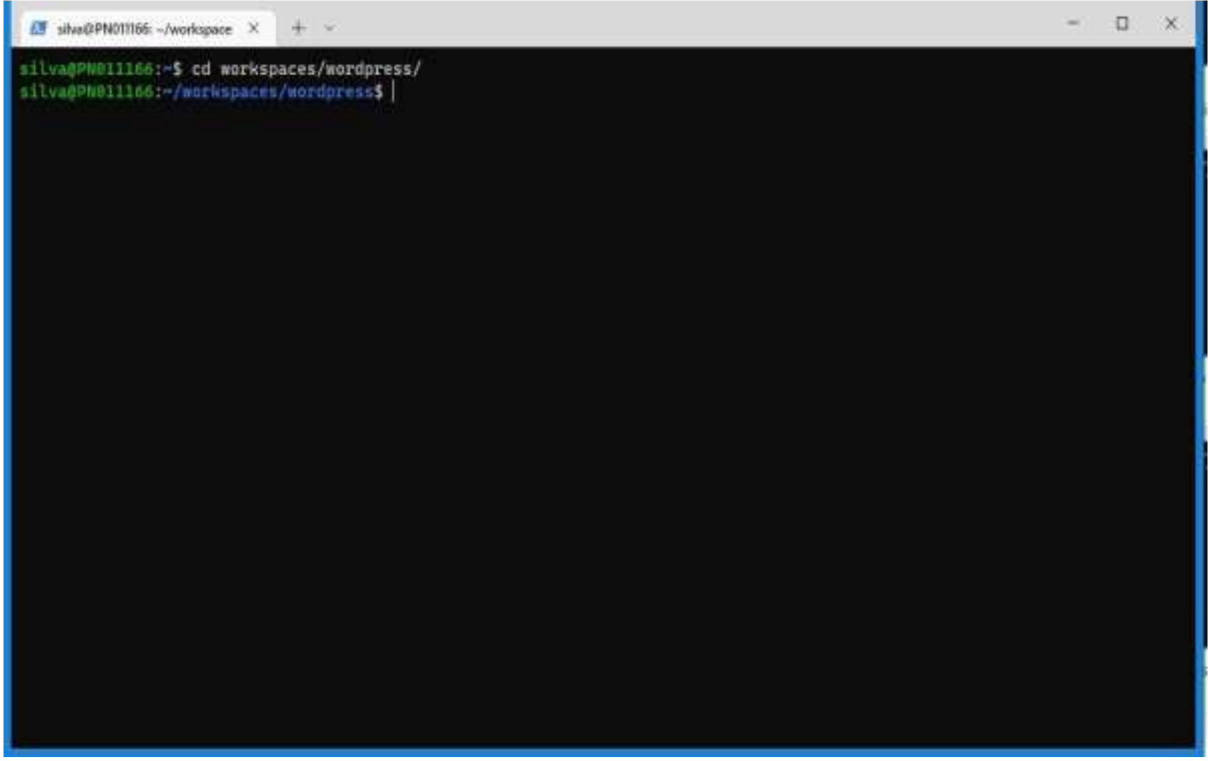


```
Windows PowerShell
Copyright (C) Microsoft Corporation. Todos os direitos reservados.

Experimente a nova plataforma cruzada PowerShell https://aka.ms/pscore6

PS C:\Users\wellingtonsilva> wsl
silva@PN011166:/mnt/c/Users/wellingtonsilva$ |
```

**Source:** Own Authorship, (2022).

In Figure 2, we were able to get into Ubuntu thanks to wsl by powershell using the wsl command.

**Figure 3:-** Powershell.

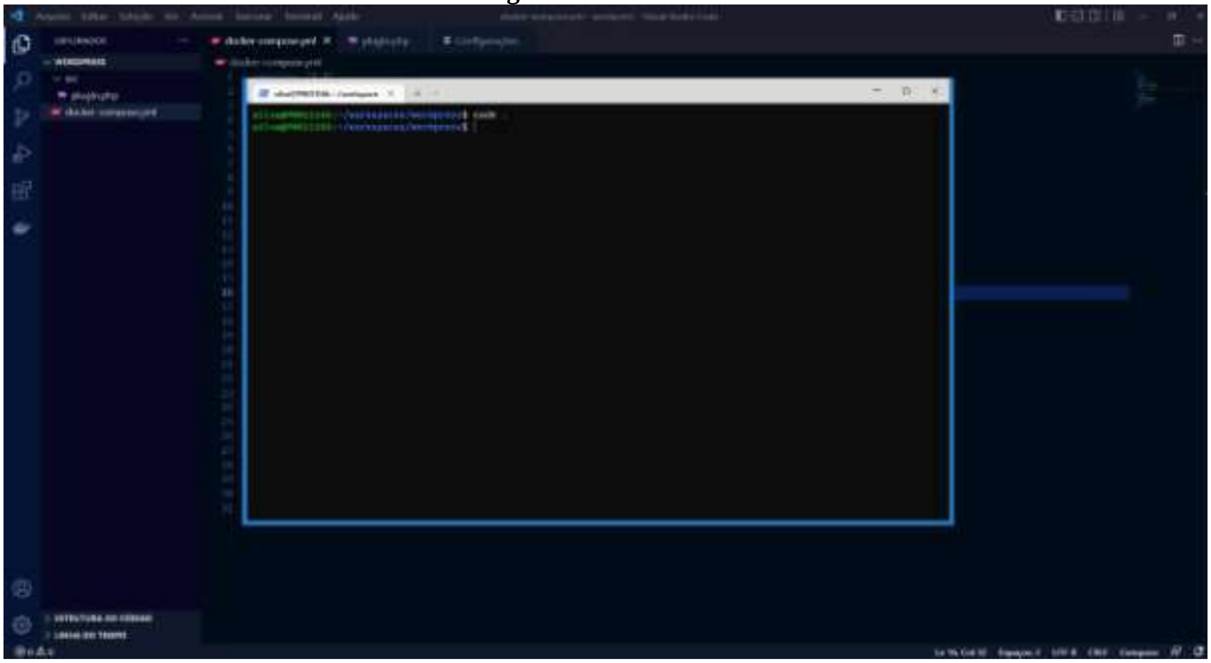


```
silva@PN011166:~$ cd workspaces/wordpress/
silva@PN011166:~/workspaces/wordpress$ |
```

**Source:** Own Authorship, (2022).

In Figure 3, we use the "cd" to switch from linux directory (folders)  to the workplace we will use.

**Figure 4:-** Powershell.

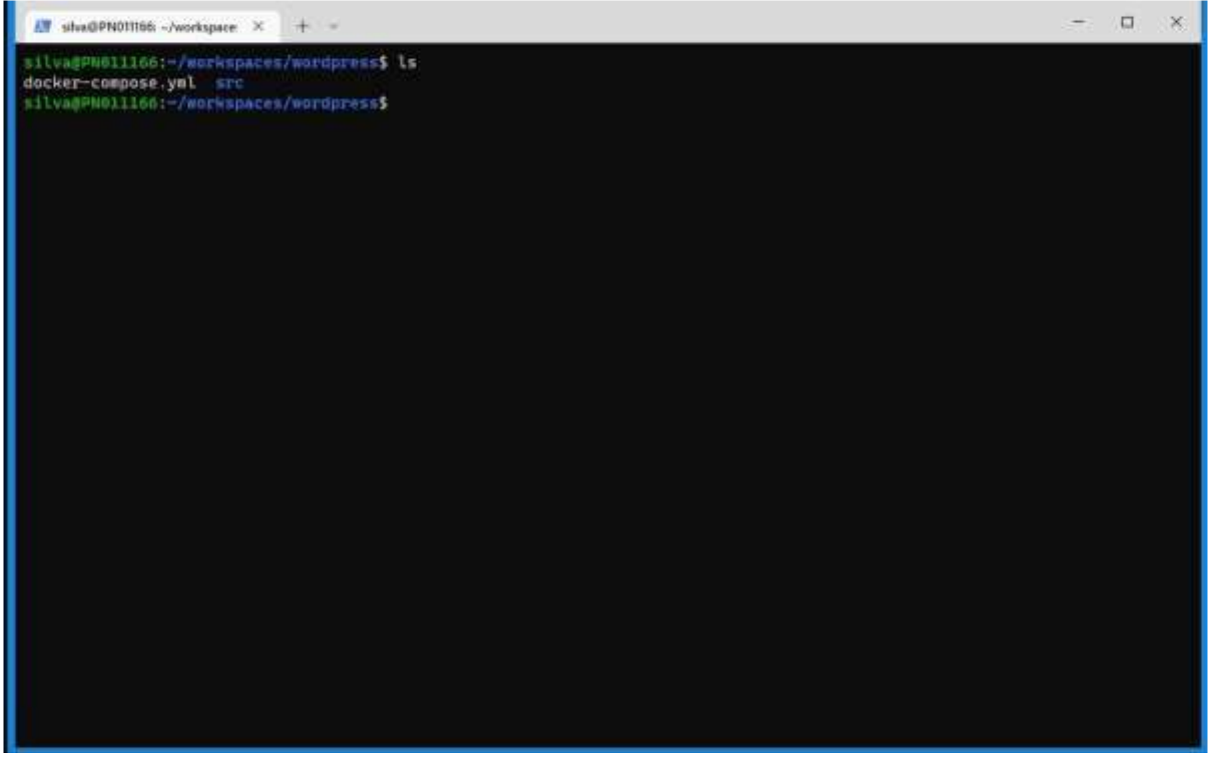


```
silva@PN011166:~/workspaces/wordpress$ code .
silva@PN011166:~/workspaces/wordpress$ |
```

**Source:** Own Authorship, (2022).

In Figure 4, when we give the command "code ." it opens an instance of vscode in the directory of thetraffic location, which is which we are currently.

**Figure 5:-** Powershell.

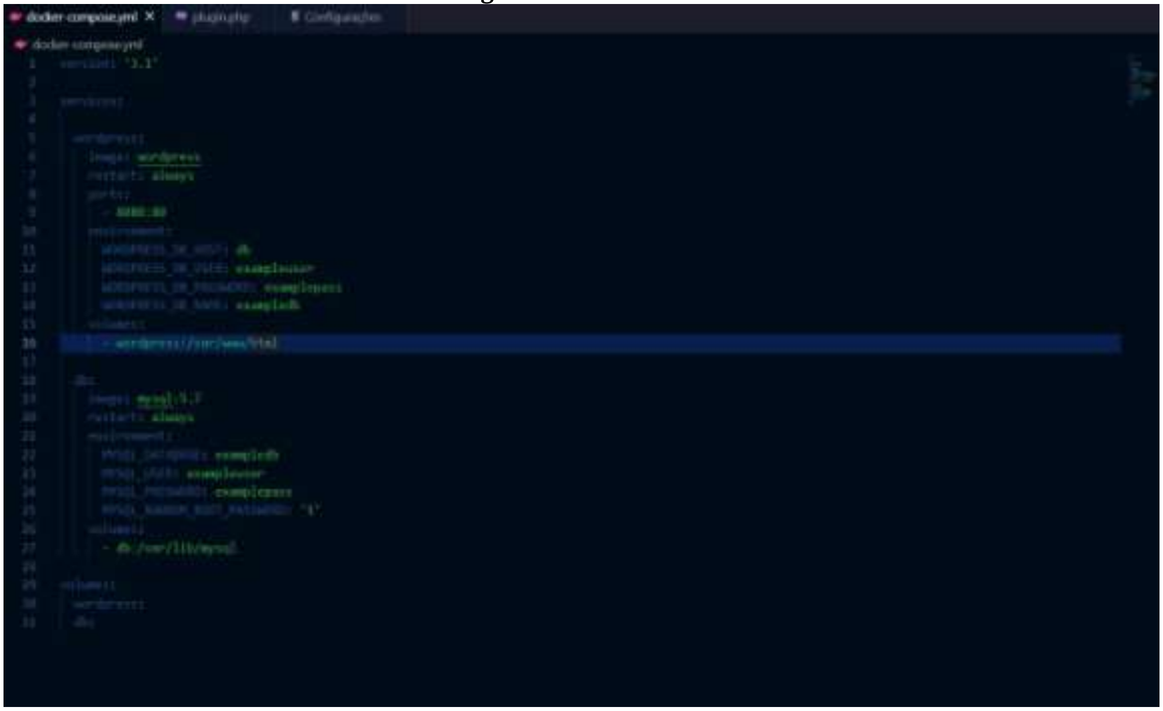


```
silva@PN011166:~/workspaces/wordpress$ ls
docker-compose.yml  src
silva@PN011166:~/workspaces/wordpress$
```

**Source:** Own Authorship, (2022).

In Figure 5, when we give the command "code ." it opens an instance of vscode in the workplace directory, which is which we are currently.

**Figure 6:-** Powershell.

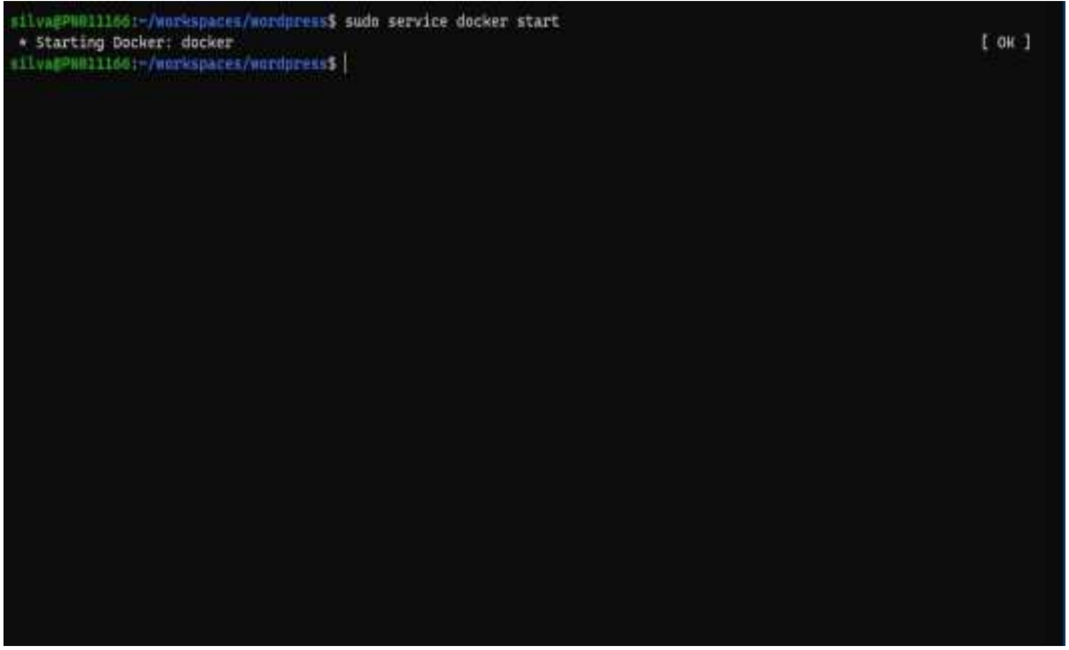


```
version: '3.1'

services:

  wordpress:
    image: wordpress
    restart: always
    ports:
      - 8080:80
    environment:
      WORDPRESS_DB_HOST: db
      WORDPRESS_DB_USER: exampleuser
      WORDPRESS_DB_PASSWORD: examplepass
      WORDPRESS_DB_NAME: exampledb
    volumes:
      - wordpress:/var/www/html

  db:
    image: mysql:5.7
    restart: always
    environment:
      MYSQL_DATABASE: exampledb
      MYSQL_USER: exampleuser
      MYSQL_PASSWORD: examplepass
      MYSQL_RANDOM_ROOT_PASSWORD: '1'
    volumes:
      - db:/var/lib/mysql

volumes:
  wordpress:
  db:
```

**Source:** Own Authorship, (2022).

In Figure 6, in the workplace directory we have 1 file and 1 folder. This file is a docker-compose script that is available on the docker site in wordpress software for it to create the site in wordpress and the database.

**Figure 7:-** Powershell.

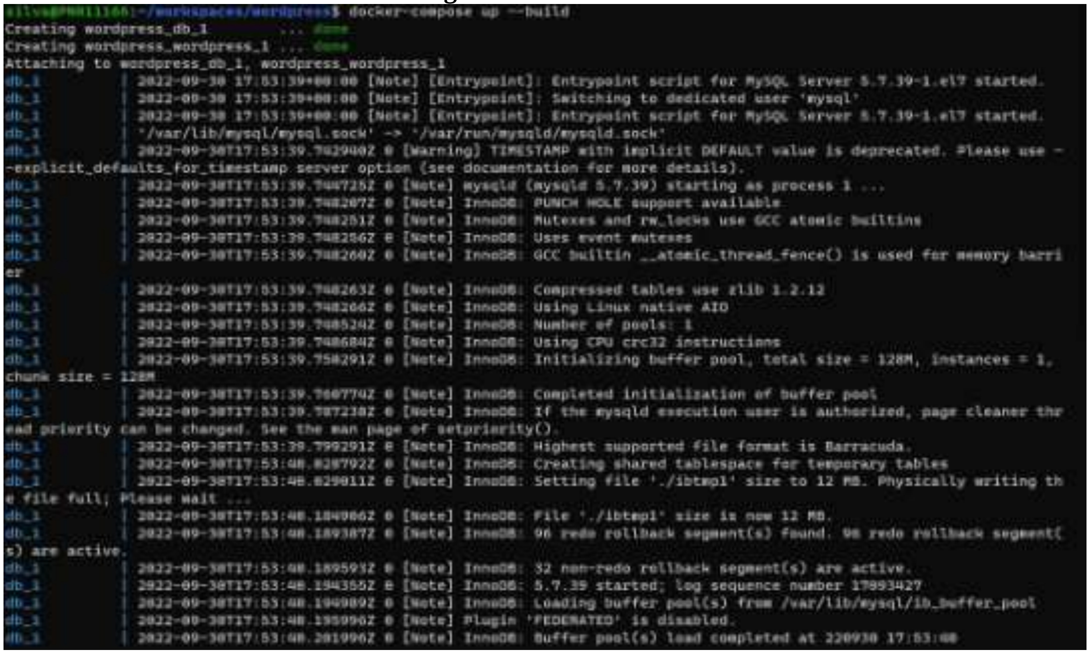


```
silva@PN011166:~/workspaces/wordpress$ sudo service docker start
 * Starting Docker: docker                                                     [ OK ]
silva@PN011166:~/workspaces/wordpress$ |
```

**Source:** Own Authorship, (2022).

In Figure 7, we are starting the docker service with administrator permission using "sudo" so that we can orchestrate the container with wordpress and mysql with docker-compose.

**Figure 8:-** Powershell.

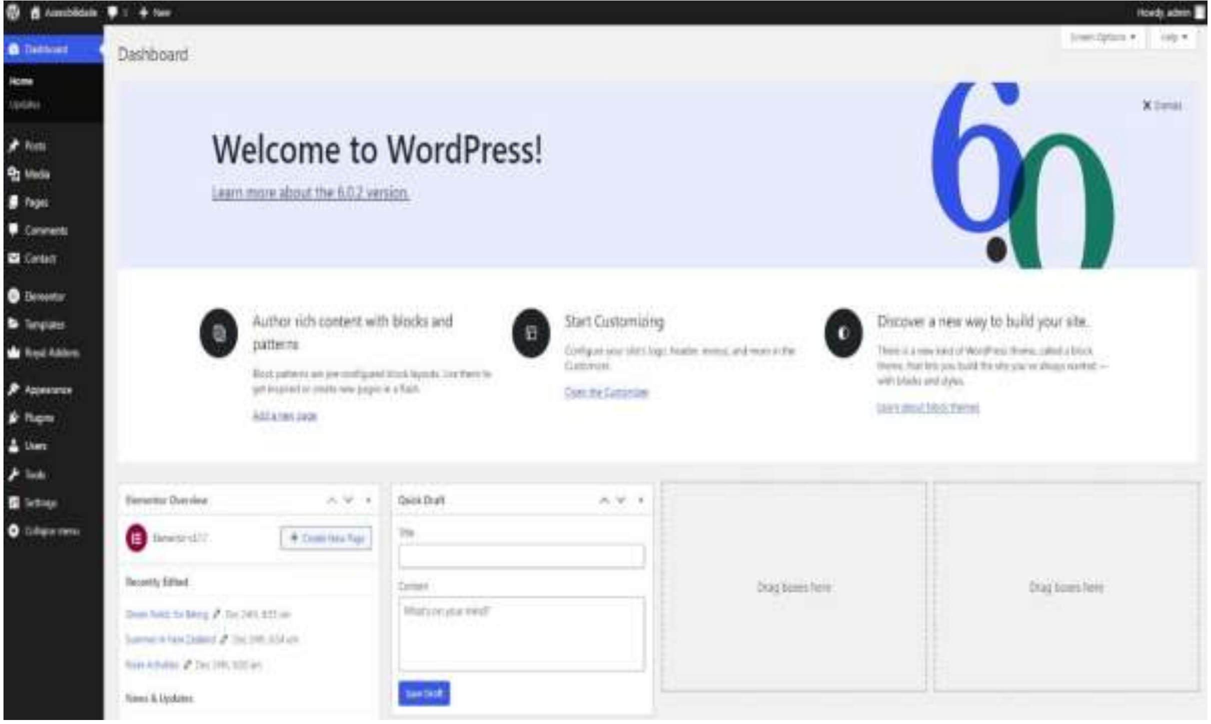


```
silva@PN011166:~/workspaces/wordpress$ docker-compose up --build
Creating wordpress_db_1        ... done
Creating wordpress_wordpress_1 ... done
Attaching to wordpress_db_1, wordpress_wordpress_1
db_1           | 2022-09-30 17:53:39+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.39-1.el7 started.
db_1           | 2022-09-30 17:53:39+00:00 [Note] [Entrypoint]: Switching to dedicated user 'mysql'
db_1           | 2022-09-30 17:53:39+00:00 [Note] [Entrypoint]: Entrypoint script for MySQL Server 5.7.39-1.el7 started.
db_1           | '/var/lib/mysql/mysql.sock' -> '/var/run/mysqld/mysqld.sock'
db_1           | 2022-09-30T17:53:39.742940Z 0 [Warning] TIMESTAMP with implicit DEFAULT value is deprecated. Please use -
-explicit_defaults_for_timestamp server option (see documentation for more details).
db_1           | 2022-09-30T17:53:39.744725Z 0 [Note] mysqld (mysqld 5.7.39) starting as process 1 ...
db_1           | 2022-09-30T17:53:39.748207Z 0 [Note] InnoDB: PUNCH HOLE support available
db_1           | 2022-09-30T17:53:39.748251Z 0 [Note] InnoDB: Mutexes and rw_locks use GCC atomic builtins
db_1           | 2022-09-30T17:53:39.748256Z 0 [Note] InnoDB: Uses event mutexes
db_1           | 2022-09-30T17:53:39.748260Z 0 [Note] InnoDB: GCC builtin __atomic_thread_fence() is used for memory barri
er
db_1           | 2022-09-30T17:53:39.748263Z 0 [Note] InnoDB: Compressed tables use zlib 1.2.12
db_1           | 2022-09-30T17:53:39.748266Z 0 [Note] InnoDB: Using Linux native AIO
db_1           | 2022-09-30T17:53:39.748524Z 0 [Note] InnoDB: Number of pools: 1
db_1           | 2022-09-30T17:53:39.748684Z 0 [Note] InnoDB: Using CPU crc32 instructions
db_1           | 2022-09-30T17:53:39.758291Z 0 [Note] InnoDB: Initializing buffer pool, total size = 128M, instances = 1,
chunk size = 128M
db_1           | 2022-09-30T17:53:39.760774Z 0 [Note] InnoDB: Completed initialization of buffer pool
db_1           | 2022-09-30T17:53:39.787238Z 0 [Note] InnoDB: If the mysqld execution user is authorized, page cleaner thr
ead priority can be changed. See the man page of setpriority().
db_1           | 2022-09-30T17:53:39.799291Z 0 [Note] InnoDB: Highest supported file format is Barracuda.
db_1           | 2022-09-30T17:53:40.828792Z 0 [Note] InnoDB: Creating shared tablespace for temporary tables
db_1           | 2022-09-30T17:53:40.829011Z 0 [Note] InnoDB: Setting file './ibtmp1' size to 12 MB. Physically writing th
e file full; Please wait ...
db_1           | 2022-09-30T17:53:40.184986Z 0 [Note] InnoDB: File './ibtmp1' size is now 12 MB.
db_1           | 2022-09-30T17:53:40.189387Z 0 [Note] InnoDB: 96 redo rollback segment(s) found. 96 redo rollback segment(
s) are active.
db_1           | 2022-09-30T17:53:40.189593Z 0 [Note] InnoDB: 32 non-redo rollback segment(s) are active.
db_1           | 2022-09-30T17:53:40.194355Z 0 [Note] InnoDB: 5.7.39 started; log sequence number 17893427
db_1           | 2022-09-30T17:53:40.194989Z 0 [Note] InnoDB: Loading buffer pool(s) from /var/lib/mysql/ib_buffer_pool
db_1           | 2022-09-30T17:53:40.195996Z 0 [Note] Plugin 'FEDERATED' is disabled.
db_1           | 2022-09-30T17:53:40.201996Z 0 [Note] InnoDB: Buffer pool(s) load completed at 220930 17:53:40
```

**Source:** Own Authorship, (2022).

In Figure 8, we start the docker orchestrator so that it creates the containers containing wordpress and the database in mysql by the lhostlocation.

**Figure 9:-** localhost home.



Dashboard

Welcome to WordPress!

Learn more about the 6.0.2 version.

Author rich content with blocks and patterns

Add a new page

Start Customizing

Open the Customizer

Discover a new way to build your site.

Learn about block themes

Elementor Overview

Recently Edited

News & Updates

Quick Draft

Title

Content

What's on your mind?

Save Draft

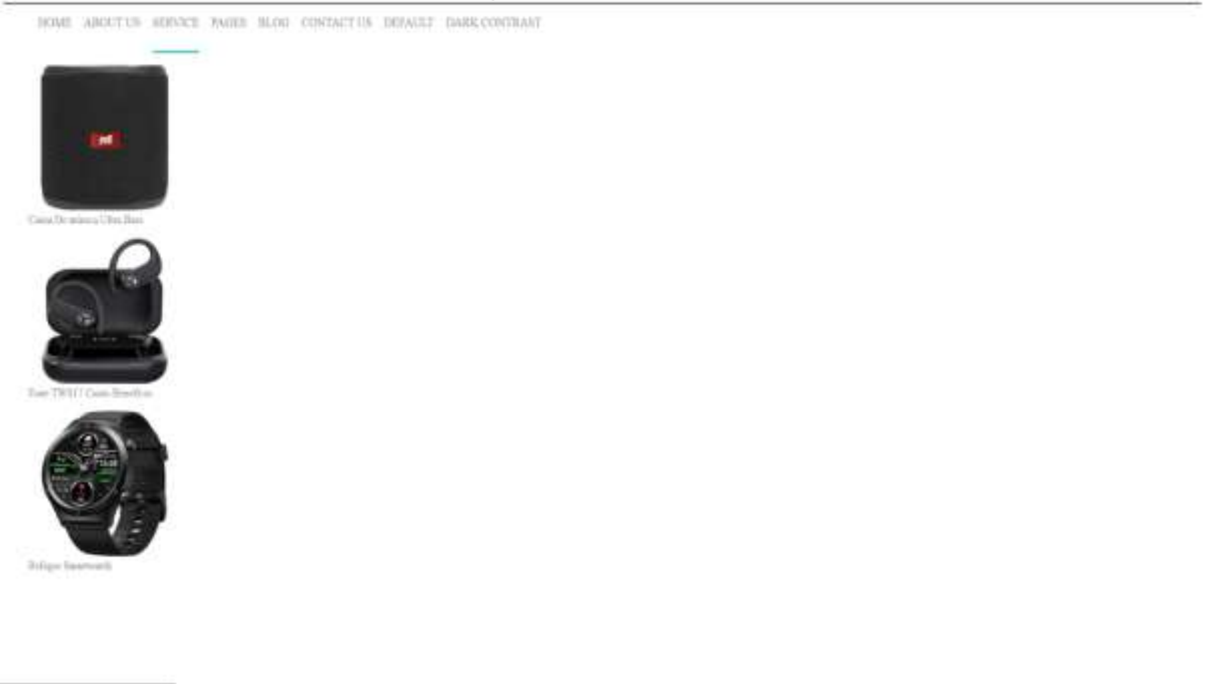
Drag boxes here

Drag boxes here

**Source:** Own Authorship, (2022).

In Figure 9, docker is running containers in the background while we can access our wordpress and database through localhost.

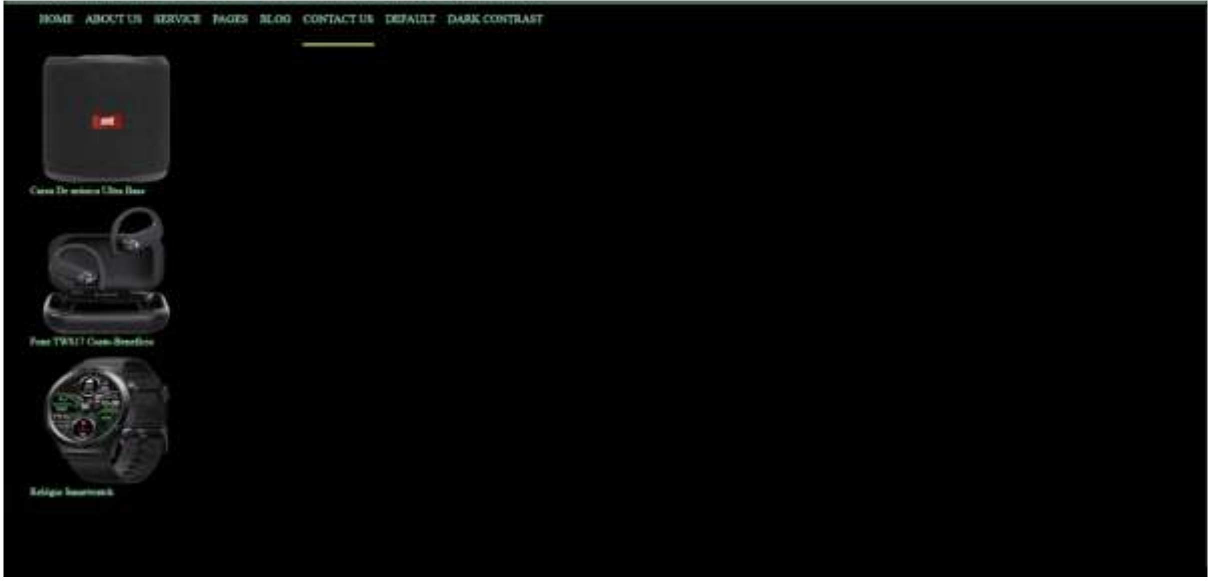
**Figure 10:-** Layout Page.



**Source:** Own Authorship, (2022).

In Figure 10, template web page for the use of the application made by its own authorship.

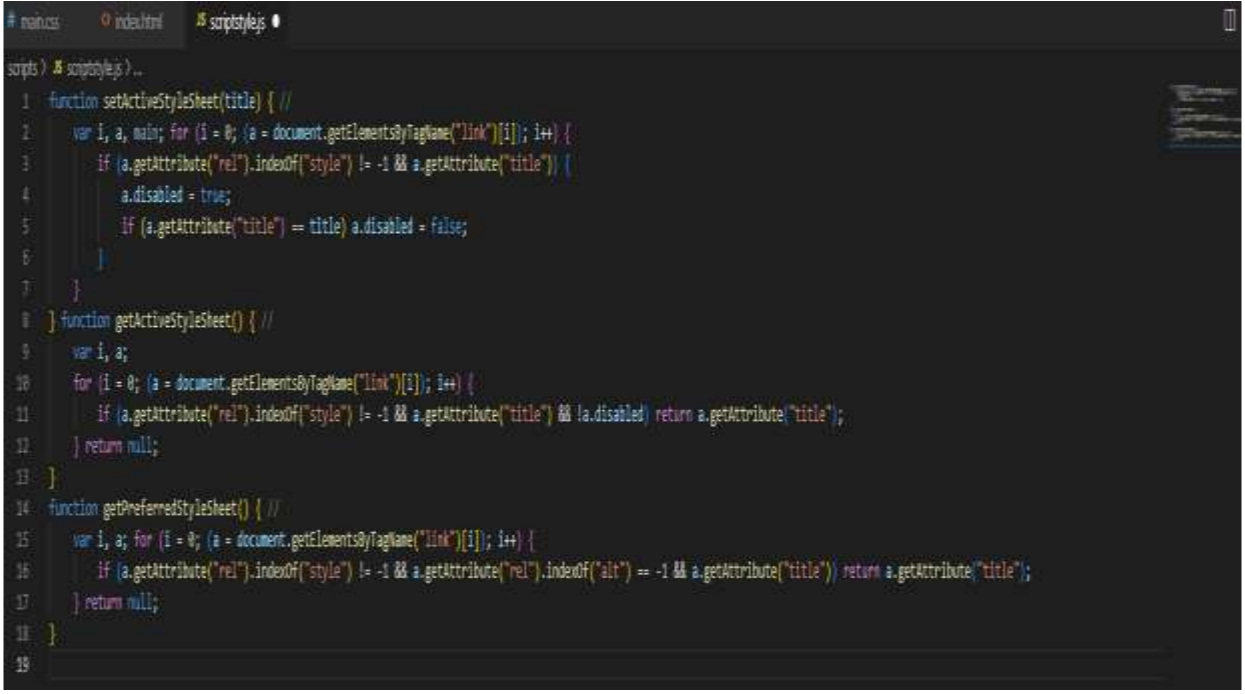
**Figure 11:-** Layout page with active contrast.



**Source:** Own Authorship, (2022)

In Figure 11, the changeoccurred when using contrast on the web page.

**Figure 12:-** Script code using VSCode.



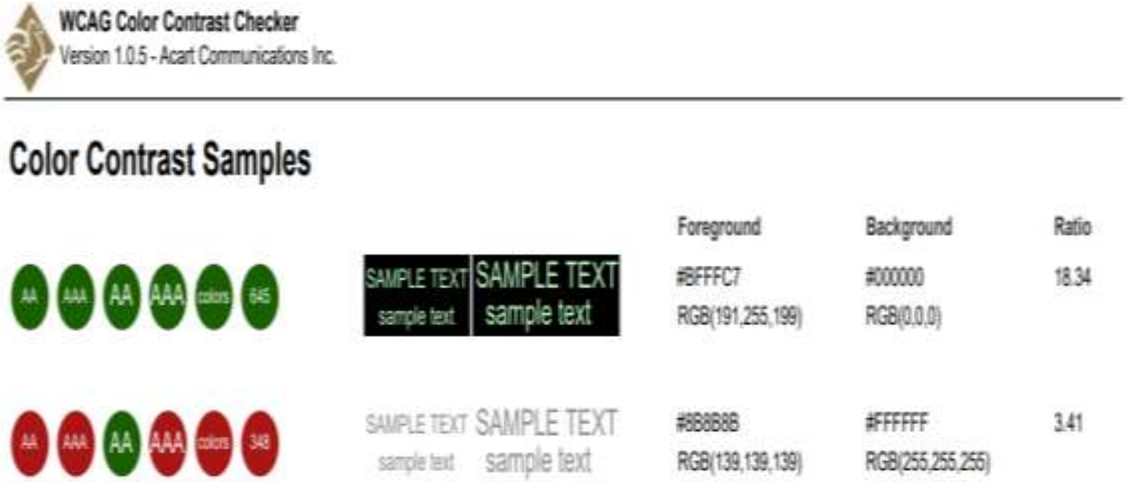
```
function setActiveStyleSheet(title) { //
    var i, a, main; for (i = 0; (a = document.getElementsByTagName("link")[i]); i++) {
        if (a.getAttribute("rel").indexOf("style") != -1 && a.getAttribute("title")) {
            a.disabled = true;
            if (a.getAttribute("title") == title) a.disabled = false;
        }
    }
} function getActiveStyleSheet() { //
    var i, a;
    for (i = 0; (a = document.getElementsByTagName("link")[i]); i++) {
        if (a.getAttribute("rel").indexOf("style") != -1 && a.getAttribute("title") && !a.disabled) return a.getAttribute("title");
    } return null;
}
function getPreferredStyleSheet() { //
    var i, a; for (i = 0; (a = document.getElementsByTagName("link")[i]); i++) {
        if (a.getAttribute("rel").indexOf("style") != -1 && a.getAttribute("rel").indexOf("alt") == -1 && a.getAttribute("title")) return a.getAttribute("title");
    } return null;
}

```

**Source:** Own Authorship, (2022).

Figure 12 shows the script code used for the development of the tool, which is made by changing the site style sheet.

## Discussions Of The Results:-

**Figure 13:-** Contrast test report using Contrast Checker.



WCAG Color Contrast Checker
Version 1.0.5 - Acart Communications Inc.

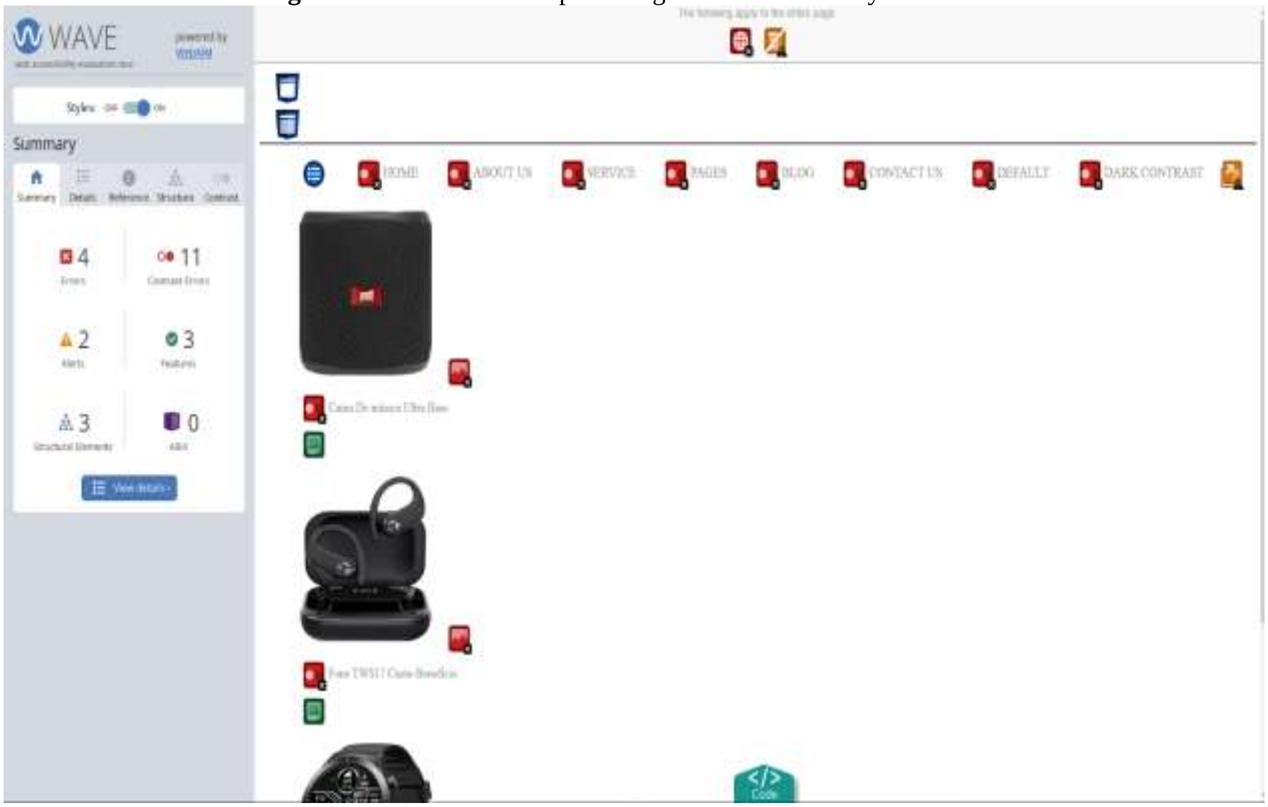
Color Contrast Samples

| | | Foreground | Background | Ratio |
|---|---|---|---|---|
| AA AAA AA AAA colors 645 | SAMPLE TEXT SAMPLE TEXT<br>sample text sample text | #BFFFC7<br>RGB(191,255,199) | #000000<br>RGB(0,0,0) | 18.34 |
| AA AAA AA AAA colors 348 | SAMPLE TEXT SAMPLE TEXT<br>sample text sample text | #8B8B8B<br>RGB(139,139,139) | #FFFFFF<br>RGB(255,255,255) | 3.41 |

**Source:** Own Authorship, (2022)

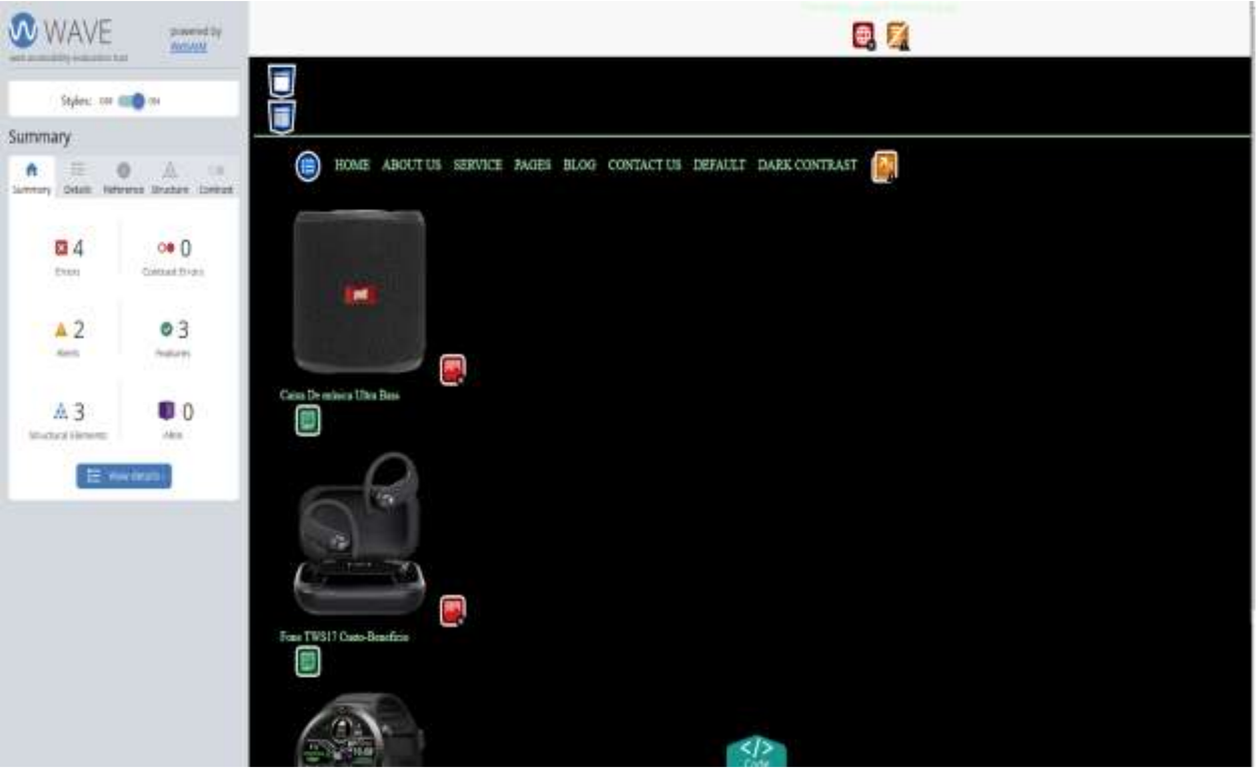
In Figure 12, contrast test performed using the Contrast Checker site tool in the after project and before using the contrast application.

**Figure 14:-** Contrast test report using Wave Accessibility Checker.



**Source:** Own Authorship, (2022)

**Figure 15:-** Contrast test report using Wave Accessibility Checker.



**Source:** Own Authorship, (2022)

In Figure 14 and 15, presentation of the detection of the lack of accessibility in the contrast itaddress of the site using the Wave Accessibility browser extension.

### Final Considerations

It is essential that the web implements more and more accessibility for its users, thus making the Internet a more welcoming and conducive place to be used by the whole society, covering a larger and more open audience with availability of control for its users, reducing its difficulty of accessing it.

In the accomplishment of this work we noticed the lack of attention to web accessibility nowadays and we look for a way to reduce this gap focusing on one of the visual difficulties. For this project we focus on the dark contrast, thus making a javascript code so that it is possible to perform the exchange of the style sheets of a site. From this project example we made a basic site that shows paragraphs, links and customizations that with this script, can make a difference on many websites.

## References:-

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