Google Summer of Code 2024

Front-end and Adaptive Question Rendering



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Link to proposal doc: [GSOC 2024 - D4GC Adaptive Question Rendering](https://docs.google.com/document/d/1VXaDWu10L5AmY_sa6EsnbUEm0cJbXOES1ox3QjLQsoQ/edit?usp=sharing)

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# Overview

## Abstract

## Project Goals and Benefits

1. Developing a suite of performance tests to measure the energy efficiency of Wagtail.
2. Produce a report on the climate impact of Wagtail sites at this point in time.
3. Implementing more sustainable web development practices in Wagtail and improving energy efficiency.
4. Encouraging the adoption of sustainable web development practices by raising awareness among Wagtail developers.

By the end of the project, I want to make Wagtail much more sustainable and greener, setting an example for other platforms.

# Approach

## Implementation and Rationale

# Project Timeline

| Community Bonding and Onboarding(May 4, 2023 - May 28, 2023) | |
| --- | --- |
| `May 4, 2023 - May 28, 2023 | * Discuss my project with my mentors and the community to see if any more improvements can be made to the plan of action. * Define specific sustainability goals and metrics to measure success. * Liaise with Wagtail’s Performance and accessibility teams. * I will start a blog documenting my journey with Wagtail. * Prioritise the approaches proposed. |
| Project Period(May 29, 2023 - August 29, 2023) | |
| `May 29, 2023 - Jun 11, 2023 | * Set up codebase to test with GreenFrame CLI and Green Metrics Tool. * Evaluate the current state of Wagtail and identify areas for improvement. |
| Jun 12, 2023 - Jun 25, 2023 | * Add support for serving images in next-gen formats. * Test the results. |
| Jun 26, 2023 - Jul 9, 2023 | * Add support for serving responsive images. * Continue making improvements and retesting until sustainability goals are met. |
| Jul 10, 2023 - Jul 23, 2023 | * Enable Template caching for sites. * Implement a Wagtail-aware Django debug toolbar. |
| Jul 24, 2023- Aug 6, 2023 | * Add a plugin for YouTube lite embeds. * Improve accessibility features. |
| Aug 7, 2023 - Aug 20, 2023 | * Make CMS carbon aware * Speed up tests. * Discuss stretch goals. |
| Aug 21, 2023 - Aug 28, 2023 | * Complete stretch goals. * Finish up the documentation works. * Complete any remaining work and prepare my final report. |

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# Extended Goals

1. Blog my entire journey
2. Deliver a talk at Wagtail space
3. At the moment, I’m the 21st highest contributor in terms of commits. My goal is to get in the top 10.
4. Keep contributing and fixing bugs.

# About me

I am **Paarth Agarwal**, an undergraduate student at the Indian Institute of Technology (BHU) Varanasi, India, pursuing a Bachelor of Technology in my fourth year. I started programming in Python and C++ and learned essential web technologies in high school. Since my first year of college, I have been very enthusiastic about using Web-based technologies, including React and Django frameworks, for two years. I have experience in building REST APIs, JAMstack / full-stack web applications, and test-driven development. I am a **Full-Stack developer** with proficiency in **HTML, CSS, Javascript, Reactjs, Nodejs, Python, Django, Wagtail, Typescript, Docker and Github**. I love exploring new tech and have worked with various technologies and languages. I love contributing to the open-source community and building something other developers can use.

## UX Unification of Wagtail

Last year, I spent my summers bringing Ben Enright’s designs to life. During the project, I applied shared **Django templates** across the whole CMS, worked with the Python backend, **modified React components** and functions, created new ones, and added components to the Wagtail **pattern library** for smoother testing. I also did some **heavy unit testing with Jest, Typescript and Python Testing**. As a result, we ended up making Wagtail **more maintainable** and **accessible** than ever before. The details of the documentation and the project can be found in my blog post.  
Link to my blog - [**https://wagtail.org/blog/open-source-internship-ux-unification/**](https://wagtail.org/blog/open-source-internship-ux-unification/)Ever since then, I have remained involved with Wagtail and helped in guiding and mentoring new contributors to Wagtail for **Outreachy**.

## Contributions to Wagtail

I have made several pull requests to Wagtail and am still working.  
  
In [**wagtail/wagtail**](https://github.com/wagtail/wagtail) repository:

| PR Number | Description | Status |
| --- | --- | --- |
| [#9191](https://github.com/wagtail/wagtail/pull/9191) | Fixed hover behaviour of Delete button | Merged |
| [#9168](https://github.com/wagtail/wagtail/pull/9168) | Applied new designs to disabled buttons | Merged |
| [#9166](https://github.com/wagtail/wagtail/pull/9166) | Applied new designs to secondary buttons | Merged |
| [#9165](https://github.com/wagtail/wagtail/pull/9165) | Removed yes button styles | Merged |
| [#9153](https://github.com/wagtail/wagtail/pull/9153) | Applied new design for delete buttons | Merged |
| [#9104](https://github.com/wagtail/wagtail/pull/9104) | Refactored button styles | Merged |
| [#9085](https://github.com/wagtail/wagtail/pull/9085) | Centered spinner icon and signing-in text for login page | Merged |
| [#9080](https://github.com/wagtail/wagtail/pull/9080) | Added buttons to pattern library | Merged |
| [#9064](https://github.com/wagtail/wagtail/pull/9064) | Fixed padding and close button bugs for chooser modal | Merged |
| [#9044](https://github.com/wagtail/wagtail/pull/9044) | Removed legacy unbutton styles | Merged |
| [#9043](https://github.com/wagtail/wagtail/pull/9043) | Added role equal to status to messages | Merged |
| [#8993](https://github.com/wagtail/wagtail/pull/8993) | Fixed console error for breadcrumbs | Merged |
| [#8972](https://github.com/wagtail/wagtail/pull/8972) | Keyboard support for sort menu order | Merged |
| [#8944](https://github.com/wagtail/wagtail/pull/8944) | Fixed empty variable issue in header template | Merged |
| [#8925](https://github.com/wagtail/wagtail/pull/8925) | Adopted new designs for the authentication pages(log in, password reset, etc) | Merged |
| [#8922](https://github.com/wagtail/wagtail/pull/8922) | Updated summary panels in Dashboard | Merged |
| [#8920](https://github.com/wagtail/wagtail/pull/8920) | Updated page listings header to new designs | Merged |
| [#8904](https://github.com/wagtail/wagtail/pull/8904) | Adopted non-collapsible breadcrumbs for root page | Merged |
| [#8896](https://github.com/wagtail/wagtail/pull/8896) | Updated help block colors | Merged |
| [#8895](https://github.com/wagtail/wagtail/pull/8895) | Added translate button to header actions dropdown along with some cleanup | Merged |
| [#8870](https://github.com/wagtail/wagtail/pull/8870) | Slim Header - redundant styles cleanup | Merged |
| [#8862](https://github.com/wagtail/wagtail/pull/8862) | Adopt shared header in Form submissions listing - 2nd approach | Merged |
| [#8857](https://github.com/wagtail/wagtail/pull/8857) | Adopted shared header for form submission page - 1st approach | Closed |
| [#8854](https://github.com/wagtail/wagtail/pull/8854) | Adopted shared header for menu settings editing view | Merged |
| [#8850](https://github.com/wagtail/wagtail/pull/8850) | Adopted shared header template in workflows | Merged |
| [#8849](https://github.com/wagtail/wagtail/pull/8849) | Adopted shared header for redirect page | Merged |
| [#8839](https://github.com/wagtail/wagtail/pull/8839) | Adopted shared header in reports view | Merged |
| [#8831](https://github.com/wagtail/wagtail/pull/8831) | Fixed typo in classname | Merged |
| [#8799](https://github.com/wagtail/wagtail/pull/8799) | Added prefix w- before header classes | Merged |
| [#9792](https://github.com/wagtail/wagtail/pull/9792) | Adopted slim header in page listing views | Merged |
| [#8781](https://github.com/wagtail/wagtail/pull/8781) | Adopted shared header template on the dashboard view | Merged |
| [#8755](https://github.com/wagtail/wagtail/pull/8755) | Remove old legacy breadcrumbs completely | Merged |
| [#8743](https://github.com/wagtail/wagtail/pull/8743) | Removed breadcrumbs from ModelAdmin | Merged |
| [#8741](https://github.com/wagtail/wagtail/pull/8741) | Clean up move page breadcumbs | Merged |
| [#8705](https://github.com/wagtail/wagtail/pull/8705) | Updated move breadcrumbs to use new design | Closed |
| [#8702](https://github.com/wagtail/wagtail/pull/8702) | Adopt new breadcrumbs within the page chooser modal | Merged |
| [#8679](https://github.com/wagtail/wagtail/pull/8679) | Added breadcrumbs next to explorer | Merged |
| [#8764](https://github.com/wagtail/wagtail/pull/8764) | Add new breadcrumbs to page explorer | Closed |
| [#8666](https://github.com/wagtail/wagtail/pull/8666) | Removed breadcrumbs next’s reliance on data-slim-header | Merged |
| [#8652](https://github.com/wagtail/wagtail/pull/8652) | Add tab nav link and tabbed interface to pattern library(storybook) | Merged |
| [#8638](https://github.com/wagtail/wagtail/pull/8638) | Added new breadcrumbs to Pattern Library | Merged |
| [#8626](https://github.com/wagtail/wagtail/pull/8626) | Adopted new Tabs in Workflow History Detail page | Merged |
| [#8616](https://github.com/wagtail/wagtail/pull/8616) | Fixed empty tabs showing to non admin users | Merged |
| [#8608](https://github.com/wagtail/wagtail/pull/8608) | Some minor modifications to make integration tests’ documentation more clear | Merged |
| [#8606](https://github.com/wagtail/wagtail/pull/8606) | Added unit test for breadcumb | Merged |
| [#8530](https://github.com/wagtail/wagtail/pull/8530) | Removed trailing slash | Merged |
| [#10160](https://github.com/wagtail/wagtail/pull/10160) | Migrated breadcrumbs to stimulus controller | Draft |
| [#8111](https://github.com/wagtail/wagtail/pull/8111) | Removed upper casing from SCSS files. | Merged |
| [#8113](https://github.com/wagtail/wagtail/pull/8113) | Replaced focus-outline-on utility. | Merged |
| [#8129](https://github.com/wagtail/wagtail/pull/8129) | Removed redundant text-transform instances | Merged |
| [#8130](https://github.com/wagtail/wagtail/pull/8130) | Updated to the latest version of stylelint-config-wagtail | Merged |
| [#8151](https://github.com/wagtail/wagtail/pull/8151) | Added the contrasting logo for the dark theme. | Merged |
| [#8174](https://github.com/wagtail/wagtail/pull/8174) | Removed font inconsistency. | Merged |
| [#8112](https://github.com/wagtail/wagtail/pull/8112) | Excluded tests and maps from published artifacts. | Under discussion |
| [#8167](https://github.com/wagtail/wagtail/pull/8167) | Added display data for Twitter embed blocks and tests. | Merged |
| [#8178](https://github.com/wagtail/wagtail/pull/8178) | Added pagination to docs search results page. | Merged |
| [#8385](https://github.com/wagtail/wagtail/pull/8385) | I have added the full\_url field for image renditions and updated tests and documentation. | Merged |

In [**wagtail/stylelint-config-wagtail**](https://github.com/wagtail/stylelint-config-wagtail) repository:

| PR Number | Fixes | Description | Status |
| --- | --- | --- | --- |
| [#16](https://github.com/wagtail/stylelint-config-wagtail/pull/16) | [#15](https://github.com/wagtail/stylelint-config-wagtail/issues/15) | Added linting rule to block text-transform. | Merged |
| [#17](https://github.com/wagtail/stylelint-config-wagtail/pull/17) | [#14](https://github.com/wagtail/stylelint-config-wagtail/issues/14) | Enforced mixins as first in declarations. | Merged |

In [**wagtail/sphinx\_wagtail\_theme**](https://github.com/wagtail/sphinx_wagtail_theme) repository:

| PR Number | Description | Status |
| --- | --- | --- |
| [#178](https://github.com/wagtail/sphinx_wagtail_theme/pull/178) | Main nav made scrollable | Merged |
| [#175](https://github.com/wagtail/sphinx_wagtail_theme/pull/175) | Added changelog for #167 | Merged |
| [#173](https://github.com/wagtail/sphinx_wagtail_theme/pull/173) | Setup stylelint and configured it to use wagtail stylelint-cofig | Merged |
| [#168](https://github.com/wagtail/sphinx_wagtail_theme/pull/168) | Separated dev and non-dev dependencies | Merged |
| [#167](https://github.com/wagtail/sphinx_wagtail_theme/pull/167) | Page toc made sticky and scrollable | Merged |
| [#165](https://github.com/wagtail/sphinx_wagtail_theme/pull/165) | Updated to lockfileVersion 2 | Merged |
| [#136](https://github.com/wagtail/sphinx_wagtail_theme/pull/136) | Added rst-content class to body. | Merged |
| [#137](https://github.com/wagtail/sphinx_wagtail_theme/pull/137) | Updated color for warning, note, and important. | Merged |
| [#143](https://github.com/wagtail/sphinx_wagtail_theme/pull/143) | Added hover state to links. | Merged via [#152](https://github.com/wagtail/sphinx_wagtail_theme/pull/152) |
| [#150](https://github.com/wagtail/sphinx_wagtail_theme/pull/150) | Removed build of api docs. | Merged |
| [#158](https://github.com/wagtail/sphinx_wagtail_theme/pull/158) | Deemphasised toc text. | Superseded by [#159](https://github.com/wagtail/sphinx_wagtail_theme/pull/159) |

## LFX’23 Mentee at CNCF-Harbor for Spring term

LFX mentorship is an open-source internship program offered by The Linux Foundation. I have been accepted as a mentee to the [**CNCF - Harbor: Harbor Robot accounts with full Harbor API access**](https://mentorship.lfx.linuxfoundation.org/project/4a96c735-6480-4464-8b33-4f9c58ba1005) mentorship. This project aims to give Robot accounts access to the full Harbor API. Primarily it's a DevOps project. Technologies I’m using in this project - **DevOps, Docker, Go, Javascript, Angular, Clarity and UX**.

## Contributions to other open source projects

I’ve contributed to various crypto projects like [**Specter Desktop**](https://github.com/cryptoadvance)**,** [**Rust-Bitcoin**](https://github.com/rust-bitcoin/rust-bitcoin)**,** and[**Fedimint**](https://github.com/fedimint)involving technologies like Python, Bitcoin API and Rust language. I’ve also contributed to [**Purr Data**](https://git.purrdata.net/jwilkes/purr-data/-/merge_requests?scope=all&state=opened&author_username=Paarth)which is an audio web library based on Pure Data written in C++. The complete list of contributions can be found in my [**Github profile**](https://github.com/PaarthAgarwal) contribution overview chart.

## Built the institute’s R&D website

I along with a team of 4 members, rebuilt our Institute's new RnD website. Technologies used - **HTML, CSS, Next.js, Tailwind, Vercel.** Link to project - [**https://iitbhu-rnd-one.vercel.app/**](https://iitbhu-rnd-one.vercel.app/)

## Postman Student Expert

I’ve been using Postman for years now for API testing. So I took up the Postman API Fundamentals to learn more about it, and at the end of the course, I aced the assignment and was awarded a badge. My learnings:

* How to use Postman to work with APIs
* Making GET, POST, PATCH, and DELETE requests
* Query parameters, bodies, headers, response codes
* Basic scripting
* API Key Authorization
* How to use APIs in your applications

# Motivation

## Why do I wish to participate in the Google Summer of Code?

I started contributing to OSS during Hacktoberfest 2021, and since then, I’ve contributed to many organizations. Working with so many people, getting reviews, improving my skills and knowledge base, and interacting with them was delightful, which wouldn’t have been possible without open source. GSoC provides an excellent opportunity to work on amazing open-source projects impacting thousands of people and receive mentoring from senior developers.

## Why do I wish to work with Wagtail in particular?

I’ve been with Wagtail for over a year now, contributing to it and being a part of this community. I love the uplifting and helping nature of the people here, and I’m grateful for everything I learned here, especially from LB and Thibaud. I’m always keen to work with the Wagtail team on some exciting projects, and GSoC is one such opportunity. Doing GSoC with Wagtail is an excellent opportunity to dive deep into the CMS and enhance my Django and web development skills.

## Why this particular project?

I am passionate about projects that have a considerable impact, especially those concerning climate impact. As a developer, I want to develop energy-efficient apps to help reduce the overall digital footprint. The programs we write are everywhere, and everybody wants more software. A program designed by a software engineer is executed many times. Either because it has been used for several years or because many people use it. For instance, Wagtail is used by thousands of developers, and the websites developed using Wagtail are being visited millions of times. Had we designed Wagtail to be just a bit more energy efficient in the first place, the effects would already be huge today. A single line of code can have a tremendous impact. That's why I want to play my role in making Wagtail greener and helping build a sustainable future for all.

## Operating systems I work with?

I primarily work with **Ubuntu** in a virtual machine for development purposes. At the same time, I also have Windows 11 as the base operating system, which lets me tests programs on both OS.

## Availability

I have my **official college summer break from the first of May to the end of July**, and during the official GSOC Period, I have no other commitments for the summer, so I will be able to devote a minimum of **35-40 hours per week**. I will also be accessible full-time during weekends after my semester starts in August and keep the community updated about my progress.

# Why me?

I’m a versatile developer working with DevOps, blockchain and web2 technologies, yet my most incredible skill is ***figuring things out along the way***. I know the required technologies, and as I shared some of my accomplishments above, I’ve hands-on working experience with all of those. I’m fun to be around and good at communicating and expressing my ideas. My passion for open source and never give up attitude when it comes to software development sets me apart from others. I’ve always felt that working in open source and helping in its development is my way of doing good for society, but through this project, I’ll be able to give back to the Wagtail community that I love so much and to the planet as well. I am excited about the opportunity to work on this project and will work as hard as I have to make this project a grand success.

# Research material and References

* [Is There a Sustainable Internet? How "Green" is WordPress? (raidboxes.io)](https://raidboxes.io/en/blog/wordpress/wordpress-internet-nachhaltig/)
* [Lean WordPress: A guide to optimizing your CMS | Opensource.com](https://opensource.com/life/16/1/lean-wordpress-optimizing-your-cms)
* [Sustainable Drupal: 10 ways to save energy by speeding up your CMS | Opensource.com](https://opensource.com/life/16/2/sustainable-drupal-save-energy-speeding-your-cms)
* [Sustainability | Drupal.org](https://www.drupal.org/about/sustainability)
* [A sustainable web build for The Climate Group | Drupal.org](https://www.drupal.org/case-study/a-sustainable-web-build-for-the-climate-group)
* [Developers Can Save The Planet, Part I: The Problem (marmelab.com)](https://marmelab.com/blog/2020/09/21/web-developer-climate-change.html)
* [Developers Can Save The Planet, Part II: The Solution (marmelab.com)](https://marmelab.com/blog/2020/09/22/developers-save-the-planet-the-solution.html)
* [Digital Carbon Footprint: The Current State of Measuring Tools (marmelab.com)](https://marmelab.com/blog/2022/04/05/greenframe-compare.html)
* [GreenFrame.io: What is the carbon footprint of a web page? (marmelab.com)](https://marmelab.com/blog/2021/04/08/greenframe-io-website-carbon.html)
* [Web performance | MDhttps://developer.mozilla.org/en-US/docs/Web/PerformanceN (mozilla.org)](https://developer.mozilla.org/en-US/docs/Web/Performance)
* [Responsive images - Learn web development | MDN (mozilla.org)](https://developer.mozilla.org/en-US/docs/Learn/HTML/Multimedia_and_embedding/Responsive_images)
* [Lite YouTube Embeds - A Better Method for Embedding YouTube Videos on your Website - Digital Inspiration (labnol.org)](https://www.labnol.org/internet/light-youtube-embeds/27941/)
* [Sustainable UI - Carbon Hack 22 @ TAIKAI](https://taikai.network/gsf/hackathons/carbonhack22/projects/cl8j1ex3h2845301s653mtnk87/idea)
* [This website is carbon aware - Fershad Irani](https://fershad.com/carbon-aware-site/)
* [Making this website carbon aware - Fershad Irani](https://fershad.com/writing/making-this-website-carbon-aware/)
* [Carbon-Aware vs. Carbon-Efficient Applications - Sustainable Software (microsoft.com)](https://devblogs.microsoft.com/sustainable-software/carbon-aware-vs-carbon-efficient-applications/)
* [Installing Django Debug Toolbar - LearnWagtail.com](https://learnwagtail.com/tutorials/installing-django-debug-toolbar/)
* [Performance — Wagtail Documentation 5.0a0 documentation](https://docs.wagtail.org/en/latest/advanced_topics/performance.html)
* [Performance and optimization | Django documentation | Django (djangoproject.com)](https://docs.djangoproject.com/en/4.1/topics/performance/)
* [How can we improve the sustainability of our digital products (torchbox.com)](https://torchbox.com/blog/how-can-we-improve-the-sustainability-of-our-digital-products/?utm_source=linkedin&utm_medium=social&utm_campaign=improving-digital-sustainability)
* [gsoc/project-ideas.md at main · wagtail/gsoc (github.com)](https://github.com/wagtail/gsoc/blob/main/project-ideas.md)
* [Greener coding - Making a 'gold' reference configuration with the Wagtail bakery app · wagtail/wagtail · Discussion #8843 (github.com)](https://github.com/wagtail/wagtail/discussions/8843)