Urban Digital Art Gallery – An EPS@ISEP 2024 Project

Abstract. The following study is conducted by six international students who joined the European Project Semester (EPS) at the Instituto Superior de Engenharia do Porto (ISEP). EPS is designed for students with at least two years of study, primarily targets engineering but welcomes other fields. Integrating project-based learning with supportive seminars, the program fosters interdisciplinary collaboration. The diverse team, hailing from various engineering majors and European countries, developed a solution for displaying digital art in urban spaces, demonstrating the program's emphasis on innovative, real-world applications and collaborative problem-solving.
ArtSy(nc) tackles the challenge of limited visibility for digital artists by creating a platform that connects them with the public. This project proposes a web/mobile application and a projector casing system for displaying digital art in public spaces. The application allows artists to upload their work and users to vote on and curate the exhibited art. The application prioritises a seamless user experience for all users (artists, art lovers, exhibitors, admins). Rigorous testing confirmed its functionality and efficiency across various user roles and scenarios. A functional prototype of the projector casing was constructed using repurposed materials to demonstrate the concept's feasibility. While achieving core functionalities like ventilation and equipment access, the prototype highlights the need for future improvements in material quality and weatherproofing. Finite element analysis was used to identify optimal casing materials for structural integrity. Overall, the concept leverages technology to bridge the gap between artists and the public, fostering a more inclusive and vibrant art scene. The project has the potential to enrich the cultural landscape of cities and redefine the way we experience art in public spaces. Future development will focus on refining the casing design for durability and exploring scalability of the application.

Keywords: Engineering Education · European Project Semester · Digital Art · Art · Urban Spaces · Art Platform · Artist Exposure · Artist Recognition · Public Art · Digital Art Development · Digital Art Gallery · Digital Art Projection · Democratic Curatorship · New Curatorship.

1 Introduction

In the spring of 2024, a team of international students enrolled in the European Project Semester (EPS) at the Instituto Superior de Engenharia do Porto (ISEP) decided to develop a solution for displaying digital art in urban spaces. This is a programme offered by several European universities to students who have

completed at least two years of study. EPS is created with engineering students in mind, but students from other fields who can contribute to an engineering project are also welcome. EPS is a mixture of project support seminars organised around a core project module, implementing project based learning [2]. The team is made of six members from different engineering majors and European countries.

In the rapidly evolving digital age, the realm of digital art has emerged as a vibrant and dynamic medium, offering artists unprecedented ways to create and share their work. However, the challenge of gaining recognition in a vast and crowded online space remains a significant hurdle for many digital artists. This document presents ArtSy(nc), an innovative project aimed at addressing this issue by enhancing the visibility and appreciation of digital art through public installations and a dedicated digital platform.

ArtSy(nc) seeks to bridge the gap between digital artists and their audiences by harnessing technology to project digital artworks into public spaces, thus transforming urban areas into open-air galleries. This approach provides artists with a new avenue for exhibition and enriches the cultural fabric of the city, offering residents and visitors a unique and immersive experience with digital art. In addition to the projection, it includes a user app that allows voting on the works on display and assigning curatorship. In this way, local artists have a fair chance of being recognised. The comprehensive approach proposed by ArtSy(nc) aims to create a sustainable, ethical and impactful platform that not only elevates digital artists but also transforms public spaces into dynamic cultural hubs.

This document is structured in six sections. The Preliminary Studies section examines the digital art landscape, current trends, platforms, and opportunities, along with the ethical considerations regarding the design and development. The proposed section chapter outlines the concept and functionalities of ArtSy(nc), including projector casing design and the development of the web/mobile application. The prototype development section delves into the assembly and testing of the proof-of-concept prototype and the final section holds the conclusion and insights for future developments.

2 Preliminary Studies

While the digital medium for disseminating and presenting art is thriving, artists are finding it difficult to gain recognition in this vast space. This chapter explores the exciting potential of digital art, examining current trends and existing platforms. Analysing their strengths and weaknesses identifies opportunities for ArtSy(nc) to create a unique experience for both artists and art enthusiasts. Ethical considerations are paramount to ArtSy(nc)'s development and operation. The chapter delves into the ethical principles guiding engineering, sales & marketing, and environmental practices. Market potential analysis for ArtSy(nc) includes target audiences and the platform's potential impact on the city's cultural landscape. Sustainability is crucial, and the chapter explores how ArtSy(nc) can minimise its environmental footprint.

2.1 Related Work

The solution aims to increase the visibility of artists and digital art by presenting digital works in public places, bringing people together through art. The aim is to create a digital platform for sharing and projecting digital art in urban spaces. To achieve this goal, it is necessary to investigate the digital art space and look for ideas in related work.

Digital art is a creative and dynamic way for artists to express themselves using computers and modern technology. Instead of traditional tools like brushes, paint and canvas, digital artists use software and various devices to create their art. Due to the rapid digitisation, digital art has a lot to offer for artists in this field. The artworks can be experienced online, in galleries, or even through virtual reality. Digital art refers to any artwork created using digital technology, whether on a computer, tablet, or other digital devices [1]. This broad category encompasses various forms of visual art, including digital painting, 3D modelling, animation and graphic design. Also, digital art creation methods are still developing, ranging from 2D and 3D pictures and renders, augmented reality and virtual reality, to machine learning and AI art.

In today's digital age, artists have countless opportunities to present their work and connect with global and local audiences through various digital platforms. One of the prominent trends in digital art platforms is the deep integration of social media functionalities. Digital art can be displayed in specialised online virtual galleries like The Collection-gallery[1], OpenSea[2] and MakersPlace[3] or in in sophisticated ecosystems that serve artists, collectors and enthusiasts alike such as ArtStation[4], Behance[5], DeviantArt[6] or Instagram[7]. Such platforms are essential for artists to share their work, connect with followers, build their brands and gain recognition in an increasingly competitive art market. The more elaborate platforms are analysed below, taking into account popularity, open-air exhibition, local visibility, contents, monetisation and mobile interface features.

ArtStation is very popular among the digital art community, especially within the gaming, film, and media industries. It focuses on digital presence and professional networking and has low to moderate local visibility. Provides support to high-quality digital art and 3D model contents. The implemented marketplace relies on print sales and commissions. It offers mobile integration, allowing artists to access their portfolios via a user-friendly app.

Behance is part of the Adobe Creative Cloud ecosystem and popular among creative professionals. It allows the integration of portfolios with professional showcases and exhibitions. Displays moderate local visibility, mostly for

[1] https://www.thecollection-gallery.com/
[2] https://opensea.io/
[3] https://makersplace.com/
[4] https://www.artstation.com/
[5] https://www.behance.net/
[6] https://www.deviantart.com/
[7] https://www.instagram.com/

professional and global audiences. The contents include professional portfolios and project showcases. Offers monetisation opportunities through client work, and seamless mobile integration via Adobe Creative Cloud.

DeviantArt is a long-standing art community platform with a diverse user base but less mainstream than Instagram. Provides some opportunities for outdoor showcases through community events and local groups. With a moderate local visibility, supports community-oriented local groups and events. The contents include illustrations, fan art and animations. The monetisation model is based on print sales and subscriptions. It integrates a mobile app to explore art, connect with artists, and engage with the community.

Instagram is extremely popular globally with over 1 billion monthly active users. Although primarily digital, can integrate with outdoor events through hashtags and promotions. Offers high local visibility through geotags and location-based hashtags. Supports photos, videos, stories and reels. The monetisation options comprise sponsored posts, affiliated links and product sales. It has an excellent, user-friendly mobile interface with frequent updates.

The ArtSy(nc) platform, unlike existing solutions, allows artists to share their works not only online via a dedicated app but also in public spaces through projectors to boost the artistic image of the city and artist visibility.

2.2 Ethics

ArtSy(nc) takes ethics verry seriously. Not only engineers devise solutions to all sorts of problems, ranging from transportation, machinery, medicine, electronics, construction to agriculture, but they must ensure the design is safe for everyone who uses it. In addition, the proposed design must be guided by ethics and sustainability concerns. The code of ethics developed by the National Society of Professional Engineers (NSPE) is divided into fundamental canons, rules of practice and professional obligations. The most important duty is to ensure the health, safety, and welfare of the public [6]. The ArtSy(nc) engineering team, as pivotal creators impacting society and the environment, have ethical obligations to ensure safety, sustainability, and honesty in their work.

Marketing ethics is an important component of contemporary business because it determines how to define the marketing strategy and interact with the stakeholders in terms of honesty, fairness, transparency, and responsibility [8]. ArtSy(nc) wants to be honest and transparent to provide factual and non-exaggerated information about the product and services and advertise without attempting to mislead. Therefore the team decided to create a transparent solution, in particular by sharing the details of production with the public, including working conditions, sources of materials and the sustainability of the process.

The environmental ethics aims to protect the environment, species and resources. Humans depend on nature and natural systems. So they are responsible for their action and decisions and their consequences for the environment [5]. Through ethical considerations, environmental imbalances and promote harmonious coexistence with all elements of nature can be addressed [4]. For ArtSy(nc)

this means adopting an environmentally friendly development of the application and the projector housing, i.e. implementing all manufacturing changes that minimise the environmental impact without affecting the product.

The Liability is a critical aspect that designers must contemplate to minimise disputes and risks. ArtSy(nc) implements copyright compliance, content moderation, and user data protection. Upholding principles of transparency, accountability, and user safety, ArtSy(nc) aims to provide a respectful environment for artistic expression while managing liability and adhering to ethical principles.

2.3 Marketing

The global art market is a massive market, with a value estimated at 520.05 billion USD in 2023 and a compound annual growth rate (CAGR) of 6.15 % for the period 2024-2032 [7]. Although digital art remains a small portion of the total art market with 4 billion USD [3], it represents an estimated CAGR of 17.1 % for the period 2023-2030 [3]. This shows that the art market, including digital art, has a lot of growth potential. However, the digital art market is not yet widely accepted. This could be an opportunity for ArtSy(nc) to jump in and raise more awareness to digital art and local artists.

The focus of the mission and target audience of ArtSy(nc) are local digital artists. The platform provides the infrastructure and the exposure they need to thrive. Art lovers are the other key demographic that ArtSy(nc) caters to. The app offers engaging ways to discover and interact with digital art. Sponsors are the third audience group that plays a vital role in ArtSy(nc)'s economic sustainability. By partnering with museums, cultural centres, and local businesses, ArtSy(nc) can create mutually beneficial relationships. Sponsors gain exposure to a targeted audience of art enthusiasts, while ArtSy(nc) secures the resources needed to maintain and develop the platform.

By transforming public spaces into open-air art galleries, ArtSy(nc) breathes new life into these areas, enhancing their visual appeal and cultural significance. This not only benefits the city's image but also creates a more vibrant and engaging experience for visitors. Local artists gain a valuable platform to showcase their work and reach a wider audience, fostering a thriving creative community within the city. Art lovers are introduced to exciting new forms of digital art, and the interactive features make the discovery process engaging and enjoyable.

Ultimately, ArtSy(nc) creates a win-win situation for everyone involved. Public areas become more visually stimulating and dynamic, artists gain exposure and recognition, the city attracts visitors, fosters a creative community and a more cultural appeal, and art lovers discover a whole new world of artistic expression. With this innovative approach and focus on distinct audience needs, ArtSy(nc) is determined to become a thriving ecosystem for digital art.

2.4 Sustainability

Geological resources have been used throughout history to provide food, shelter, and transportation for humans. Unfortunately, the ecosystem has suffered greatly

from this over consumption, which has led to pollution and resource depletion. Sustainable engineering is based on the three pillars of sustainable development: the environment, the social and the economy [United Nations, 2024].

The following environmental aspects are considered for the projector casing:

1. Choice of materials: a goal is to opt for durable, recyclable materials with a low carbon footprint for the manufacture of housing in order to minimise its impact on the environment.
2. Energy consumption: To keep energy consumption low, there is a need for an energy-efficient projector and integrate efficient cooling systems to reduce energy consumption and limit Carbon dioxide emissions.
3. Transport and logistics: Reduce the carbon footprint of transport by favoring local suppliers and optimizing delivery routes.
4. Waste management: Implement a collection and recycling system for end-of-life projector housings to minimize waste and promote the reuse of materials.
5. Impact on public spaces: Ensure that artistic projections do not disrupt local ecosystems or generate excessive light pollution. There is a need to think about choosing appropriate locations that minimise the impact of light pollution.
6. Environmental Awareness: The platform needs to integrate environmental awareness elements into the app, encouraging artists and users to reduce their carbon footprint and adopt eco-friendly practices environment.

The materials used for the projector casing are chosen to be as sustainable as possible, they are stainless steel, plexiglass and aluminium.

Stainless steel is mainly composed of iron, chromium and nickel. The raw materials necessary for its manufacture can be extracted locally in Portugal or imported. The extraction of iron ore, chromium and nickel can lead to environmental impacts.

The raw materials needed to make plexiglass, such as methyl methacrylate, can be derived from petroleum products or natural gas, and are often produced abroad. This can result in greenhouse gas emissions associated with the transportation and processing of raw materials. But plexiglass is needed for the protection of the projector and is easy to use and maintain. Therefore it increases the longevity of the casing.

Aluminium is mainly extracted from bauxite, a resource unavailable in Portugal. Therefore, the aluminium used in the housing must be imported. Bauxite extraction and aluminium production can have significant environmental impacts, including deforestation, biodiversity loss and water pollution. But aluminium is needed for the protection of the projector and is easy to use and maintain. It will make the casing more robust which increases the longevity of the casing.

Once the components are manufactured, they will be assembled to form the external housing of the projector. This process may also require energy and resources. The housing will be used locally in Portugal, which reduces emissions associated with international transport.

The casing at the end of its useful life needs to be recyclable. This could be done by easy to disassemble components and using recyclable materials such as

stainless steel, plexiglass and aluminium, which can be recovered for reuse in new products. Disposal: Non-recyclable components can be disposed of responsibly in accordance with local environmental regulations. Regarding the packaging will be composed mainly of recycled cardboard, this will contribute to reduce the overall environmental footprint of the product by promoting the use of recycled and recyclable materials.

2.5 Concept

Problem Statement ArtSy(nc) aims to address the lack of exposure and recognition of digital artists. Digital art is an art form that hasn't yet been fully embraced by the mainstream. This means many people are not exposed to it, don't know about it and miss the chance to experience this unique and innovative artistic expression. Additionally, there's a lack of platforms connecting artists and the general public to generate exposure and recognition for the artist. This makes it difficult for artists to showcase their work and generate fans/followers to achieve the visibility they need to grow as an artist.

Solution Concept ArtSy(nc) offers a solution to these issues by creating a platform that connects digital artists to the general public and art lovers. The platform provides artists with a space to upload and share their work with a wider audience. The platform encompasses a mobile app that allows users to vote on art works they like, created by local digital artist. One of the goals is that all the uploaded art will have the same exposure in the app. This means that every artist has a shot at exposure. When an artwork gets liked a lot it will be showcased in the public spaces. Hereby the curatorship of these places will be given to the art lovers who use the app. They can also look on the on the map within the application for digital art installations in public spaces. The art will be showcased with the use of projectors in public spaces such as murals in the city, coffee shops and parks, creating a unique and interactive experience for locals and tourist and exposure for artist.

Solution Impact This concept will increase the exposure of digital artist enable more people to experience this unique art form. It has the potential to positively impact the art world and society:

1. Assisting artists in showcasing their work.
2. Increasing the exposure of digital art.
3. Allowing more people to experience digital art.
4. Revolutionising the curatorship process.
5. Enhancing the visual appeal and cultural significance of public spaces.
6. Encouraging people to view art in a new light.
7. Fostering a sense of community around digital art.
8. Generating a thriving creative community within the city.
9. Driving economic activity in public spaces by drawing visitors with the projector installations.

2.6 Design & Structure

As stated previously there are two separate parts, the projector casing and the application. The projector casing will be a versatile tool that can help place the projectors everywhere in different types of public spaces. The application will help users to vote, artist to upload and users to find art installations throughout the city.

Urban Projector Casing To be able to show art anywhere in the city there is a need for the right technology, where projectors can be placed in any urban environment. The technology must be protected against: sun, rain, heat, abuse and theft. The casing should only function as protection for the monitor and computer within. It should not draw to much attention itself. The public should be able to concentrate on the digital art. For this reason, the casing is kept very simple. It is also not connected to the app. They are completely independent of each other.

The casing has been designed so that it can quickly switch between different setups. A stand for simple parks (Figure 1), rubber feet for coffee shops (Figure 2), and a construction to hang the box on a pole in the city (Figure 3). This is possible due to the four holes on the underside of the box. Either the rubber feet can be screwed on directly or a plate, which is used as a base plate for the other two options. The base plate is square. This has the advantage that the projector can be aligned exactly as it is needed. As the digital art is to be projected in all kinds of public places, there must be different ways of setting up the box. In order to prevent overheating there will also be use of two 24 V fans. These keep air flowing till the inside casing temperature is cooled down. A transformer is also installed at the bottom, as the box is connected to a 230 V power source and the fans are only designed for 24 V. A hole has been drilled on the underside for the external power supply. As this is laser-cut, with edge protection, this is used to prevent the cables from being slit. With this type of casing the projector will be able to be set up in every public space desired to the locations needs.

Fig. 1. Robust and steady for park-like locations.

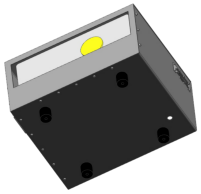

Fig. 2. Small and compact for cafe-like locations.

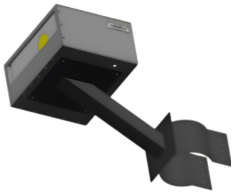

Fig. 3. Lamp post mount for every outside location in the city.

Web/Mobile Application In order to vote on and upload art the application needs to be build. Therefore the logo created, the User-experience/User-interface (UX/UI) with low-fidelity (LoFi) and high-fidelity (HiFi) wireframes, software flowcharts and database design are all part of the creating process.

The logo incorporates a "sync illustratio" using two paintbrushes, symbolising the artists and their work. The logo's design choices, including the orange colour and flame motive, reflect the project's passion for art. A harmonious colour palette is developed to embody professionalism, creativity, and energy. Deep navy blue signifies stability, while royal and cerulean blue represent sophistication and user engagement. Warm apricot and dynamic orange infuse the palette with vibrancy, while light taupe grounds the overall look.

The concept is designed through the creation of LoFi and HiFi wire-frames. The prototype was developed (Figure 4). This prototype offered a more comprehensive and realistic representation of the app's design and functionality. It incorporated detailed design elements, interactive features, and realistic content, allowing stakeholders to provide valuable feedback and facilitate further iteration. The structure and User Experience in the app's design prioritises an

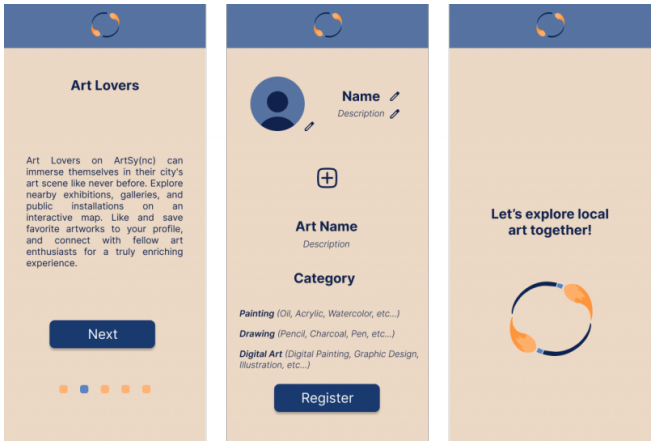

Fig. 4. HiFi design: opening (left), sign in (middle) and process (right) pages.

intuitive and engaging user experience. It allows users to easily explore different sections of the app and find the content they're interested in.

For the front-end and mobile application development, React Native was selected to create a unified and cohesive user experience across both app and website platforms. React Native's capability to develop iOS and Android apps with a single codebase allows for delivering a consistent look and feel, enhancing user engagement and satisfaction. This approach not only streamlines the development process but also ensures that users have a seamless and interactive experience across different devices.

ASP.NET was chosen for the back end framework over other alternatives for several compelling reasons. ASP.NET is known for its high performance and scalability, essential for handling large volumes of data and complex transactions. Its built-in security features protect against common vulnerabilities such as SQL injection, cross-site scripting (XSS), and cross-site request forgery (CSRF). The framework supports robust authentication and authorisation mechanisms through .NET Identity, ensuring that user data is secure.

MySQL was chosen as the database solution. This decision was driven by the requirement to use open-source software, ensuring cost-effectiveness while still maintaining strong security and compatibility with various platforms. Its open-source nature provides flexibility and scalability, making it a suitable choice for the system's needs.

3 Prototype Development

The prototype development phase involved creating a functional representation of the intended product, allowing for practical evaluation and iterative improvements. This section outlines the assembly and structural components of the projector casing prototype and the web/mobile application, followed by an analysis of the testing results for both the structural and software elements.

3.1 Assembly & Structure

The Projector casing prototype, differs material wise a lot from the original product. Due to cost reduction and available tools and materials the casing is made in a old drawer with multiple levels. The upper level is closed by plywood and the ventilators are mounted to the sides. The front end is left open for the projector beam to come out. The back end is closed off as well and able to open and close, hereby the monitor can be taken in and out. As far as materials were concerned, only a few specific purchases were made: wooden planks were bought to cover the video projector, and hinges were needed to create a door. For the ventilators the prototype, utilised 12 V fans and a 12 V power source instead of the originally planned 24 V components. This decision was made to reuse existing materials and minimise costs.

In general there have been many material changes for the casing. None of the original materials were used but the general concept stays the same. A project casing where the computer and all the electrical components are together in a closed system that can be opened, cooled down if needed and showcase art in a public space.

Web/Mobile Application During the development of the software prototype, there were minimal deviations from the original concept. However, two notable changes were made to the database structure. These changes were necessary due to an oversight regarding the relationship between expositions and categories,

and to allow places to accommodate multiple exhibitors, which was essential for the correct functioning of the front-end.

Additionally, limitations were encountered with the official MySQL connector of ASP.NET, specifically regarding the transmission of bit arrays larger than 5000. To overcome this issue, the decision was made to switch to the Pomelo MySQL connector, which provided better support for the requirements. Once these minor issues were addressed, the code operated as intended.

The design was also integrated exactly as intended, and is visualised as supposed. There were no deviations and it looks accordingly to the original HiFi-design.

3.2 Tests & Results

Structure The software prototype is really well and levels all requirements. There is room for professionalisation but that will be noted in future works. The prototype does everything the full application also should be doing. The casing prototype either needs improvement, it is a very low version of the original box casing. The vans work, the monitor work, the casing is a closed system. But it uses low grade non sustainable materials, and has no level planks for the monitor and computer. And it is not build for strong weather conditions. There is a lot of room for improvement. But the general casing concept works, if it is to hot the ventilators go on, the box has a door that can open and close and the monitor is able to shine on the walls. In general the prototype works, the artist can upload art, the app user can vote on the art and the art can be displayed with the projector in a relatively primitive casing. It works but there is room for improvement especially for the projector casing

Table 1. Average Response Times for /api/users with the GET method

#Simultaneous Requests	Average Response Time (ms)	Standard Deviation
Initial	117	7
10	138	9
100	249	30
1000	803 (request failures and timeouts)	97

Web/Mobile Software Application To conduct the software testing, several standard approaches were employed. These approaches included testing the functionality for the different actors and and measuring the response time for API calls. All the functionality test were conducted and passed positively. In Table 1 and Table 2 The results of the fastest (Table 1) and slowest route (Table 2) in average is given.

After conducting these tests, it can be concluded that the current prototype implementation is functioning correctly. These comprehensive tests ensure that

Table 2. Average Response Times for /api/exhibitor/expositions with the POST method

#Simultaneous Requests	Average Response Time (ms)	Standard Deviation
Initial Avg	175	11
10	211	14
100	376	47
1000	1198 (request failures and timeouts)	151

the application meets the necessary requirements and performs efficiently across different scenarios.

Casing structure The finite element analysis and finite element method are tools used for analysing and predicting the structural performance of the projector casing. These methods involve dividing the structure into small finite elements to assess stress, displacement, and strain under various conditions.

Initially, 2 mm stainless steel sheet was considered, but this material showed significant deformation under load. Subsequent analyses with thicker materials (5 mm and 3 mm) demonstrated improved results. The 3 mm thick sheet was deemed optimal, balancing weight and structural integrity, with a final weight of 29.5 kg and acceptable displacement values. Additional internal components such as fans and electronics were excluded from this specific analysis.

Temperature management The results of both the temperature management and durability tests indicate that the ventilators perform as expected under varying conditions. The ventilators successfully activated and cooled the system when the temperature thresholds were exceeded and consistently managed the internal temperature even during prolonged operation. These tests confirm that the temperature management system is reliable and effective, even with the prototype adjustments. This provides confidence that the system will maintain optimal performance and protect the projector from overheating during extended use.

4 Conclusion

To conclude the outcome of the project, it is essential to examine three key aspects: project outcomes, future developments, and personal reflections. The project outcomes highlight ArtSy(nc)'s pioneering role. Future developments envision ArtSy(nc) expanding, integrating innovative technologies like Non-Fungible Tokens (NFTs), and establishing educational platforms. Personal reflections from the team members underscore the transformative impact of interdisciplinary collaboration. This chapter explores these facets, affirming ArtSy(nc)'s commitment to shaping vibrant cultural landscapes and empowering artists worldwide.

4.1 Project Outcomes

ArtSy(nc) presents a compelling solution to the lack of digital artist visibility and recognition. It tackles the challenges faced by digital artists in gaining exposure and recognition, while fostering a more democratic and inclusive art scene. It is a unique platform that empowers both artists and art lovers. Artists benefit from a space to showcase their work to a wider audience, while art lovers gain the opportunity to actively participate in curating the artistic landscape of their city through the mobile app.

The potential impact of ArtSy(nc) extends beyond the art world itself. By enhancing public spaces with captivating digital art installations, it has the potential to revitalise urban landscapes, attract visitors, and stimulate local economies. Additionally, ArtSy(nc) encourages a fresh perspective on artistic expression and fosters a sense of community around digital art.

The casing's design incorporates versatility, allowing it to be adapted for different public settings, including parks, coffee shops, and city streets. This flexibility is achieved through various mounting options—stands for parks, rubber feet for cafes, and pole mounts for urban areas. The simplicity of the casing design ensures that it remains unobtrusive, focusing the public's attention on the projected art rather than the equipment itself.

Functionality and durability were key considerations in the prototype development. The use of a repurposed drawer and plywood for cost-effective construction demonstrates the feasibility of the design concept. Despite the use of low-grade materials, the prototype successfully integrates essential features such as ventilation to prevent overheating, a secure door for easy access to the projector, and a stable structure to house the electronic components. This initial prototype proves the viability of the concept, although it acknowledges the need for improvements in materials and construction quality for the final product.

The projector casing effectively meets the basic requirements for protecting and displaying digital art in various public settings. While the prototype serves as a functional proof of concept, future developments should focus on material upgrades and structural refinements to enhance durability and sustainability. This will ensure the long-term success of the installations and contribute to the project's goal of enriching public spaces with innovative digital art.

The application component of ArtSy(nc) has demonstrated robust functionality across various user roles including admins, artists, art lovers, and exhibitors. Through rigorous testing, it has been confirmed that the application meets the necessary requirements and performs efficiently in different scenarios. The platform facilitates a seamless experience for artists to upload their artwork and for users to view and interact with these digital art pieces. This interaction is crucial in fostering a community around digital art, enhancing user engagement, and ensuring a dynamic and interactive art scene.

Overall, ArtSy(nc) demonstrates the potential of technology to bridge the gap between artists and the public, fostering a more vibrant and inclusive art scene. The project holds significant promise for enriching the cultural fabric of the cities and redefining the way of experiencing art in public spaces.

4.2 Personal Outcomes

Élise The EPS program has been an incredibly enriching experience for me, both personally and professionally. It significantly improved my teamwork and language skills. Additionally, I developed new and essential competencies such as marketing and project management, which will be invaluable in my future career.

Working with European students from various disciplines on a topic completely outside my usual field broadened my horizons and opened my mind. This interdisciplinary collaboration allowed me to see things from new perspectives and strengthened my ability to adapt and learn quickly in diverse environments.

In summary, the EPS program not only equipped me with practical and valuable skills but also prepared me to work effectively in multicultural and interdisciplinary teams, a major asset for my professional future.

Jule The EPS was a great experience. I have developed both personally and professionally. Through the School I was forced me to learn a new computer aided design tool, which will help me in my future career. It was also a lot of fun to work in such a disciplined team where everyone has different strengths and everyone is willing to help each other or teach something new. This project was my first group project on such a large scale. I was able to develop my teamwork and communication skills very well here.

Julia During the EPS, I enhanced my skills in teamwork, development and design, which allowed me to create ArtSy(nc) with my group. I learned to effectively manage my time and resources, ensuring that all deadlines were met. Collaborating with my team improved my communication and leadership abilities. Overcoming unexpected challenges boosted my problem-solving skills. This experience has prepared me for future professional projects and broadened my horizons.

Leevi For me the most valuable aspect was to work with people from diverse backgrounds. This multicultural collaboration broadened my perspectives and enhanced my teamwork skills. Additionally, I gained valuable knowledge in marketing, a field I hadn't studied before. Writing a large-scale report was another new and challenging experience that improved my writing and analytical skills. I also feel that I gained a lot of confidence with the English language. I'm grateful for this experience.

Lucas Joining the EPS course in Porto was driven by my desire to work in an international setting focused on innovation. The city's cultural richness and surfing appealed to me. Collaborating with students from diverse fields like design and engineering broadened my perspectives and enhanced my project management skills. I also gained insights into digital arts. Living in Porto allowed me to experience its vibrant culture, balancing academic work with exploring the city. This experience has been enriching both my professional skills and personal life.

Siebe Working on the EPS project was a transformative experience that enhanced my professional development by blending both soft and hard skills.

Collaborating closely with a diverse and talented team, I honed my communication and teamwork abilities. Having dedicated designers allowed me to focus on development, learning from their creative processes while ensuring efficient and cohesive results. From the project's inception to implementation, we meticulously planned, executed, and adapted using agile methodologies, ensuring we met our goals. A significant aspect was learning about broadcasting technology, which, despite the steep learning curve, added a valuable skill to my repertoire and broadened my perspective on modern web technologies. This project not only resulted in a successful product but also fostered substantial personal and professional growth.

4.3 Future Development

ArtSy(nc) has the potential to evolve beyond a platform for showcasing digital art, transforming into a thriving ecosystem that empowers artists, engages art lovers, and fosters a global movement. Here are some ideas for potential future endeavours:

Non-Fungible Tokens (NFT) offer the opportunity to build a commission-based marketplace within ArtSy(nc), potentially reducing the dependency on sponsors. By enabling artists to mint and sell NFT directly on the platform, ArtSy(nc) can develop a secure, verifiable ownership record on the blockchain. This opens new revenue streams for artists and allows collectors to own unique pieces of digital art.

Global Expansion of ArtSy(nc) provides an opportunity to broaden the user base while supporting artists worldwide to showcase their work and art lovers everywhere to engage with the art scene. This involves implementing multilingual support, adapting to regional regulations, and partnering with international cultural institutions.

Online Academy of ArtSy(nc) constitutes an opportunity to strengthen customer relationship by offering learning modules, workshops, and masterclasses led by renowned digital artists, as well as foster collaboration and knowledge exchange within the artistic community, nurturing the next generation of digital art pioneers.

Acknowledgements

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