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An Innovative and Sustainable Design Approach in Contemporary Architectural Education: Parasitic Architecture

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Abstract: This paper investigates parasitic architecture as an innovative and sustainable approach in contemporary architectural education. Parasitic architecture, which establishes symbiotic relationships with existing structures, is explored as a design strategy for creating new spaces within constrained urban environments. The study's methodology includes a multi-phase process beginning with a literature review and discussions on parasitic architecture, sustainability, flexibility, and innovation. Students then proposed structures based on their urban experiences and developed scenarios linked to architectural programs. The final phase involved a design studio at Bingöl University, where students applied parasitic architecture principles to real-world scenarios. The results demonstrate that this approach significantly fosters creative problem-solving skills, refunctionalizes spaces, and enhances environmental awareness. The study highlights the potential of parasitic architecture in addressing post-disaster challenges in urban environments like Bingöl, contributing to the reactivation of underutilized spaces and enhancing the social and cultural vitality of urban areas. This positions parasitic architecture as an effective strategy in both architectural education and practice.

Keywords: Contemporary architectural education, Environmental impact and sustainability, Urban context, Adaptive reuse of existing structures, Parasitic architecture.

Introduction

Architecture education must continuously evolve to keep pace with the ever-changing societal, technological, and environmental dynamics. Traditional methods employed in architectural design education can often be static and repetitive, which may inadvertently confine students to predefined patterns of thinking, thereby limiting the development of innovative ideas (Lökçe, 2002; Varolgüneş et al., 2024). While traditional methods and theories might have fulfilled the needs of a specific era, they increasingly fall short in addressing the rapidly changing technological, social, and environmental conditions of today (Şensoy&Üstün, 2018). In contemporary practice, architects are required not only to consider aesthetics and functionality but also to prioritize sustainability, energy efficiency, and social responsibility (Özdemir&Varolgüneş, 2024). Consequently, educational programs must offer innovative and interdisciplinary approaches to equip students with the skills to tackle these complex and multidimensional challenges (Casakin&Wodehouse, 2021). Additionally, the growing integration of digital technologies in architecture necessitates that students become proficient in these tools, further underscoring the importance of contemporary approaches in education. Parasitic architecture emerges as a significant contemporary approach within this context. By attaching to or integrating with existing structures, parasitic architectures foster a symbiotic relationship with the existing architectural fabric, enabling students to rethink architecture and push its boundaries (Letzter, 2023). This approach is particularly effective in offering creative solutions to pressing issues such as urbanization and sustainability. Parasitic architecture enhances students' abilities to transform existing structures and develop new typologies. Adopting innovative and experimental approaches like parasitic architecture in architectural education empowers students to move beyond traditional practices and generate creative solutions that are responsive to future architectural challenges (Yorgancıoğlu&Güray, 2018).

This paper explores the concept of parasitic architecture as an alternative space design strategy and its application in architectural education. Parasitic architecture aims to create new spaces by establishing symbiotic relationships with existing structures, encouraging students to approach these structures from different perspectives. This paper discusses the potential benefits of parasitic architecture in the educational process and examines how this strategy can be effectively implemented in architecture education. In this context, a study was conducted within the third-semester studio course at Bingöl University's Department of Architecture, focusing on the theme of "parasitic architecture". The study offers suggestions through a design studio that seeks solutions to real-world problems (Caglar&Uludag, 2006). Design studios, where students articulate ideas, evaluate alternatives, and experiment with new approaches, must be properly guided to prepare them for the profession of architecture (Roberts, 2004). The selection of this topic was influenced by the need to develop innovative solutions to the increasingly complex urban and environmental problems of today. As population growth and the continuous expansion of cities increase the demand for new housing and living spaces, interventions in the natural environment have also escalated. In this context, parasitic architecture aims to challenge the limits of existing structures, providing both space-saving solutions in dense urban areas and contributing to the preservation of the natural environment. This approach offers sustainability-focused solutions by maximizing benefits with limited resources and introducing new functions to existing structures with minimal interventions. Parasitic architecture reduces pressure on the natural environment by offering innovative and sustainable designs that can integrate with existing urban fabrics. The selection of this project topic emphasized the potential of such architectural approaches to both transform existing structures and minimize environmental footprints. The goal was for students to develop creative solutions that are responsive to global issues such as urban density, spatial scarcity, and environmental sustainability.

The key contributions of this study are as follows:

- The application of parasitic architecture in architectural education enhanced students' abilities to interact with existing structures, repurpose spaces, and develop innovative solutions in limited urban areas.
- By examining how parasitic architecture aligns with sustainability principles, the study emphasized the importance of creating living spaces with minimal environmental impact and contributed to promoting environmentally sensitive architectural practices.
- The study focused on the design process of structures that could be integrated into the existing urban fabric, thereby improving students' abilities to optimize space in urban areas and unlock the potential of existing structures.

- The educational benefits of addressing real-world problems and data in student projects were highlighted.
- Parasitic architecture-focused projects enhanced students' creative problem-solving abilities, increasing their confidence in addressing complex urban and environmental issues and strengthening their innovative thinking skills.

This paper is structured into four main sections. The first section introduces the concept of parasitic architecture and provides a theoretical framework derived from the literature. The second section outlines the methodology of the study, including the structure of the 14-week design studio and the evaluation criteria. The third section presents and analyzes selected student projects, focusing on how parasitic architecture strategies were applied in urban contexts. The final section summarizes the key findings and educational implications of the study. The organizational flow of the article is illustrated in Figure 1.

Parasitic Architecture as a Design Strategy in the Architectural Design Studio

The term "parasite" in biology refers to the ecological relationship where the host organism supports the parasite, which benefits from the connection without providing anything in return (Gültekin&Birer, 2019). Similarly, parasitic architecture integrates with existing structures, creating a symbiotic relationship akin to biological parasitism (Kavut&Selçuk, 2022). This design strategy aims to create new spaces by repurposing existing buildings, deviating from traditional paradigms and addressing contemporary challenges such as sustainability, flexibility, and innovation (Arabulan&Lank, 2023; Mehan&Mostafavi, 2023). First discussed by Ungers in 1966, parasitic architecture refers to structures that attach to existing buildings or urban spaces, relying on the host for support while providing unique benefits in return (Given, 2021; Šijaković&Perić, 2018). This approach involves temporary, modular designs that extend the life of existing buildings, reduce material consumption, and lower the carbon footprint (Pratama et al., 2023; Bardzinska-Bonenberg, 2018). It offers an important solution to sustainable urban development by minimizing the need for new construction and promoting energy-efficient designs (Mehan&Mostafavi, 2023). Parasitic architecture mimics biological strategies such as attachment, climbing, and anchoring to existing structures, drawing inspiration from natural parasitism (Kachri&Hanna, 2014). It should be viewed not as an appendage, but as a

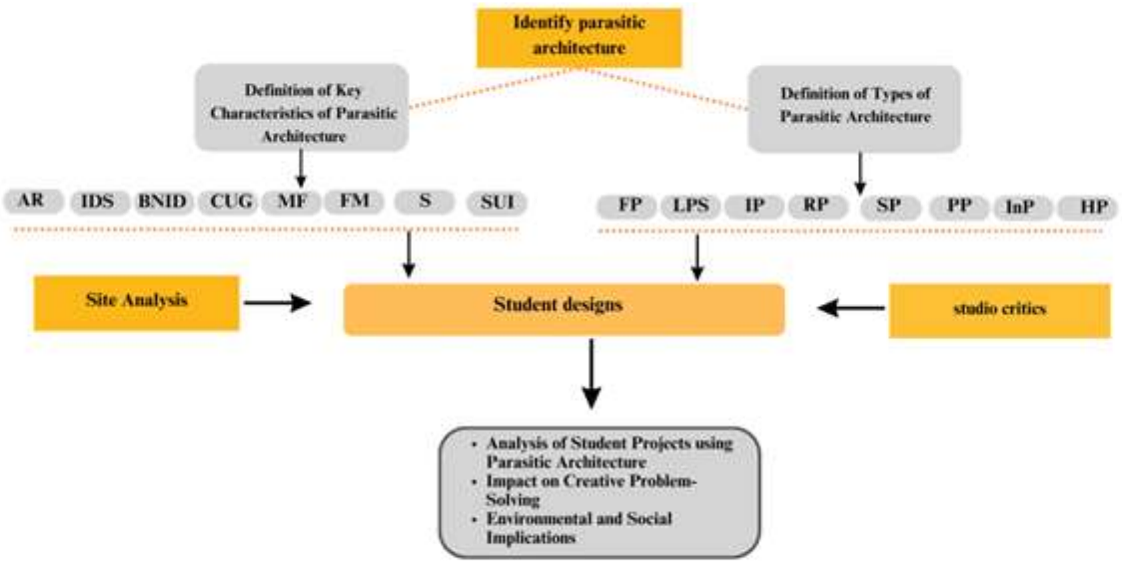

***Figure 1:** Conceptual framework of the research*

growth mechanism within the urban context, contributing to the sustainable and organic development of cities (Šijaković&Perić, 2018). This approach is being explored in architectural studios, encouraging innovative and adaptable design solutions. It helps optimize underutilized spaces, promotes urban growth, and fosters speculative design to address contemporary challenges (Karacalı & Polat, 2022; Christenson, 2014). Parasitic architecture also addresses urban issues such as space constraints, homelessness, and the need for flexible growth. Students have transformed disused walls into public spaces and developed strategies for infiltrating and parasitizing existing structures (Karacalı & Polat, 2022; Christenson, 2014). Through biomimicry, this approach provides new perspectives on contemporary architectural challenges, contributing to the development of flexible, sustainable urban environments (Baroš & Katunský, 2020; Watanabe et al., 2014; Sara, 2007).

Methodology

This study examines the concept of parasitic architecture and evaluates the architectural design strategies developed through this approach. It covers the 14-week studio process and its outcomes (as detailed in Table 1), along with the authors' research and studio-based educational experiences. The architectural design studio was conducted during the fall semester with the participation of 18 students. At the end of the term, students submitted their final design projects individually. Among these, projects that focused on Bingöl Province as a common intervention area were selected for detailed analysis. The selection criteria included: the diversity in the students' interpretations of parasitic architectural strategies, the variety of urban and structural contexts they engaged with, and the clarity with which they applied key characteristics and typologies derived from the literature. The selected projects represented a range of parasitic interventions (such as rooftop, façade-attached, suspended, and interstitial structures) allowing for a rich comparative analysis.

In the initial phase of the studio, instructors and students collaboratively examined academic literature on parasitic architecture, sustainability, flexibility, and innovation. These discussions helped students comprehend the core concepts, historical development, built examples, and associated design strategies. In the second phase, students proposed parasitic architectural interventions based on their own urban observations, aligning these with specific architectural programs and user scenarios. This stage encouraged critical spatial analysis and the identification of design opportunities within the existing built environment. In the final phase, students developed their design proposals using parasitic architecture strategies. The projects were evaluated based on a rubric derived from the literature, which included criteria such as integration with existing structures, use of sustainable and modular materials, contextual harmony, and spatial adaptability. This study offers a comprehensive analysis of how student projects interact with the urban fabric on structural, aesthetic, and functional levels. Focusing on the post-disaster urban context of Bingöl, the research demonstrates the potential of parasitic architecture to revitalize underused spaces and enhance socio-cultural urban vitality. It also highlights the pedagogical value of this approach in fostering creative problem-solving and sustainable design thinking within architectural education.

During the evaluation process, student projects were assessed by the studio instructor based on a set of criteria derived from the literature. These criteria included integration with existing structures, use of sustainable and modular materials, contextual harmony, spatial flexibility, and conceptual clarity. No external jury was involved in the evaluation. The development of students' creative problem-solving skills was qualitatively observed through the progression of their design revisions, mid-term reviews, and final presentations. Throughout the project phases, it was noted that students were able to generate more diverse, functional, and sustainable solutions to complex urban problems. These observations, although not supported by quantitative data, were considered as indicative of the pedagogical contribution of the studio.

Table 1: *The 14-week course process and outcomes (Edited by author, 2024)*

Week	Topic	Description	Outcomes
1	Introduction and General Conceptual Framework	Introduction to the concept of parasitic architecture and explanation of fundamental principles.	Conceptual understanding, literature review.
2	Historical Buildings and Parasitic Structures	Examination of parasitic structures attached to historical buildings.	Case study analyses, discussion, and presentation.
3	Material Selection in Parasitic Architecture	Investigation of innovative and sustainable materials used in parasitic structures.	Material research, report on selected materials.
4	Biomimicry Applications in Parasitic Structures	Application of nature-inspired design strategies in parasitic architecture.	Biomimicry examples, conceptual sketches.
5	Urban Context and Parasitic Structures	Integration of parasitic structures into urban areas and their relationship with the city.	Urban analysis and mapping studies.
6	Flexibility and Modularity	Examination of flexibility and modular design approaches in parasitic structures.	Modular design examples, conceptual model.
7	Community and Social Sustainability	Examination of the social benefits and impacts of parasitic structures on social sustainability.	Social needs analysis, discussion, and presentation.
8	Midterm Jury: Initial Design Studies	Students present their initial design drafts and receive feedback.	Design presentation and jury evaluation.
9	Temporary and Portable Parasitic Structures	Examination of temporary and portable parasitic structures and their advantages.	Proposals for portable parasitic structures, draft plans.
10	Innovative Design Solutions in Parasitic Structures	Integration of innovative technologies and design solutions into parasitic architecture projects.	Innovative design solutions, prototype proposals.
11	Environmental Impact and Sustainability	Analysis of the environmental impacts of parasitic structures and the integration of sustainability principles into projects.	Sustainability analysis, material and energy strategies.
12	Implementation and Feasibility in Parasitic Architecture	Evaluation of the implementation processes and practical feasibility of parasitic structures.	Implementation scenarios, construction techniques report.
13	Final Design Studies and Preparation	Finalization of students' design projects and preparation for presentations.	Final design plans and model studies.
14	Final Jury: Final Design Presentation	Students present their final designs to the jury for evaluation.	Final presentation, jury feedback, and final report.

Table 2: *An overview of key characteristics of parasitic architecture and their explanations. (AR: Adaptive Reuse, (IDS): Innovative Design Solutions, BNID: Biomimicry and Nature-Inspired Design, CUG: Community and Urban Growth, MF: Minimal Footprint, FM: Flexibility and Modularity, S: Sustainability, SUI: Social and Urban Impact)*

Key Characteristics of Parasitic Architecture	Explanation	References
Adaptive Reuse (AR)	Parasitic architecture often involves reusing and repurposing existing structures, breathing new life into underutilized or obsolete buildings.	Kavut & Selçuk (2022) Letzter (2023) Arabulan & Lank (2023)

Innovative Design Solutions (IDS)	Parasitic architecture transforms idle or underused spaces into productive public areas, fostering diverse and functional design ideas. This approach encourages flexible structures that adapt to various spatial and environmental constraints, enhancing architectural versatility.	Christenson (2014) Casakin & Wodehouse (2021) Karacalı & Polat (2022)
Biomimicry and Nature-Inspired Design (BNID)	Utilizing biomimicry, parasitic architecture leads to self-designing, self-growing structures inspired by natural processes like fungal colonies. This approach mimics natural parasitism, using "sticking," "climbing," and "holding" mechanisms to attach to host structures, reflecting symbiotic relationships.	Speck et al. (2022) Baroš & Katunský (2020, 2021) Kachri & Hanna (2014)
Community and Urban Growth (CUG)	Parasitic architecture can drive urban growth by creating new spaces in dense areas, optimizing city space while adhering to planning regulations.	Gültekin & Birer (2019) Mehan & Mostafavi (2023) Šijaković & Perić (2018)
Minimal Footprint (MF)	Parasitic structures minimize environmental impact by being added to existing buildings, using modular and recyclable materials, making them ideal for dense urban environments with limited space.	Bardzinska-Bonenberg (2018) Speck et al. (2022) Pratama et al. (2023)
Flexibility and Modularity (FM)	Parasitic structures are designed to be flexible, modular, and adaptable, allowing them to meet various spatial and environmental needs while offering long-term sustainability by being repurposable rather than demolished.	Given (2021) Karacalı & Polat (2022) Sara (2007)
Sustainability (S)	Parasitic architecture, inspired by biological concepts like modularity and zero waste, promotes sustainable urban development by reusing existing infrastructure and reducing the environmental impact of new construction.	Speck et al. (2022) Šijaković & Perić (2018) Yorgancıoğlu & Güray (2018)
Social and Urban Impact (SUI)	Parasitic architecture provides practical solutions to urban challenges like homelessness and density by adding functional spaces to existing buildings, evolving from artistic expressions to effective social interventions.	Arabulan & Lank (2023) Gültekin & Birer (2019) Bardzinska-Bonenberg (2018)

Table 3: *An overview of different types of parasitic architecture and their applications (FP: Façade Parasites, LPS: Layered Parasite Structures, IP: Infill Parasites, RP: Rooftop Parasites, SP: Suspended Parasites, PP: Plug-in Parasites, InP: Interstitial Parasites (InP), HP: Hybrid Parasites)*

Type	Description	
Façade Parasites (FP)	Structures added to the facades of existing buildings. They typically provide additional space or functions and integrate with the facade.	Karacalı & Polat (2022) Letzter (2023) Alborghetti & Erioli (2015)
Layered Parasite Structures (LPS)	Structures added in a layered or modular fashion on top of existing buildings. These structures often offer various functions.	Sara (2007) Bardzinska-Bonenberg (2018) Arabulan & Lank (2023)
Infill Parasites (IP)	Structures placed in empty spaces or between existing buildings. They are typically used to address urban voids.	Gültekin & Birer (2019) Baroš & Katunský (2020) Šijaković & Perić (2018)
Rooftop Parasites (RP)	Structures added to rooftops. They often make efficient use of roof space and provide additional functions.	Given (2021) Pratama et al. (2023) Bardzinska-Bonenberg (2018)

Suspended Parasites (SP)	Structures suspended or supported above existing buildings. They usually extend outward from the existing structures.	Baroš & Katunský (2021) Karacalı & Polat (2022) Kachri & Hanna (2014)
Plug-in Parasites (PP)	Modular structures that can be added or removed from existing buildings. They are designed for easy installation and removal.	Christenson (2014) Arabulan & Lank (2023) Casakin & Wodehouse (2021)
Interstitial Parasites (InP)	Structures integrated into the gaps between two existing buildings. These structures utilize the voids between buildings.	Baroš & Katunský (2020) Karacalı & Polat (2022) Yorgancıoğlu & Güray (2018)
Hybrid Parasites (HP)	Structures that combine multiple parasite types. They typically incorporate various functions and design strategies.	Watanabe et al. (2014) Mehan & Mostafavi (2023) Alborghetti & Erioli (2015)

Findings and Discussion

This study analyses student projects from the Architectural Design 3 studio at Bingöl University, focusing on how parasitic architecture strategies were applied. The evaluation considers site and program selection, structural integration with existing buildings or infrastructure, and the experiential scenarios created within urban contexts. Student designs were examined in relation to key concepts and typologies of parasitic architecture derived from the literature, illustrating its educational and design impact. The study also aims to raise awareness of the potential to repurpose underused urban spaces in Bingöl through parasitic approaches. Students were encouraged to produce innovative, context-sensitive designs emphasizing reuse, sustainability, modularity, and social impact. One example, Design 1, reimagines an abandoned city center site to provide temporary housing for homeless individuals (Figure 2). The project demonstrates how parasitic architecture can support both shelter provision and social integration. Its modular, portable units were adaptable to various urban settings and enabled rapid transformation of space (Figure 3), offering not only shelter but access to essential services. The design also aligns with sustainability principles by reusing urban space and minimizing resource waste, contributing to long-term social benefits. Overall, the study concludes that parasitic architecture offers a sustainable and effective framework for

Figure 2: *Selected study area for design 1 in the city centre*

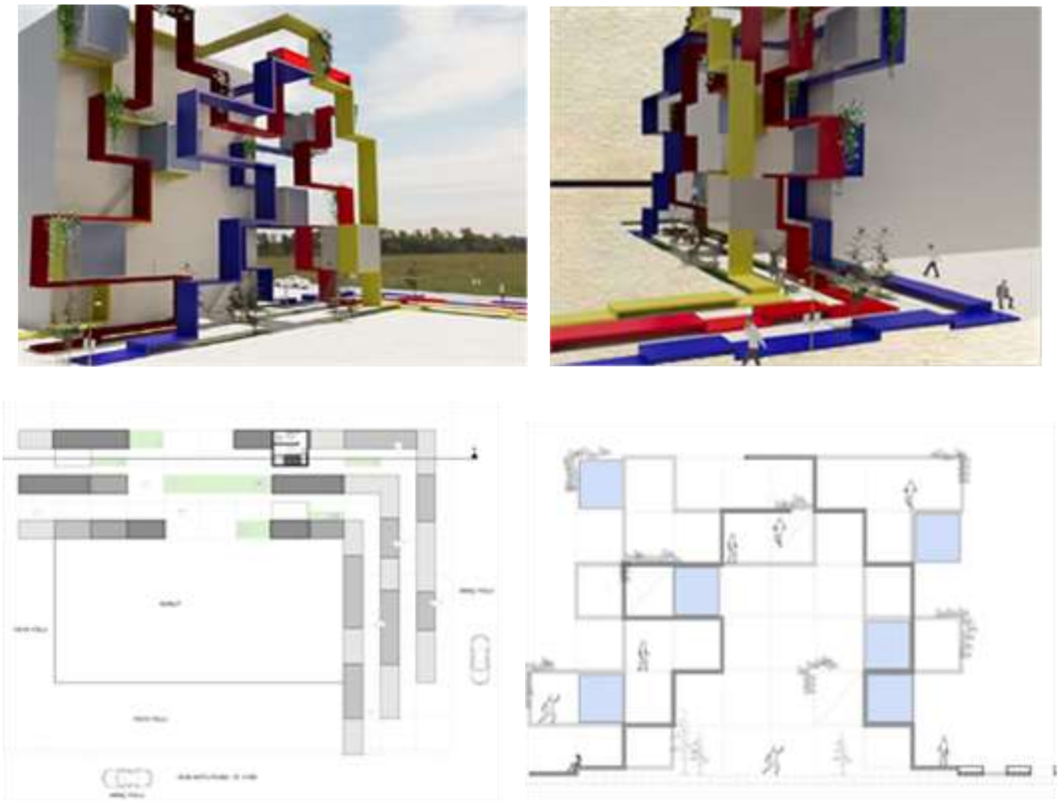

__Figure 3:__ Parasitic architecture proposal for design

temporary housing, helping to address social and environmental challenges in urban design.

Design 1 is associated with the key characteristics of parasitic architecture, specifically IDS, CUG, FM, and S, and is linked to the types of parasitic architecture such as FP, LPS, PP, InP, and HP. These associations demonstrate that Design 1 has a significant impact not only in terms of aesthetics and

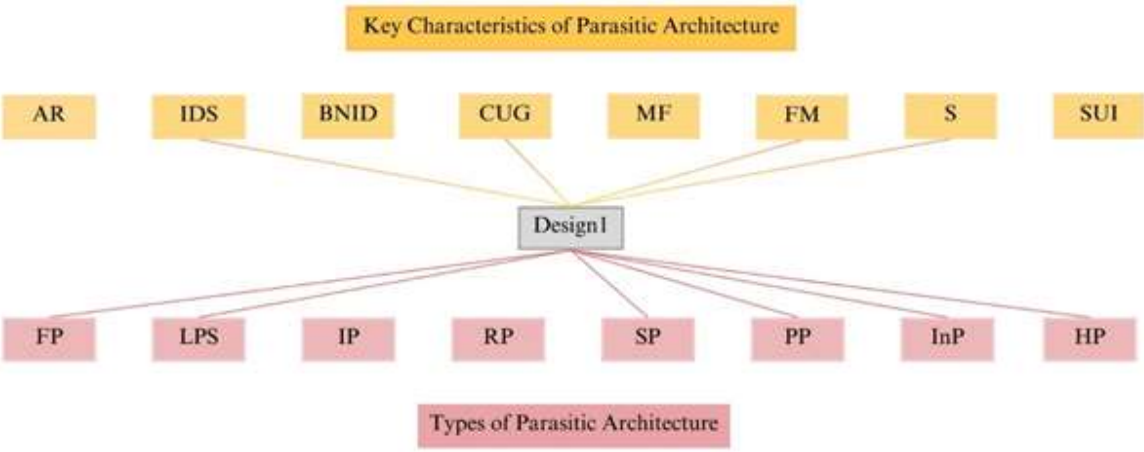

__Figure 4:__ The relationship of design 1 with the "key characteristics of parasitic architecture" and "types of parasitic architecture"

functionality but also in the broader context of social growth, urban development, and sustainability. This indicates that the design approach taken highlights the innovative potential of parasitic architecture. The connection of Design 1 with various types of parasitic architecture such as FP, LPS, PP, InP, and HP reveals its capacity to integrate with existing structures by employing diverse spatial strategies and construction techniques. For instance, FP and LPS add new functions to the surfaces and layers of existing buildings, while PP and InP create innovative connections between existing structures and new spaces. HP further enhance flexibility and modularity by combining these strategies.

Design 2 is a project that aims to transform an abandoned water tank owned by a public institution into a residential and living space (Figure 5). This work stands out as a unique example that highlights the transformative capacity of parasitic architecture on existing structures. The student prioritised preserving the existing structural features of the water tank during the design process, aiming to add new functions to the structure through additions and interior modifications. In this context, the

Figure 5: *The selected abandoned water tank area for design 2 and the proposed parasitic architecture for design2*

design process required meticulous consideration of both the physical and social contexts. The student's design sought to create a functional and aesthetic living space for the community surrounding the water tank, establishing a new dialogue between the structure and its environment while adhering to the core principles of parasitic architecture. This dialogue aimed to reassess the potentials of the existing space and utilise these potentials sustainably. Within the project, the spatial organisation of the water tank's conversion into a residential area was carefully planned; the existing voids within the tank were reorganised to accommodate new functions. The horizontal and vertical spaces of the water tank were redesigned to suit the necessary functions of a living space, and these adjustments ensured the structure's integration with the street level. Considering the user profile, the project aimed to repurpose the water tank as a social and cultural interaction centre for the surrounding community. This work showcases the innovative approaches of parasitic architecture in transforming existing structures and the creative solutions it brings to urban spaces. The student's water tank project not only maximised the structure's potential in both functional and aesthetic terms but also successfully established a strong and sustainable relationship with the urban context. These findings underscore the flexibility and creativity that parasitic architecture offers in education, serving as a significant indicator of its potential in architectural practice.

Design 2, transforming an abandoned water tank into a residential and living space, reflects key characteristics of parasitic architecture, including AR, MF, FM, S, and SUI. The AR principle is emphasized by preserving the tank's existing structural features while refunctioning the space. Minimal interventions align with MF, minimizing environmental impact and demonstrating sustainability (S). FM allows for adaptable, modular spatial solutions, enabling the tank to serve various functions. The project's new relationship with the community enhances its SUI, highlighting the social significance of the transformation (Figure 6). Parasitic architecture typologies such as FP, LPS, PP, and HP further enhance the design's innovation. The FP concept adds to the exterior, enriching the structure functionally and aesthetically, while LPS reorganizes spatial arrangements by incorporating new layers. PP supports modular flexibility, and HP combines multiple parasitic strategies to create a versatile space.

Design 3 is a notable example of parasitic architecture's ability to integrate with existing structures. Located between the 12.00 and

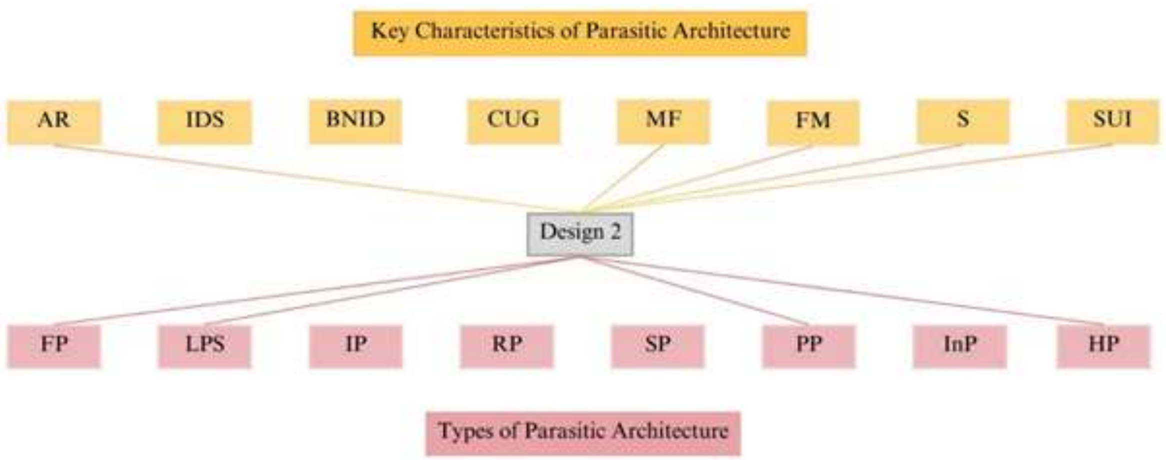

Figure 6: *The relationship of design 2 with the "key characteristics of parasitic architecture" and "types of parasitic architecture"*

Figure 7: *The viaduct selected for design 3 is located within the city*

Figure 8: *Parasitic architecture proposal for design 3*

16.00 levels of the Çapakçur Viaduct, which connects the two sides of Bingöl, the project introduces new spatial functions while maintaining harmony with the viaduct's structure (Figure 7). It includes various functional units such as accommodation spaces, event venues, glass terraces, cafés, and walking paths, created through modular voids between the levels. This design maintains spatial continuity with the viaduct and allows for its re-evaluation in both physical and social contexts. The project demonstrates parasitic architecture's potential to refunction abandoned spaces and integrate them into the urban fabric (Figure 8). A key success is the preservation of vehicle circulation on the +24.00 level, ensuring functional integration with the existing structure. Design 3 highlights how parasitic architecture can contribute to spatial renewal, introducing new functions aligned with the urban context. It also serves as a strong example of how parasitic architecture can enhance creative problem-solving skills in architectural education, transforming neglected areas into valuable urban spaces.

Design 3, associated with key concepts of parasitic architecture such as IDS, BNID, CUG, MF, FM, S, and SUI, has achieved an environmentally conscious spatial transformation that benefits the community (Figure 9). The intervention carried out between the 12.00 and 16.00 levels of the viaduct merges the potential of the existing structure with innovative functions while aligning with the urban context through nature-inspired design approaches and modular solutions. The use of LPS, IP, SP, PP, and HP has enhanced the functional capacity of the structure, reinforcing spatial diversity and creativity (Figure 9). This project exemplifies the ability of parasitic

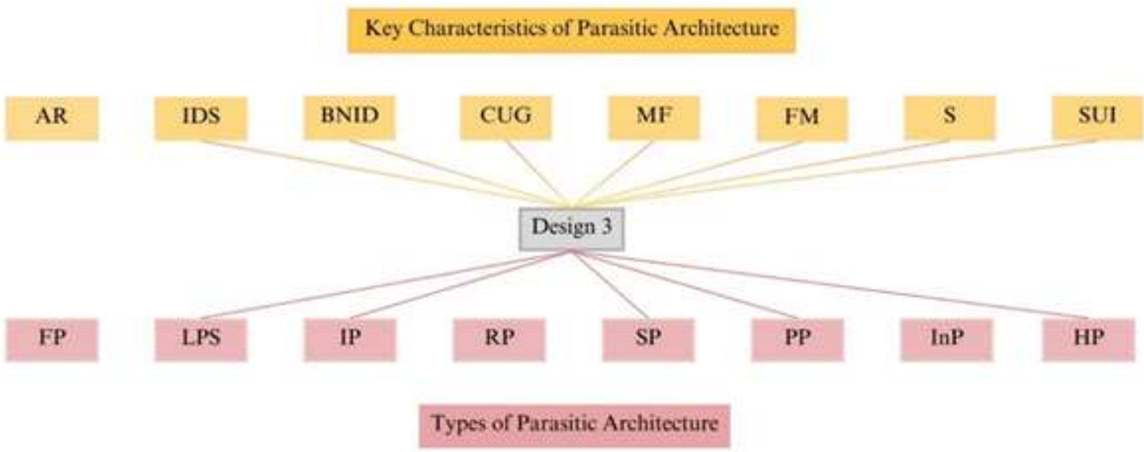

Figure 9: *The relationship of design 3 with the "key characteristics of parasitic architecture" and "types of parasitic architecture"*

Figure 10: *Selected study area for design 4 in the city centre*

architecture to generate innovative, sustainable, and socially responsive solutions in urban areas and stands out as a significant application for developing creative problem-solving skills in architectural education.

Design 4 presents an innovative reinterpretation of a blank façade in the city centre, applying parasitic architecture principles (Figure 10). The project transforms the adjacent neglected area into day-use accommodation and public spaces, harmoniously integrating with the nearby green park. Featuring a modular mixed-use system of residential and commercial units, the design enhances both functionality and aesthetics (Figure 11). Its adaptability ensures responsiveness to future urban needs. Emphasis was placed on the balance between solid and void, with sustainable materials supporting durability. Each of the three façades was uniquely designed to strengthen the building's relationship with its surroundings, while a central atrium introduces natural light, improving spatial quality and connecting interior with exterior. Overall, Design 4 exemplifies how parasitic architecture can successfully integrate with existing structures to revitalize urban spaces.

Figure 11: *Parasitic architecture proposal for design 3*

Design 4 is associated with the key characteristics of parasitic architecture, including IDS, BNID, CUG, MF, FM, S, and SUI (Figure 12). The project aims to transform the neglected and dilapidated area adjacent to the blank façade of a building in the city centre, creating day-use accommodation units and public spaces that meet contemporary needs. The design integrates with the existing green park using a BNID approach, adopting sustainable materials and a MF strategy to minimise environmental impact. Additionally, the project's flexible and modular structure FM enhances its capacity to adapt to future urban needs. From the perspective of parasitic architecture types, Design 4 is closely related to FP, LPS, IP, SP, PP, and HP, reinforcing the project's spatial diversity and innovative nature (Figure 12). The FP type has transformed the previously blank façade into a functional element, while LPS and IP have established spatial continuity through layered and infill structures added to the dilapidated area. SP and PP types, through suspended and modular structures added to the façade, have facilitated the building's multi-faceted integration with the urban context. The HP type, by combining various parasitic architecture types, has resulted in a versatile and flexible structure capable of meeting diverse user needs. These findings strongly demonstrate that Design 4 showcases the potential of parasitic architecture to offer innovative, sustainable, and socially responsive spatial solutions.

Design 5 aims to reimagine a vacant space nestled within the dense and monotonous development of the city's market district, in line with parasitic architecture principles (Figure 14). This project seeks to break the monotony of the urban fabric by creating a focal point that stands out amidst the surrounding homogeneous structures. Situated between two blank façades, the structure is designed as a public gathering space, offering a new perspective within the existing urban environment. The design underscores the capacity of parasitic architecture to repurpose unused or overlooked spaces within the city, bringing them into the urban context. The student's effort to create a public space while working within the constraints of existing structures highlights the potential of parasitic architecture to deliver innovative solutions in

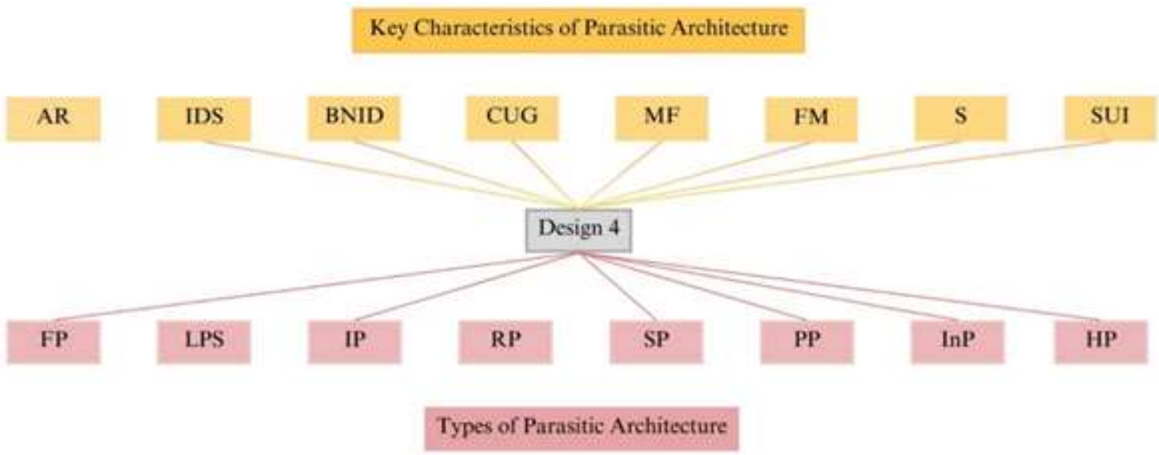

Figure 12: *The relationship of design 4 with the "key characteristics of parasitic architecture" and "types of parasitic architecture"*

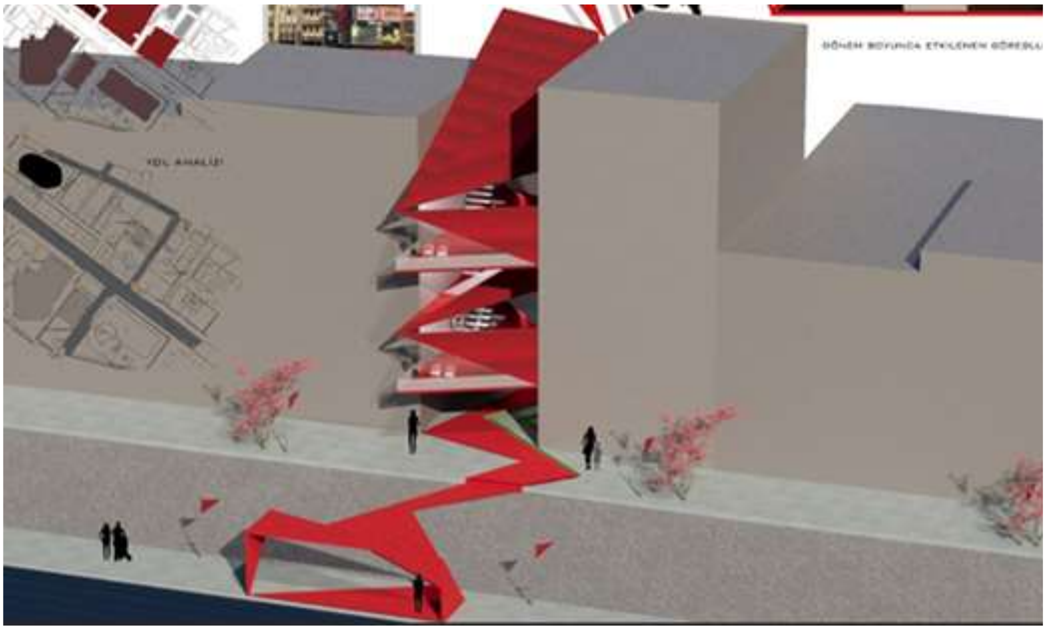

Figure 13: *Parasitic architecture proposal for design 5*

urban settings (Figure 13). Design 5 exemplifies the student's ability to transform spatial perceptions and make a significant impact within the existing built environment, both in terms of architectural design and parasitic architecture. The project successfully applies the core principles of parasitic architecture: integrating with existing structures, reclaiming unused spaces, and creating new opportunities for urban use. In this context, Design 5 stands out as a rich urban intervention, both aesthetically and functionally, through the creation of a public gathering space in the city's market district. The project is seen as a significant example of how parasitic architecture can challenge the city's monotonous landscape, offering new spaces for social interaction and demonstrating its importance and potential in architectural education.

Design 5 incorporates key principles of parasitic architecture, including IDS, BNID, CUG, MF, FM, S, and SUI, with the goal of transforming a vacant space in the city's densely built market centre into a public gathering area. By doing so, it disrupts the monotony of the urban fabric and creates new social interaction zones. The IDS approach demonstrates the ability to work within the constraints of existing structures, repurposing unused spaces to serve urban needs. The BNID method, inspired by nature, contributes to the project's sustainable design, minimizing environmental impact. Furthermore, Design 5 exemplifies the MF approach by promoting compact, eco-friendly urban development, while the FM strategy allows the project to remain adaptable to future urban needs. The integration of new social spaces aligns with CUG and SUI, enhancing social and urban development in the city center. Various types of parasitic architecture are applied: FP enhances building exteriors, LPS

Figure 14: *Selected study area for design 5 in the city centre*

and IP utilize vacant spaces in dense developments, RP adds rooftop spaces, SP extends public areas, and PP and InP offer modular flexibility. HP combines these strategies, creating a diverse and innovative design. Design 5 effectively showcases the potential of parasitic architecture to revitalize vacant urban spaces, foster social interaction, and promote sustainability, making it a valuable example for both educational and urban transformation purposes.

Design 6 stands out as a compelling example of how parasitic architecture can create functional and aesthetic transformations in structures that have left their mark on a particular era but are now in a state of disuse. For this design, a historic bridge built in 1952 in the Genç District of Bingöl was selected (Figure 16). The project demonstrates that it is possible to add a modern parasitic extension to a historical structure without compromising its integrity, by incorporating a modular group of structures onto the existing bridge. The student's choice of transparent materials and lightweight steel construction has been integrated into the bridge, preserving its architectural integrity (Figure 17). This approach successfully bridges the past and present with a modern design language, without altering the historic fabric of the structure. The parasitic structure creates a living space within the bridge, extending its use beyond a mere point of passage and providing both aesthetic and functional value. The parasitic addition not only enhances the durability and functionality of the bridge but also succeeds in creating a natural atmosphere in line with sustainability principles. In this

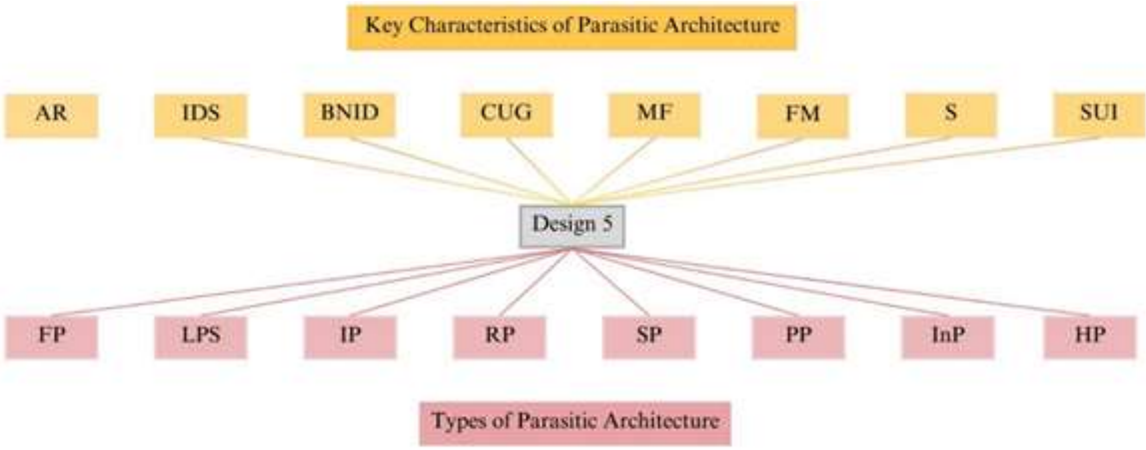

Figure 15: *The relationship of design 5 with the "key characteristics of parasitic architecture" and "types of parasitic architecture"*

context, the project offers significant insights into how parasitic structures can be integrated into the preservation and renovation of historical buildings. In conclusion, Design 6 technically demonstrates how parasitic architecture can offer innovative solutions for both the aesthetic and functional transformation of historical structures. The project clearly highlights the importance and potential of parasitic architecture in architectural education, especially in the process of preserving and enriching historical buildings with new functions. These findings provide important clues on how existing structures can be sustainably transformed through parasitic additions.

Figure 16: *The selected abandoned historical Genç bridge, built in 1952*

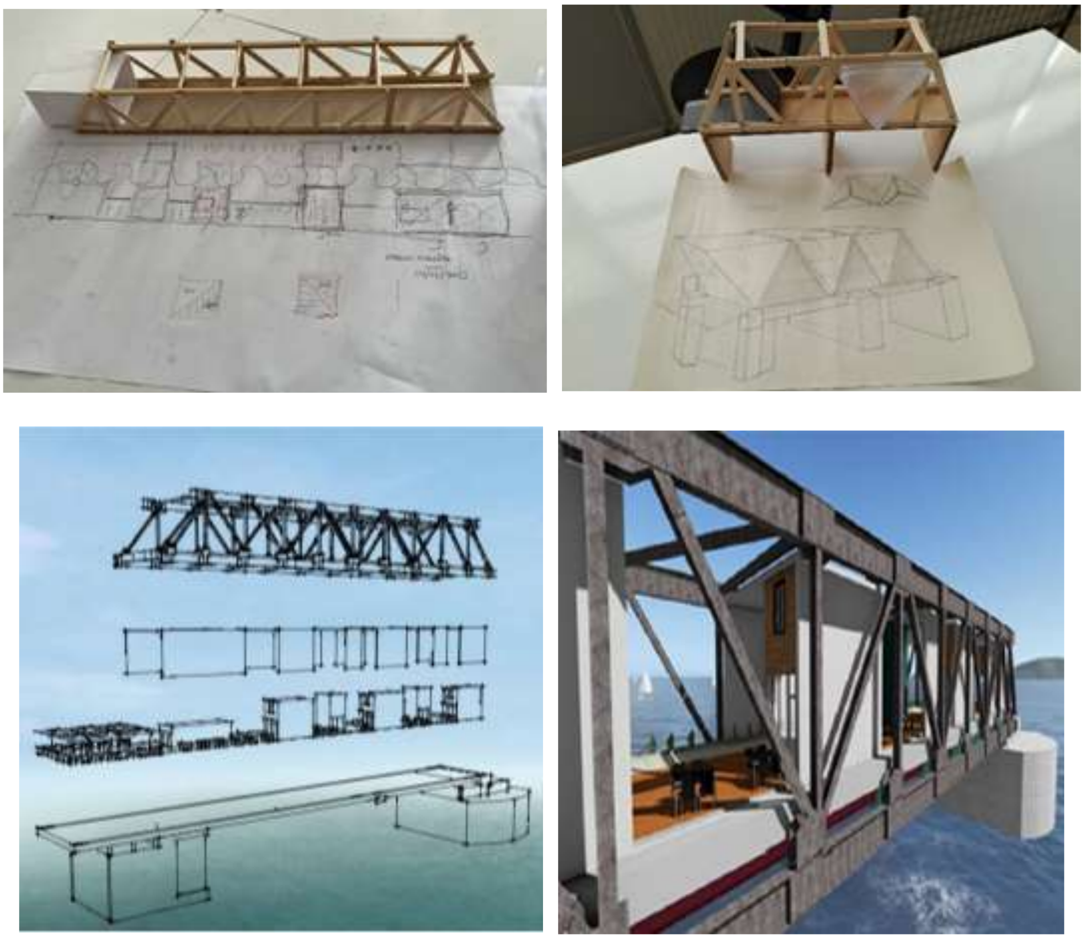

Figure 17: *Parasitic architecture proposal for design 6*

Design 6 exemplifies key aspects of parasitic architecture, such as AR, CUG, MF, FM, S, and SUI. The project involves the transformation of a historic bridge through parasitic additions, demonstrating how existing structures can be enhanced without compromising their historical value. The Adaptive Reuse approach integrates modern, innovative structures with the bridge, preserving its cultural significance while introducing new functions. The project enhances the bridge's role in the urban fabric by creating new social and public spaces, addressing urban density and community needs. Parasitic structures are designed with Minimal Footprint and Sustainability principles, using environmentally friendly materials and modular systems to ensure longevity and adaptability. The concepts of Flexibility and Modularity allow the additions to be integrated seamlessly and adapted for future needs. Design 6 incorporates various parasitic architecture types: LPS create multiple functional areas within the bridge; SP utilize previously unused spaces beneath the bridge; PP add modular, portable elements; and HP combine these approaches to maintain the bridge's historical integrity while introducing modern functionality. Overall, Design 6 illustrates the effectiveness of parasitic architecture in transforming historical structures into functional, aesthetic, and sustainable urban elements, highlighting its potential for educational purposes and urban renewal.

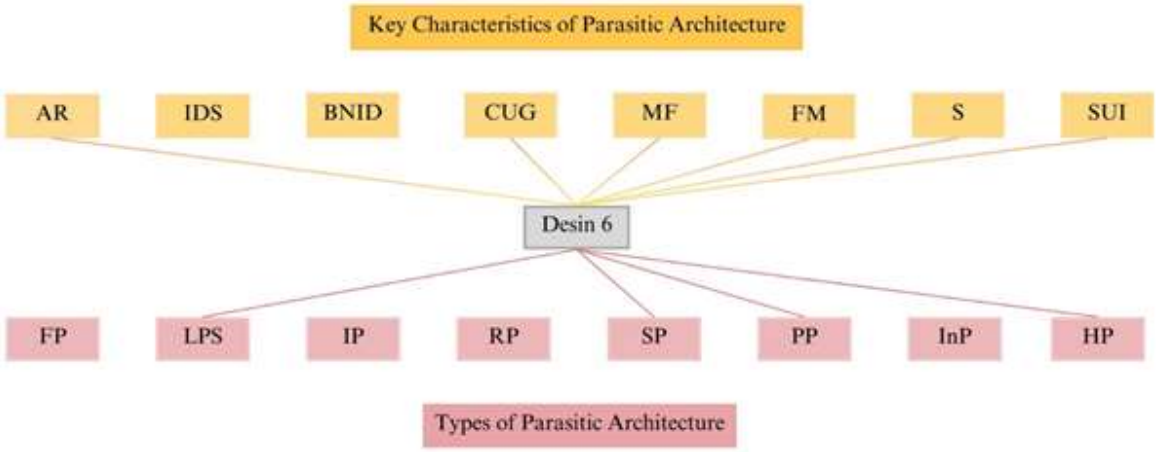

Figure 18: *The relationship of design 6 with the "key characteristics of parasitic architecture" and "types of parasitic architecture"*

The comparative analysis of the six student projects (summarized in the evaluation matrix presented in Table 4) demonstrates a consistent prioritization of Minimal Footprint (MF), Flexibility and Modularity (FM), and Sustainability (S) as core design criteria. These three key characteristics were incorporated into all six projects, revealing a strong collective orientation toward environmentally conscious and adaptable architectural thinking. Additionally, the widespread use of Hybrid Parasites (HP), Layered Parasite Structures (LPS), and Plug-in Parasites (PP) across the majority of the projects reflects a preference for multifunctional, modular, and innovative design strategies. Conversely, typologies such as Infill Parasites (IP), Rooftop Parasites (RP), and Adaptive Reuse (AR) were used less frequently, indicating that themes such as reuse of historical structures require further emphasis in future studios. These patterns, derived directly from the comparative table, underscore students' growing awareness of sustainable urban transformation and their ability to critically interpret parasitic architecture not only as a formal intervention, but as a socially and ecologically responsive design strategy.

Table 4: *Comparative Matrix of Student Projects Based on Key Characteristics and Typologies of Parasitic Architecture*

	AR	IDS	BNID	CUG	MF	FM	S	SUI	FP	LPS	IP	RP	SP	PP	InP	HP
Design 1	—	✓	—	✓	✓	✓	✓	—	✓	✓	—	—	✓	✓	✓	✓
Design 2	✓	—	—	—	✓	✓	✓	✓	✓	✓	—	—	—	✓	—	✓

	AR	IDS	BNID	CUG	MF	FM	S	SUI	FP	LPS	IP	RP	SP	PP	InP	HP
Design 3	—	☑	☑	☑	☑	☑	☑	☑	—	☑	☑	—	☑	☑	—	☑
Design 4	—	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	—	☑	☑	—	☑
Design 5	—	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑	☑
Design 6	☑	—	—	☑	☑	☑	☑	☑	—	☑	—	—	☑	☑	—	☑

Conclusion and Recommendations

In this study, conducted as part of the Architectural Design course at Bingöl University's Department of Architecture, proposals were developed for underutilised areas in the city of Bingöl, considering parasitic architectural approaches. The students reimagined various spaces such as the blind facades of buildings, an unused water tank, an old bridge, and the viaduct piers connecting the city, redesigning them as day-use accommodations, social event spaces, public areas, and community gathering spots. Special emphasis was placed on sustainability, nature conservation, and reducing the carbon footprint in these projects. For instance, innovative interventions such as the transformation of a water tank into a functional living space and the addition of a new living space attached to a city bridge demonstrate that parasitic architecture can not only revitalise neglected areas but also enhance ecological sustainability.

The findings reveal how parasitic architecture can support urban development in Bingöl in a more sustainable and ecologically sensitive manner while also enhancing the social and cultural vibrancy of urban spaces. Moreover, as clearly illustrated in the comparative evaluation matrix (Table X), certain criteria were consistently prioritized across all six student projects. Minimal Footprint (MF), Flexibility and Modularity (FM), and Sustainability (S) were the three key characteristics that appeared in every project, demonstrating a shared commitment to environmentally conscious and adaptable design thinking. Typologies such as Hybrid Parasites (HP), Plug-in Parasites (PP), and Layered Parasite Structures (LPS) were also highly favored, pointing to a collective interest in multifunctional and modular spatial strategies.

On the other hand, Adaptive Reuse (AR) and Rooftop Parasites (RP) appeared less frequently, indicating that themes related to the reuse of historical or existing structures may require further emphasis in future studios. These gaps suggest the need for more diverse site selection and targeted discussions around heritage transformation in architectural education. Interdisciplinary input (particularly from urban planning, sociology, or environmental engineering) may help students understand the broader implications of parasitic interventions and their relevance to social equity and policy.

The general conclusions of the study are as follows:

- The application of parasitic architectural approaches in architectural education significantly enhanced students' abilities to interact with existing structures, repurpose spaces, and develop innovative solutions within constrained urban areas. The creative interventions developed by the students in response to current issues such as urban density and space scarcity are considered a major step in their professional preparation process.

- The study emphasised the importance of creating living spaces with minimal environmental impact by exploring how parasitic architecture aligns with sustainability principles. This process increased students' awareness of environmentally sensitive architectural practices and strengthened their knowledge and understanding in this area.
- The process of designing structures that could be integrated into the existing urban fabric improved students' abilities to conserve space and uncover the potential of existing buildings. This approach equipped architecture students with the skills to produce functional and aesthetic solutions in dense urban environments.
- Addressing real-world problems and data in student projects contributed significantly to the learning process. This experience helped students bridge theory and practice, making them better prepared to face real-world challenges in the architectural profession.
- Projects focused on parasitic architecture enhanced students' creative problem-solving skills, boosting their confidence in tackling complex urban and environmental issues. These projects also strengthened students' ability to think innovatively, making them more equipped to handle the challenges they will encounter in architectural practice.
- The use of parasitic architecture in architectural education effectively fosters students' creative thinking and problem-solving skills. Integrated with project-based learning, this approach encourages students to question existing urban spaces and propose innovative interventions for their transformation. It promotes deeper engagement with built environments and supports an experimental, forward-thinking design perspective.

The study explored the transformations that parasitic architecture can create on existing structures, encouraging students to investigate strategies of dissection, infiltration, and parasitisation in relation to these structures. These strategies enhance students' capacities to introduce new functions to urban spaces, ensure the continuity of architectural structures, and develop innovative solutions that can be integrated into existing urban fabrics. The socially focused aspect of parasitic architecture highlights its potential to raise awareness on issues such as homelessness and immigration. In this context, architecture students can gain a deeper understanding of architectural design as a process that not only involves aesthetics but also has social implications.

Furthermore, the evaluation shows that parasitic structures hold significant potential to diversify and revitalize urban environments through minimal yet impactful interventions. They provide flexible frameworks that can accommodate temporary or permanent, legal or informal additions making them suitable for future collaboration with municipalities or NGOs interested in urban regeneration. Future research could explore how parasitic strategies evolve in different institutional settings or over multiple semesters, offering insights into their long-term educational value.

The findings from this study clearly demonstrate the significance and potential of parasitic architecture in architectural education. This educational model holds great value in not only providing students with theoretical knowledge but also in enhancing their ability to apply this knowledge in practice and offer creative solutions to real-world problems. The integration of parasitic architecture into architectural education fosters a deeper and more critical engagement between students and both existing structures and urban spaces. As a result, architectural education provides an experience that strengthens students' independent thinking abilities, boosts their confidence, and prepares them for the challenges they will face in future architectural practice.

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