

Modular Miniature Golf

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Abstract

Miniature golf, a nostalgic and enduring pastime, is experiencing a resurgence in popularity as it adapts to modern consumer demands for connectivity. This research examines the evolution of miniature golf, from its historical roots as a simple putting game to its current status as a billion-dollar industry. The study explores the potential of modular design as a transformative strategy to enhance user engagement, foster greater customization, and increase accessibility. By analyzing the competitive landscape, consumer preferences, and technological advancements, the paper argues that modularity offers a unique solution to balance traditional values with contemporary expectations. Modular courses can provide dynamic, customizable gameplay experiences that cater to diverse demographics while preserving the family-friendly essence of the sport. This integration of innovation and accessibility positions modular miniature golf as a key player in the evolving recreational entertainment sector, fostering community and customer loyalty in an increasingly isolated world.

Introduction

American culture is perpetually growing more isolated despite the manifold opportunities we have to connect through technology. We're spending less time with friends, less time with family, and we're not getting out as much as people were decades ago. The Atlantic's Derek Thompson states that "For American adults, we are spending 30% time less doing face-to-face socializing than we did just 20 years ago. For American teenagers, the decline is ... just over 45%, so almost 50%." Along with loneliness, we have grown accustomed to customization, wanting our products to be designed specifically for our needs, wherever we are. As a solution to these two dilemmas, I turn to Miniature Golf, a tried-and-true means of socializing for decades. In essence, miniature golf (or crazy golf, putt-putt, or mini-putt) is a spin-off of golf where players focus solely on putting. However, since its origins, this framework has expanded to become one of the most beloved and immersive activities that appeals to any demographic. This nostalgic pastime is making a comeback because it is "long loved for its approachability and fun course designs—offers something for every age, skill level, budget, and locale" (Wyatt). According to IMIR Market Research, what began as a fad has now turned into a billion dollar industry, and now is the time to capitalize on this resurging form of entertainment, especially for the sake of connecting isolated individuals. Miniature golf has proved time and time again to bring people together, so now the question is how to tackle the desire for customization that is void from its traditional design. I believe that is found in modularity. In the face of market demand, how does modular design within miniature golf courses enhance user engagement, foster greater customization, and increase accessibility, ultimately cultivating customer loyalty and repeat visits?

The History of Mini Golf and Its Role Today

The American pastime of miniature golf has a rich history of innovation and trials. With roots in 11th century China, and especially 13th century Scotland and Netherlands, mini golf originated as a solution to the exclusion of women and caddies from conventional golf courses, culminating with the establishment of the St. Andrews Ladies' Putting Club on a hilly patch of grass, void of windmills and obstacles. This pastime took many shapes before making its way to America, where the theatrics were first introduced. The seminal moment in America arrived in 1916 with the unveiling of the Thistle Dhu course in North Carolina, a clever play on words echoing the sentiment, "This will do." This standardized course laid the groundwork for the Tom Thumb movement of the 1930s which introduced whimsical, immersive spectacles that would define the mini golf experience in subsequent decades. After fading in demand during the tribulations faced with the great depression, miniature golf began regaining some popularity with prefabricated kits created by the Taylor Brothers and later Lomma Enterprises. These kits, adorned with iconic obstacles such as windmills and drawbridges, democratized the mini golf experience, making it accessible to a broader audience. Throughout its various forms, the appeal has always been in its "cheap and frivolous diversion in times of economic cataclysm" and because "showmanship and mechanical art are an alluring combination" (Haley).



(Lomma Enterprises, 1955)

With technological advances in the modern era in both virtual reality and immersive environments, the market of competitive socializing and communal fun is resurging once again. When thinking of advancements, we tend to focus solely on technological aspects, and the pursuit of achieving hyper-realism and futuristic qualities through artificial means. However, it is obvious that one of the biggest draws to mini golf users is broad accessibility, and simply put, having a fun experience. Considering many of the distressing factors of today, it's no wonder why people want a fun, comfortable, and accessible escape with each other. There must be attention and efforts to not employ technology for technology's sake, but to consider if it genuinely enhances or distracts from the user experience in any setting. In virtual reality, “Walkabout Mini Golf” has become the “best-rated multiplayer virtual reality game on both Meta Quest and Steam platforms” (Wyatt). In the real world, “businesses like Puttshack (a “leading concept in the emerging and growing market of competitive socializing”) ... are outfitted with lots of screens which transform the IRL gameplay” (Wyatt). These advancements have the potential to heighten connectivity, or the power to crush it. In a space like VR, the game is being used as a catalyst to build relationships globally, but in real life, trends are showing the opposite effect. A common thread between many Google reviews of Puttshack is that the technology is “unreliable”, “gimmicky”, and “wildy-unnecessary”. This isn't to say the technology isn't creating an appealing experience, but maybe it is missing the point.

Business Impact

Traditional, family-owned miniature golf courses “require neither significant maintenance nor an overwhelming startup capital” (Lahey). These small businesses focus on the

activity of the miniature sport, with maybe the addition of an ice cream stand or arcade. They don't have any fancy technology elevating their status and visibility, but they stay true to the heart of the game and spirit, which has merit in its own right. Locking in solely on the putting activity provides customers with a sense of nostalgia that is overshadowed in corporations that have pursued miniature golf. As miniature golf takes shape as larger brands such as Puttery, Puttshack, and Tiger Woods' PopStroke, the game almost becomes secondary to the food and nightclub atmosphere that many of these businesses present. In terms of business strategy and revenue, maybe this is the way to go.

In terms of customer satisfaction, however, there is something to be said about leaning into the nostalgia of the game. Nostalgia is a powerful tool in branding and experiences. In order to lean into that with today's technology, the concept of anticipatory nostalgia combines the past and the future. The concept of "anticipatory nostalgia", coined by Yoy Bergs, is a psychological phenomenon where individuals feel nostalgic not for the past, but for the present moment, knowing it will soon become a memory. By recognizing anticipatory nostalgia, designers can tap into a unique emotional space and create more immersive and impactful experiences. In order to achieve this, designers can leverage familiar elements from the past or create nostalgic atmospheres that transport participants to a bygone era. These could be elements from traditional mini golf courses that America has come to love. There are ethical dilemmas in manipulating the consumer's emotions for profit, however if done in moderation, can elevate both the creator and the user. This shift in attention from the present experience may also have benefits, such as forming a signal to capture the moment by making a picture or video to directly share the present experience with other consumers. This concept challenges traditional notions of nostalgia, where "rather than focusing on nostalgia as a post-visit phenomenon, we argue that a distinct construct

of anticipatory nostalgia exists, which refers to a mental image based on the projection of a future state, combined with an emotional response” (Yoy).

Competitive Research and Analysis

Miniature golf is not just a nostalgic pastime—it's a thriving modern business model. Delving into the statistics behind the industry reveals key factors like location, pricing, and customer experience that pave the way for success in today's markets. Despite varying costs and consumer preferences, traditional miniature golf remains a vibrant and lucrative sector, ready for further expansion and innovation. As evidence, consider the words of Lindner, who notes that "the global mini golf industry has seen tremendous growth over the past few decades," boasting a \$9.9 billion value in 2019 and a projected market size of \$633.1 million in the US alone by 2028. With approximately 40,000 registered professional miniature golfers spanning 65 countries, and an estimated 130 million players globally generating around \$1 billion in revenue”, it's clear that miniature golf is not just surviving, but thriving worldwide (Soocial).

In a booming industry, there is naturally healthy competition that drives unique opportunities and practices to stay ahead of opposition. In business strategy, there's a clear link between being strategically competitive and gaining an advantage over competitors. Being strategically competitive means a company can consistently create value for its stakeholders and maintain it over time. This ability directly affects how well it can outperform others in the market. It highlights why managing strategies effectively is so important – it's what helps a company not only compete but also stay ahead. There are plenty of methods and ideas out there to help businesses improve their strategic competitiveness and stay ahead in tough, ever-changing markets. According to renowned administrative academic, Peter Drucker,

“ingenuity is a key factor in economic and social change, as well as a basic weapon in the development, resilience, and adaptability of contemporary organizations in changing environmental circumstances, as those organizations that do not innovate will soon be eliminated” (Ali). One way to stay on top of competition is through modularity. For example, think of a modular sofa. When a family looks to host a large party, they can combine couch components to create a larger couch, which meets their need for the audience at the time. The next day, the large couch takes up more space than they would like, so they separate the couch and divide the piece between various rooms to meet their new needs. Consumers and their preferences are constantly changing, and modularity allows quick change, iteration, and delivery to stay ahead of the competition.

As the miniature golf industry evolves, it's not just about creating courses – it's about crafting experiences that resonate with diverse audiences. With each new establishment comes a flood of feedback from customers, each with their own preferences and expectations. These days, companies are getting creative, infusing technology and upscale atmosphere into the traditional game, offering players an elevated experience where they can wine, dine, and putt their way through the course. PopStroke, Tiger Woods' new putt-putt business, is a good representative of the state of mini golf. The Orlando Real describes the entertainment hub like this, “This definitely isn't your traditional mini golf, I would refer to it as “sophisticated” mini golf.” As many businesses seek novelty, the recreation becomes secondary to nightlife experiences. This can suppress the family-friendly atmospheres that cemented miniature golf as a staple form of entertainment. Additionally, once played, the courses have nothing new to offer a returning customer. Modular design can transform miniature golf through greater accessibility and customization that leads to unique experiences while preserving family-fun at its core. In terms

of production, “modular design significantly influences the manufacturing process by introducing efficiency, flexibility, and scalability.” Deconstructing a product into basic modules optimizes the production process, and using standardized modules across different products saves significant costs. As the market continuously changes, “it also enables rapid response... as manufacturers can easily alter the combination of modules in a product to meet evolving consumer demands or incorporate technological advancements” (Tencom). However, designing a course that appeals to every demographic is no easy task. As I aim to develop a family-friendly course, I've realized that relying on the nightclub or “sophisticated” atmosphere that is popular among today’s businesses distracts from the heart and soul of the game. To succeed, the focus must shift towards reliability in technology, ensuring that the holes strike a balance between fun and challenge without feeling overly gimmicky. By utilizing modularity in my design, the courses can also be customized to suit different demographics, desires, and ensure the return of customers. Unlike establishments with alcohol to entertain patrons during wait times, our focus must be on keeping players engaged throughout their time on the course. When looking at the emerging trends in the industry, notable innovations include automatic score tracking with electronic putters and balls, creatively themed holes that add an element of luck, immersive environments reminiscent of escape rooms, versatile platforms that integrate arcade-style gaming, and the incorporation of food and beverage options. What's noteworthy about these innovations is their common thread – they're predominantly found indoors, marking a departure from the traditional outdoor setup. This shift reflects an industry-wide embrace of indoor venues, catering to the preferences and needs of modern players. Analyzing the strengths, weaknesses, threats, and opportunities will allow me to uncover what is working and can be capitalized on, and what needs to change.

Design Strategy

Building a brand isn't just about catchy logos and pretty designs—it's about forging deep connections with customers. Through insights from neuroscience research, Walvis has developed three fundamental laws that dictate how likely consumers are to remember and engage positively with a brand. These laws—distinctive relevance, coherence, and participation—aim to align branding efforts with the way our memory works. Take the law of participation, for example. Brands that grab our attention and pique our curiosity, enticing us to try, play, learn, or interact with them, are the ones that stand out and ultimately win the battle for consumer awareness. In other words, it's all about creating experiences that motivate and engage customers on a deeper level (Walvis). As an element of modular miniature golf, users could participate in the design process and have the opportunity to customize courses to their liking. If users have the opportunity to have a hand in the creative process in a controlled environment, they feel a sense of relevance as they have a personal bond with the product. With modular putt-putt, users will have the opportunity to mix and match pieces to create a personalized experience, and thus increasing interaction and play with the brand.

Modular design exists in a multitude of spaces such as user interfaces, products, design problems, and manufacturing. These modular systems aren't just about convenience; they're powerful tools that enhance standardization and customization, making it easier to adapt to market demands and customer preferences in a cost-effective manner. Whether it's through connecting modules together or swapping out components, modularity offers a flexible approach to designing and building miniature golf courses that meet the needs of both operators and players. The focus of modularity lies in breaking down complex problems into smaller,

independent parts, minimizing the interactions between them. This approach not only streamlines the design and construction process but also ensures that each component functions efficiently within the larger system, ultimately resulting in a more responsive and adaptable putt-putt experience for all (Salhie). By utilizing these techniques, courses could adapt to changing themes, seasons, difficulties, or shapes effortlessly. With component swapping, elements such as obstacles, decorative features, or even entire sections of the course could be easily interchanged to create fresh experiences for players. Sectional modularity could revolutionize the overall layout and structure of miniature golf courses. Instead of fixed designs, courses could be composed of modular sections that can be rearranged or expanded upon to accommodate different preferences. This flexibility not only allows for greater customization but also enables operators to optimize space usage and adapt to varying player demographics or skill sets. Beyond the physical aspects, modularity can extend into digital components, such as interactive scoreboards or augmented reality elements. If integrated seamlessly into the design in ways that only enhance the overall experience, these modular digital enhancements could allow operators to update or customize courses at an accelerated pace.

In order to realize this idea, creating a prototype will be essential in the exploration of miniature golf modularity. Creating prototypes involves striking a balance between realism and practicality; where the prototype is effective in conveying necessary information without requiring excessive time or resources. Designers should aim for the most cost-effective prototype possible, one that can be developed quickly and inexpensively while still fulfilling its purpose (Yang). Yang's research on prototypes reveals the correlation between simplicity and success in design. The study suggests that devices with fewer parts tend to perform better in terms of grades and rankings for various milestones. Reducing the number of parts not only streamlines the

design process, but “intuitively, fewer parts means less to design, fabricate, assemble, debug, and maintain” (Yang). Simplicity isn't just a matter of aesthetics, but a practical approach that can lead to more efficient and successful outcomes in the realm of product development and innovation.

Design Process

Phase 1: Conceptualization and Research

The first phase of this two semester long project focused on creating the modular course itself. Initially, I was inclined to dive into branding and market positioning. However, my mentor, MK Haley, emphasized the importance of first establishing a tangible product before developing its brand identity. This guidance directed my efforts toward extensive research, including analyzing market trends, examining established stationary miniature golf businesses, and exploring companies that had ventured into portable mini golf systems. Additionally, I conducted historical research to draw insights from the origins of miniature golf and studied existing modular products to assess design components such as joinery systems, materials, scalability, and branding strategies.

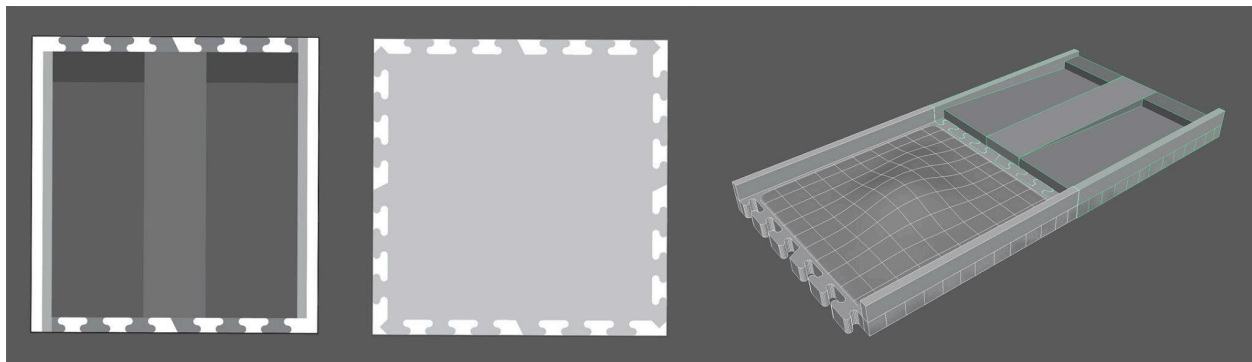
Now understanding the significance of storytelling in themed entertainment, I began developing a narrative for the product early in the process, using the Hero's Journey as a framework. This helped define the purpose of the modularity and informed the user experience design, shaping how the game would feel and play. Inspired by *Adventure Golf & Sports*, a leading innovator in the mini-golf industry, I incorporated their guiding principles for designing effective holes: choice, chance, and challenge. These principles—offering multiple paths, creating opportunities for surprising outcomes, and ensuring the experience remains engaging for a diverse audience—were integrated into the modular design philosophy. These 3 key pillars

ensure “multiple routes to a golf hole, the chance of a hole-in-one, or the chance that something unexpected happens to the ball, [and a challenge that] should be enjoyable for both children and adults” (Adventure Golf & Sports). With a modular design, the player is able to tailor this experience to fit any of these needs and opportunities to a more specific degree.

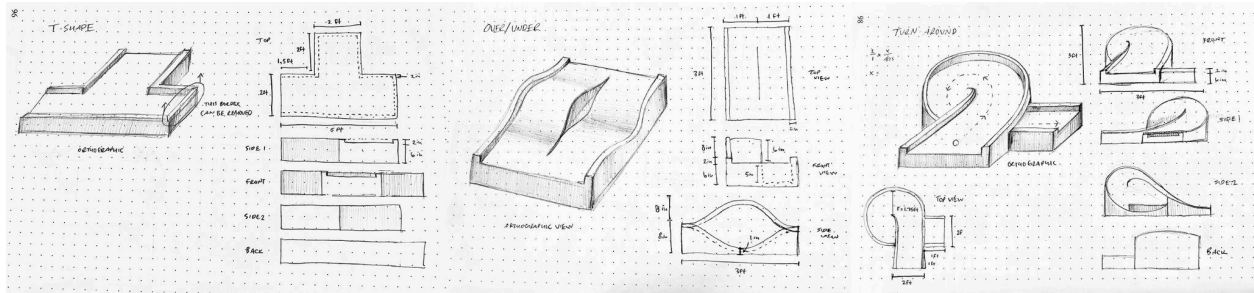
After conceptualizing the product’s narrative and conducting further research, I transitioned into the experimental development phase. This stage involved iterative prototyping using sketches, LEGO models, and paper constructions. Tangibly working through design challenges was invaluable for identifying both successes and obstacles in developing a modular mini-golf system.

Phase 2: 3D Modeling and Prototyping

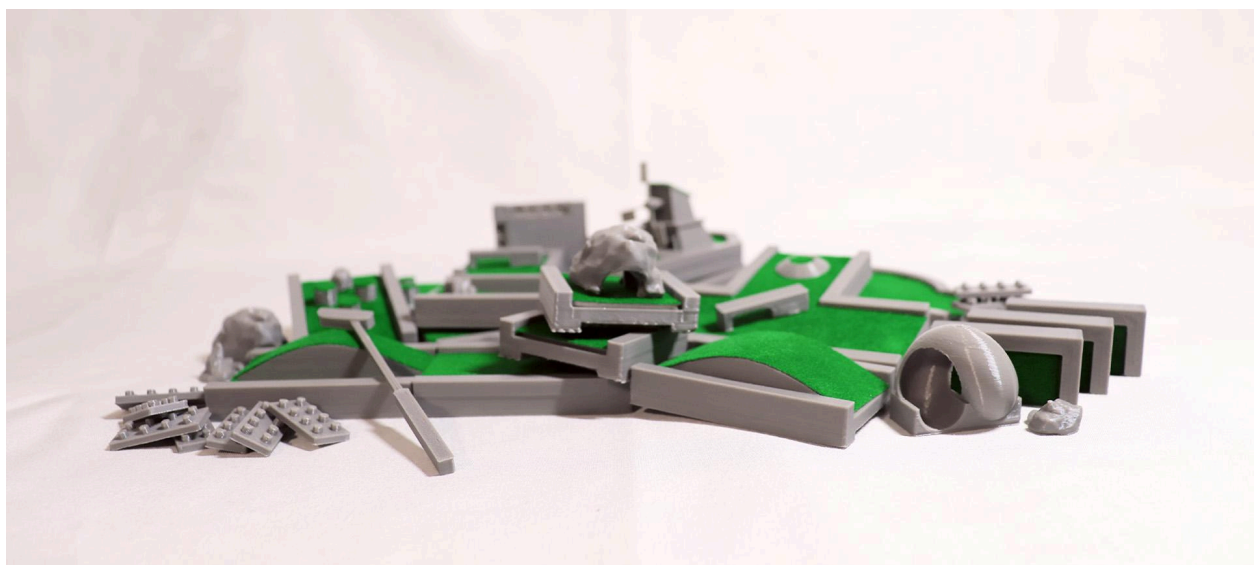
Building upon the insights gained during phase one, I moved into 3D modeling to produce an initial prototype of the modular course. My first approach leveraged familiar tools: I used Adobe Illustrator to create vector outlines of the modular pieces, which I then imported into Autodesk Maya for extrusion. While this workflow allowed me to visualize the design in 3D space, inaccuracies in the process highlighted its limitations, especially when trying to model more complex shapes that were not all level in height.



Exploring alternative 3D software tailored for product design proved challenging due to steep learning curves and time constraints. This led me to refocus on the broader creative objectives of the project rather than becoming overly preoccupied with perfecting 3D modeling techniques. To expedite the process, I collaborated with fellow student Diego Romero. Together, we pivoted toward myself producing detailed, dimensionally accurate blueprint concepts for each modular component, which Diego then 3D-modeled using Houdini.



To ensure timely progress, we concentrated on grayscale maps in Houdini for rapid prototyping through 3D printing. While these initial models serve as proof of concept, future iterations will utilize Diego's developing system, which integrates these foundational concepts into a robust framework for producing digital and physical variations of the modular course. The end result for this semester was a table-top miniature prototype as a proof of concept.



This featured 11 course pieces, 5 variations of generalized obstacles, and a rudimentary connection system to allow everything to snap together. The course pieces are layered with metal and felt to mimic the look of an life-size scale, and also allow for the obstacles to snap to the surface with embedded magnets. This is a solid foundation for playtesting and development that will continue next semester to enhance the table-top model and well as a full scale prototype.

Phase 3: Enhancing Accessibility and Interactivity

As the semester progressed, a key element emerged: expanding user interaction beyond traditional putting. To address accessibility and appeal to a broad demographic, I began incorporating features that allow players to engage with the system in innovative ways. These include analog and mechanical components such as moveable peg systems, rotating platforms, and pump-activated obstacles. These elements introduce opportunities for both cooperative gameplay and competitive interference, fostering inclusivity and engagement for players of all ages and abilities. This enhanced interactivity, combined with the modularity of the system, transforms miniature golf into a customizable experience that can adapt to varying user needs. The result is a product designed to bring miniature golf to diverse audiences—both metaphorically, by engaging people where they are in life, and physically, by offering a portable and adaptable recreation solution.

The integration of modular design in miniature golf courses amplifies user engagement in branding and facilitates tailored experiences. By offering dynamic gameplay and personalized challenges, these designs forge stronger connections between patrons and the business. Modular designs prioritize accessibility, ensuring that miniature golf remains an inclusive activity for all individuals, regardless of their ages or abilities. Through adaptable features and barrier-free

environments, these designs foster a sense of community and belonging among patrons. As the landscape of recreational entertainment evolves, further exploration into the transformative potential of modular design calls. This study highlights the profound impact of innovative design on customer retention, inviting future research to delve deeper into the realm of experiential design and its role in shaping the future of leisure and entertainment.

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