



How to cite this article:

Armstrong, S., & Fazea, Y. (2026). Hobbyists' Collection Web Application for Managing Miniature Model Inventories Using MERN Stack. *Journal of Digital System Development*, 4 (1), 38-45. <https://doi.org/10.32890/jdsd2026.4.1.3>

## **HOBBYISTS' COLLECTION WEB APPLICATION FOR MANAGING MINIATURE MODEL INVENTORIES USING MERN STACK**

**<sup>1</sup>Sean Armstrong & <sup>2</sup>Yousef Fazea**

Department of Computer Science,  
Marshall University, One John Marshall Dr., Huntington, WV 25704, USA

<sup>2</sup>*Corresponding author: [yousef.fazea@marshall.edu](mailto:yousef.fazea@marshall.edu)*

Received: 16/1/2026

Revised: 13/4/2026

Accepted: 15/4/2026

Published: 30/4/2026

### **ABSTRACT**

This is a web-based prototype that serves as a solution for miniature collectors of tabletop games, allowing them to manage their collection through addition, modification, deletion, and viewing. One of the principal problems this project addresses is that as collections grow, managing them becomes a hassle, leading people to purchase items twice because spreadsheet-based management is neither convenient nor portable. This analysis highlights a deficiency in current general-purpose inventory techniques when used for miniature hobbyist inventorying. Among its objectives, it aimed to develop a web application using React.js to improve the user experience (UX), develop the web server using Node.js (Express), enhance Node.js with Express, and utilise MongoDB to meet database needs. Among other objectives, it identified the functional and non-functional specifications of projects, activity diagrams, use case diagrams, user story specifications, collaboration diagrams, and database object schematics. A test of both usability and user experience was carried out using a 5-point Likert scale. The evaluation served as the prototype assessment to identify user perspectives and guide further refinements. There were 17 responses, representing roughly 89% of the active membership of a local game group. Results suggested that one should consider mobile-friendliness and allow users to interact using a touchpad. Results demonstrate the need to implement mobile-responsive features in the upcoming development iteration. Future developments would involve database modification, redesign of the graphical user interface, login function, and hosting options.

**Keywords:** React.js, MERN, Node.js, Usability, Web-Based Application

## INTRODUCTION

The MERN stack, which includes MongoDB, Express.js, React.js, and Node.js, is commonly used for web application development. It is popular due to its cost-effectiveness and ease of access. In addition, it has proven suitable for building interfaces which utilise JavaScript. This is supported by recent studies on the MERN stack (Labba et al., 2023). It has a website maintained by the React.js developers that provides information on using React.js for various purposes (Abramov & Nabors, 2023). All of which contribute to it being a viable web application development platform. It is used in several applications, such as e-commerce (Lilly et al., 2024) and online gaming platforms (McCloy et al., 2024). Despite the growing popularity of the MERN stack in general-purpose web systems, insufficient attention has been paid to its utilisation in inventory management solutions designed specifically for niche hobbyist communities such as miniature enthusiasts. To make it more usability-oriented, the project involves assessing user interaction and perception. Usability testing is carried out using the System Usability Scale, with proven effectiveness informing the process. Following guidelines for usability testing on mobile devices is also intended to assess accessibility (Weichbroth, 2024; Deshmukh & Chalmeta, 2024).

Ramos-Miller and Pacheco (2023) stressed the importance of having easily accessible information for managing inventories and how it helps achieve good results and minimise errors. Furthermore, miniature hobbyists often employ spreadsheets, general inventory tools, or even keep records manually, which serve basic inventorying purposes but lack the customisation required to meet the community's needs. Learning React is made easy through project-based learning and guidance from experienced teachers (Wieruch, n.d.). Technology is extremely helpful for people who own miniatures and are involved in tabletop gaming because it provides access to information on all devices. It helps item collectors and people interested in miniatures manage their inventories and get details about their items.

The project discussed here involves developing a website to help people manage their collections. The project involves creating, editing, deleting, and viewing miniatures. A problem identified in the miniature collection community is the mental strain of inventorying miniatures, which can lead to the purchase of duplicates. Inventory inaccuracies can also lead to complications. Spreadsheets can be an alternative; however, their usability and portability are limited. This situation suggests a practical gap in applying general-purpose inventory techniques to hobbyist miniature collectors, which helps explain the decision to create a prototype based on web technologies. The miniature collection community focuses on improving inventory efficiency.

The current prototype represents Phase 1 and involves an iterative and rapid cycle of planning, design, testing, and refinement until the system is ready. Results from the first development iteration will help improve the usability and functionality of subsequent iterations, with a primary focus on mobile responsiveness, interface refinement, and support for touch-based features. The user interface layer of the prototype uses React.js.

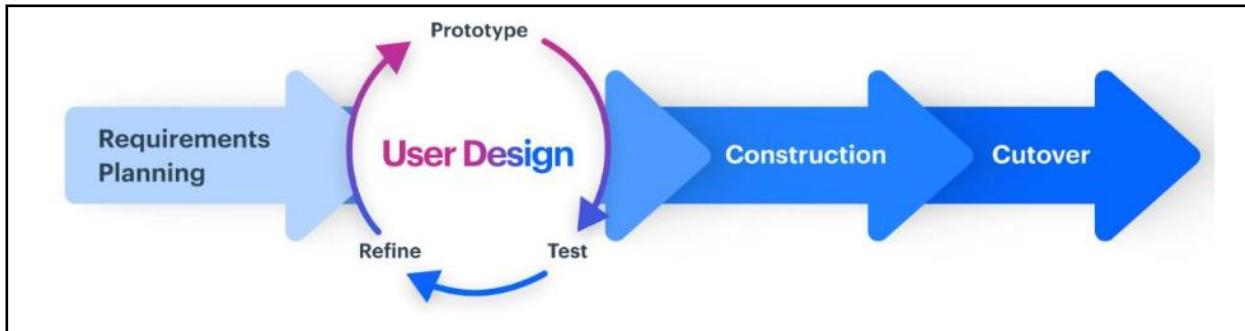
## METHODOLOGY AND FRAMEWORK

A Rapid Application Development (RAD) framework is used to describe the development approach for The Hobbyists' Collection, with a focus on phased delivery and an iterative prototype cycle. The RAD model was chosen for its applicability to prototype-based system design, enabling rapid creation, implementation, and integration of user input for further refinement. Figure 1 illustrates how the process corresponds to the RAD phases. As seen in Figure 1, the project progressed from planning to design and

development, followed by the evaluation stage, with the results of the current prototype helping to guide future iterations and improvements in usability and functionality.

**Figure 1**

*Rapid Application Development Methodology*



### DESIGN AND DEVELOPMENT

Functional and non-functional requirements were specified and prioritised using mandatory, desirable, and optional classifications as shown in Tables 1 and 2. System requirements were defined in Tables 1 and 2 to guide the first iteration of the design and implementation process. The requirements cover login, miniature inventory management (view, add, edit, delete, sort, filter), user management (admin add/edit/delete), and optional customisation through settings. JSON file for site colour scheme changes. The workflow and interactions were modelled through activity diagrams (login, add record, edit record, delete record, filter table view), use case diagrams (hobbyist use case and admin use case) as shown in Figure 2, and collaboration diagrams (user login, add mini, edit mini, delete mini, hobbyist filters table) as shown in Figure 3. Figures 2 and 3 outline, respectively, the core system features available to end users and miniature hobbyists, as well as the interactions among these features. User story specifications were documented for two user personas, Bilbo (general user) and Gandalf (admin user), with acceptance criteria for each major capability. Data structures were defined using database object schemas for two MongoDB entities, Miniatures and Users, which include fields for identifiers, ownership, quantities, dates, manufacturer, setting, status, role, email, and password. A Usability and User Experience (UX) test was conducted using a 5-point Likert scale with statements intended to infer potential future changes. This device served as the first context-specific evaluation of the prototype and was not intended to be a standard System Usability Scale (SUS) test; nevertheless, the results could serve as guidelines for design refinements. Listed below are the functional and non-functional requirements for the system. In the priority column, the following short hands are used:

- M – mandatory requirement (something the system must do)
- D – desirable requirement (something the system should preferably do)
- O – optional requirement (something the system may do)

**Table 1**

*Functional Requirements*

| No. | Requirement ID | Requirement Description   | Priority |
|-----|----------------|---|----------|
|     | <b>THC_01</b>  | <b>Login</b>  |          |
| 1   | THC_01_01      | The users must log in to the system using their name and password | M        |

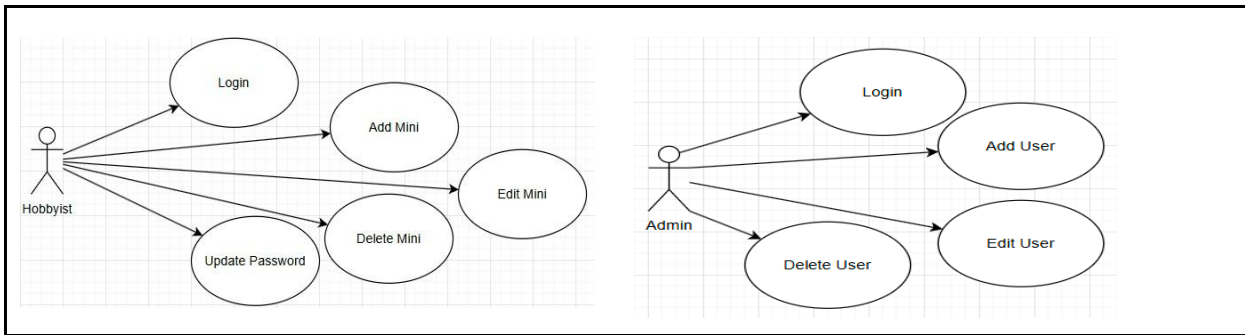
|    |               |  |   |
|----|---------------|--|---|
| 2  | THC_01_02     | Users can change their own passwords   | D |
|    | <b>THC_02</b> | <b>Miniature Inventory Management</b>  |   |
| 3  | THC_02_01     | Users can view their existing miniatures from the main page                                    | M |
| 4  | THC_02_02     | Users can add a new miniature to their collection  | M |
| 5  | THC_02_03     | Users can edit their miniature records in their collection                                     | M |
| 6  | THC_02_04     | Users can delete miniature records in their collection   | M |
| 7  | THC_02_05     | Users can sort their miniature records into their collection                                   | D |
| 8  | THC_02_06     | Users can filter their miniature records in their collection                                   | D |
|    | <b>THC_03</b> | <b>User Management</b>   |   |
| 9  | THC_03_01     | Admin can add user accounts  | D |
| 10 | THC_03_02     | Admin can edit user accounts   | D |
| 11 | THC_03_03     | Admin can delete user accounts   | D |
| 12 | THC_03_04     | Users can upload a .json file to change the colour scheme of the site from the default colours | O |

**Table 2**

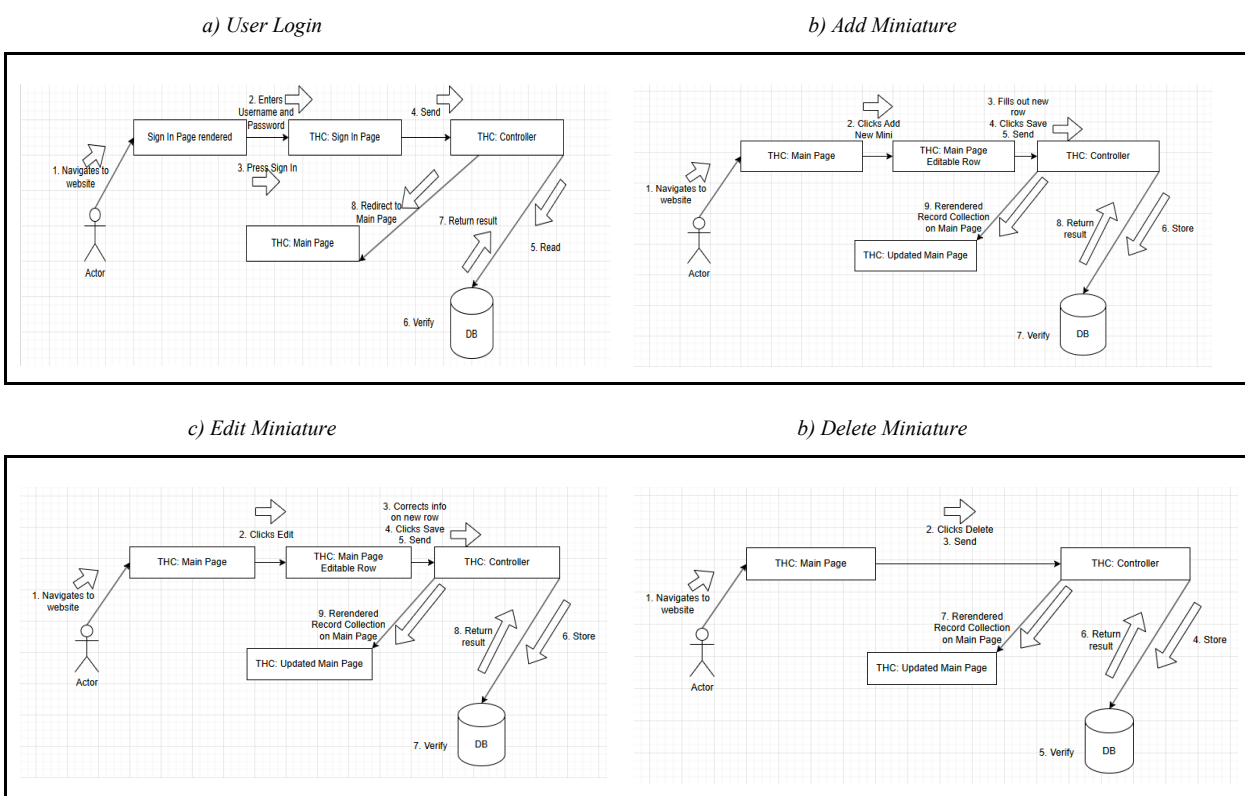
*Non-Functional Requirements*

| No. | Requirement ID | Requirement Description   | Priority |
|-----|----------------|---|----------|
|     | <b>THC_04</b>  | <b>Security</b>   |          |
| 1   | THC_04_01      | The system should be secure by preventing unauthorised users from interacting with other users' records and credentials | M        |
| 2   | THC_04_02      | The system should be secure by allowing only the Project Owner to promote a user account's role to Admin.               | M        |
|     | <b>THC_05</b>  | <b>Usability</b>  |          |
| 3   | THC_05_01      | The system must be easy to use  | M        |
|     | <b>THC_06</b>  | <b>Understandability</b>  |          |
| 4   | THC_06_01      | The system must be easy to understand   | M        |
|     | <b>THC_07</b>  | <b>Reliability</b>  |          |
| 5   | THC_07_01      | The system should present the same workflow for every user  | M        |
|     | <b>THC_08</b>  | <b>Performance</b>  |          |
| 6   | THC_08_01      | The system should update quickly whenever a network or DB request is made   | D        |
| 7   | THC_08_02      | The system should not re-render non-changing components or elements on the page   | M        |
|     | <b>THC_09</b>  | <b>Availability</b>   |          |
| 9   | THC_09_01      | The system must not crash, and if it does, it should be able to quickly come back                                       | D        |
| 10  | THC_09_02      | The system should be available on all common browsers and maintain a similar appearance                                 | D        |

**Figure 2**  
Use Case Diagram



**Figure 3**  
Collaboration Diagram

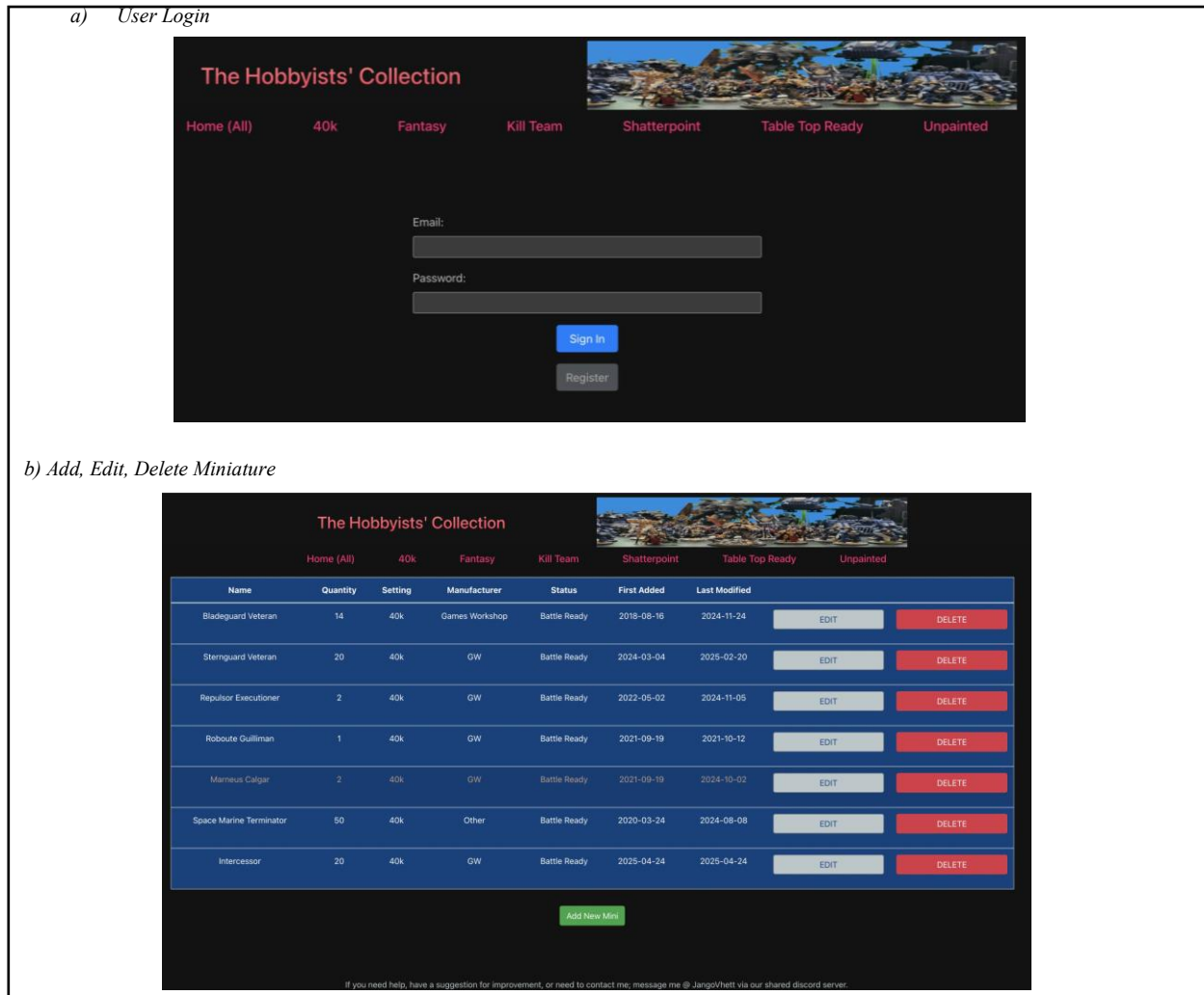


The system was developed as an inventory tool for tabletop gaming miniatures, called The Hobbyists' Collection. As shown in Figure 4, the prototype begins with a User Login screen that displays the application title and navigation links (e.g., Home (All), 40k, Fantasy, Kill Team, Shatter point, Tabletop Ready, Unpainted), along with fields for Email and Password and buttons to Sign In (and register). Figure 4 shows the main graphical user interface of the prototype and explains how the design makes it easier to access core inventory functions. After successfully signing in, the user is taken to the main page, where the miniature collection is displayed in a table format. The table presents each record with fields such as Name, Quantity, Setting, Manufacturer, Status, First Added, and Last Modified, and provides row-level actions through EDIT and DELETE buttons. From this view, a new miniature can be added by selecting Add New Mini, which opens a form for entering the information needed to save a new record in the database; after saving, the new miniature appears in the collection list. If a record needs correction, selecting EDIT opens an editable row to modify the relevant field(s), and saving updates the displayed record. If a miniature has been sold or removed from the collection, selecting DELETE removes that record from the table view. The

user perspective on usability identified in this iteration necessitated further enhancements in the next development iteration.

**Figure 4**

*GUI of the Web-Based Application*



## USABILITY EVALUATION

A standard Usability Test was initially planned; several statements were replaced with User Experience (UX)- focused ones to better identify potential future changes. Consequently, this evaluation should be viewed as a context-specific usability and user experience assessment of the prototype rather than an implementation of the standardised SUS scale. A 5-point Likert scale was used for responses to ten statements, including intended frequency of use, difficulty and ease of use, ease of finding actions (Add Mini, Edit, Delete), speed of learning, confidence, need to learn before use, willingness to refer the site to a friend, design distraction, and preference for phone versus computer use. A local gaming group tested the website and provided 17 responses, which were about 89% of active members. As shown in Figure 5, ease of use and confidence were fully positive (easy to use: 52.9% strongly agree and 47.1% agree; confident to use: 76.5% strongly agree and 23.5% agree). Intended frequent use was also largely positive (41.2% agree and 29.4% strongly agree), with 23.5% neutral and 5.9% disagree. Preference for mobile use was supported by 47.1% who agreed and 29.4% who strongly agreed, while 11.8% were neutral and 11.8% disagreed. These results indicate a need to reapproach the design with a mobile-first focus and to include

functionality for touchpad interaction. These findings also suggest improvements for the next iteration, including interface refinement, mobile responsiveness, and support for touch-based functionality.

**Figure 5**

*Usability Evaluation*

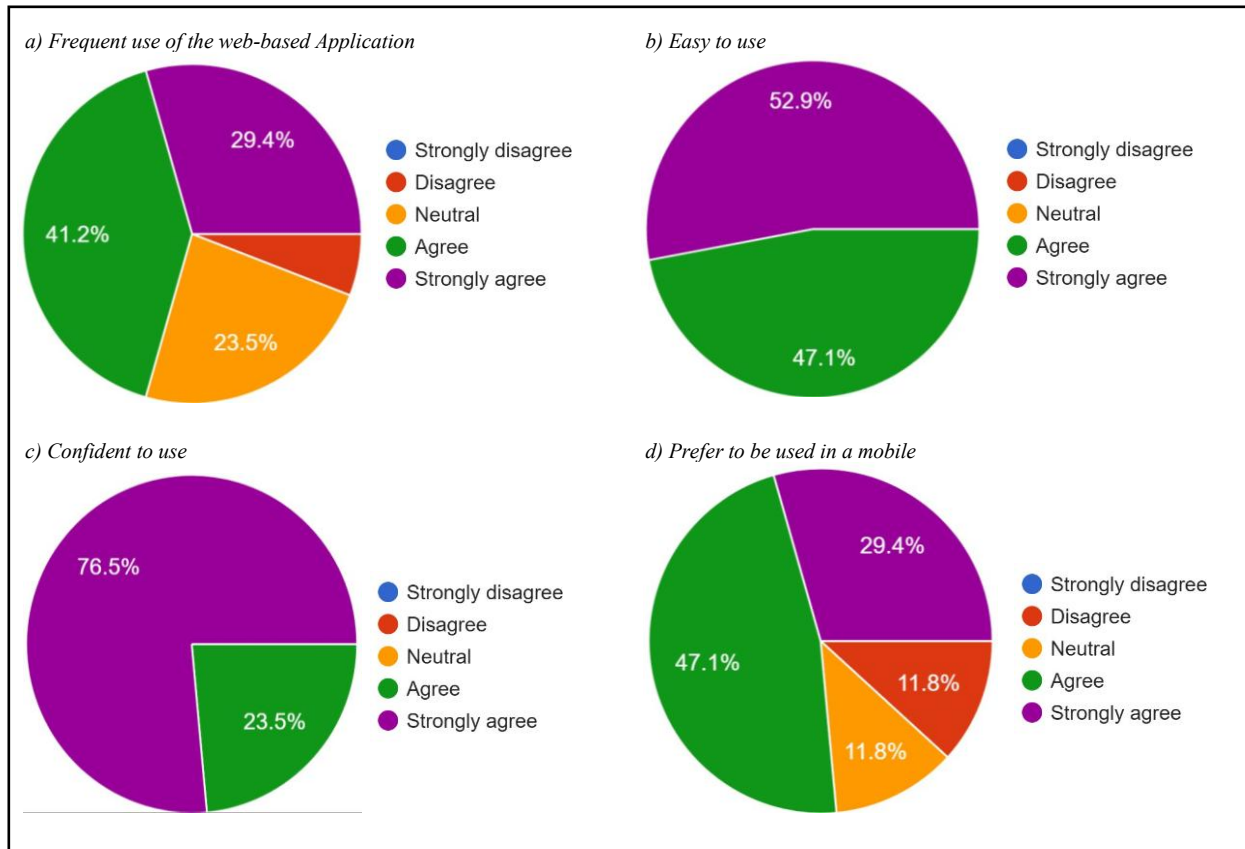


Figure 5 shows the main usability and user-experience feedback from the intended users. Overall, it can be concluded that perceived usability and user satisfaction are very high, although there is a clear need to improve the software's mobile compatibility.

**CONCLUSION**

The prototype, The Hobbyists' Collection, provides a web-based inventory tool that allows users to add, edit, delete, and view miniature records to help manage tabletop gaming miniature collections, where remembering items can become difficult and may lead to duplicate purchases. A Usability and User Experience (UX) test with 17 responses (about 89% of active members) indicated that the site was easy to use and functioned well; however, opinions about the design were mixed, and most participants were more interested in using the site on a mobile device than in a browser. The findings indicate a need to reapproach the design with a mobile-first focus and to include functionality for touchpad interaction. Expected future changes include a database migration, a Graphical User Interface (GUI) overhaul, and integration with login and hosting services. In conclusion, this study defines the prototyping stage of system development and demonstrates that a MERN stack application can serve as a basis for a small inventory management system in a specific domain of interest. The results confirm the utility of the current prototype and outline future improvements.

## ACKNOWLEDGMENT

This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

## REFERENCES

- Abramov, D., & Nabors, R. (2023, March 16). Introducing react.dev. React Blog. <https://react.dev/blog/2023/03/16/introducing-react-dev>
- Deshmukh, A. M., & Chalmeta, R. (2024). Validation of the System Usability Scale as a usability metric for evaluating voice user interfaces. *PeerJ Computer Science*, 10, e1918. <https://doi.org/10.7717/peerj-cs.1918>
- Labba, S. T., Sharfuddin, M., Praveen, Z. S., Sujitha, B., & Reddy, D. (2023). Comprehensive analysis of web application development using the MERN stack. *International Journal of Creative Research Thoughts (IJCRT)*, 11(7). <https://www.ijcrt.org/papers/IJCRT2307133.pdf>
- Lilly, B., Zeigler, A., & Fazea, Y. (2024). Toronto Cupcakes e-commerce powered by React JS frameworks for user-centric design. *Journal of Digital System Developments*, 2(2). <https://e-journal.uum.edu.my/index.php/jdsd/article/view/23093>
- Mccloy, D., Byrant, K., & Fazea, Y. (2024). The gathering deck builder with React.js and cutting-edge web development. *Current Trends in Computing*, 2(1), 48–59. <https://dergipark.org.tr/en/pub/ctc/article/1492138>
- Ramos-Miller, C. G., & Pacheco, A. (2023). Towards inventory control excellence: Analysing management in educational institutions. *F1000Research*, 12, 1471. <https://doi.org/10.12688/f1000research.140745.1>
- Weichbroth, P. (2024). Usability testing of mobile applications: A methodological framework. *Applied Sciences*, 14(5), 1792. <https://doi.org/10.3390/app14051792>
- Wieruch, R. (n.d.). The road to learn React: Your journey to master plain yet pragmatic React.js. Independently published. <https://www.roadtoreact.com/>