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Auto generated user room

Project 1

Virtual bedroom arrangement

A blue and white logo

Description automatically generated

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# System-as-is

## Problem:

Manually designing a room requires effort, skills, and time. Most users may not know how to arrange furniture or select items that fit well within their room. Users also face challenges in visualizing room layouts and determining whether furniture will fit and function well in the space. Manual design requires effort and expertise.

## Opportunity:

* Provide an automated, easy-to-use room layout generator that eliminates the need for design experience.
* Offer a flexible and customizable tool for both individual users and professionals.
* Monetize the system through premium features and licenses.

## System knowledge:

The system will require advanced algorithms for space calculation, user interface design, database management, and 3D rendering techniques.

# System-to-be

## Objective(why):

### Purpose:

To help users quickly and easily visualize a room layout by providing minimal information about the space and letting the system automatically create the design.

### Objectives:

* Allow users to input and modify room dimensions and furniture details.
* Ensure that furniture fits within the room through automated space calculations.
* Provide a user-friendly interface for account management and room customization.
* Offer graphical visualization of the final room layout.
* Generate suggestions for better room arrangements and furniture upgrades.
* Provide options for free and premium accounts with different feature sets

## Functionality(what):

* User input management (add, modify, delete)
* User account management
* Database management
* Room Space Calculation and Furniture Placement
* Output and Visualization

## Who:

* Client: People who want a quick and easy way to visualize their room layout without manually designing it

# Functional requirements

* The system shall allow users to add, modify, and delete room dimensions and furniture types.
* The system shall validate user input and ensure completeness before generating room layouts.
* The system shall automatically calculate whether all selected furniture can fit within the given room dimensions.
* The system shall display furniture arrangement graphically, showing free space and distances.
* The system shall support account creation, deletion, and management, including password validation and security.
* The system shall offer both free and paid account options, with different levels of features.

# Non-Functional requirements

* Performance: The system shall generate room layouts within 5 seconds of receiving user input.
* Scalability: The system must handle an increasing number of users and room configurations without performance degradation.
* Security: User information, including room data and account details, shall be stored securely, with encryption for sensitive data.
* Usability: The user interface shall be intuitive and easy to navigate, even for users without design experience.
* Availability: The system shall maintain 99.9% uptime and autosave user progress every 30 minutes

# User story

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | User point | Rate |
| VBA-01. Add room dimension | As a user, I want to add my room dimension | 1 | H |
| VBA-02. Modify room dimension | As a user, I want to modify my room dimension | 1 | M |
| VBA-03. Delete room dimension | As a user, I want to remove my room dimension | 1 | L |
| VBA-04. Add bed type | As a user, I want to add my type of bed | 1 | H |
| VBA-05. Modify bed | As a user, I want to change mt type of bed | 1 | M |
| VBA-06. Delete bed | As a user, I want to remove my bed | 1 | L |
| VBA-07. add number of people | As a user, I want to add the amount of people that will use this room | 1 | H |
| VBA-08. modify number of people | As a user, I want to modify the amount of people that will use this room | 1 | M |
| VBA-09. remove number of people | As a user, I want to remove the amount of people that will use this room | 1 | L |
| VBA-10.add drawer | As a user, I want to add the amount of drawer I have and say what kind of drawer I have | 1 | H |
| VBA-11. modify drawer | As a user, I want to change the amount/type of drawer | 1 | M |
| VBA-12. remove drawer | As a user, I want to remove drawer | 1 | L |
| VBA-13. add closet | As a user, I want to add amount/type of closet | 1 | H |
| VBA-14. modify closet | As a user, I want to change the amount/type of closet | 1 | M |
| VBA-15. remove closet | As a user, I want to remove the closet | 1 | L |
| VBA-16. add nightstand | As a user, I want to add nightstand and its type | 1 | H |
| VBA-17. modify nightstand | As a user, I want to modify the amount/type of nightstand | 1 | M |
| VBA-18. remove nightstand | As a user, I want to remove nightstand | 1 | L |
| VBA-19. add office table | As a user, I want to add office table | 1 | H |
| VBA-20. modify office table | As a user, I want to modify an office table | 1 | M |
| VBA-21. remove office table | As a user, I want to remove an office table | 1 | L |
| VBA-22. free space | As a user, I want to tell the program how much space I want in my room | 1 | H |
| VBA-23. modify free space | As a user, I want to modify how much space my room will have | 1 | M |
| VBA-24. remove free space | As a user, I want to remove how much free space my room can have | 1 | L |
| VBA-25. add door | As a user, I want to tell where my room door is and what is the size | 2 | H |
| VBA-26. modify door | As a user, I want to change the placement of my room door | 1 | M |
| VBA-27. remove door | As a user, I want to remove my room door | 1 | L |
| VBA-28. add window | As a user, I want to add my window and provide its size | 2 | H |
| VBA-29. Modify window | As a user, I want to change the placement/size of my window | 1 | M |
| VBA-30. remove window | As a user, I want to remove my window | 1 | L |
| VBA-31. add in-room wardrobe | As a user, I want the program to tell me if I have a add in-room wardrobe | 2 | H |
| VBA-32. modify in-room wardrobe | As a user, I want to modify placement of in-room wardrobe | 2 | M |
| VBA-33. remove in-room wardrobe | As a user, I want to remove in-room wardrobe | 1 | L |
| VBA-34. create account | As a user, I want to create my account | 3 | H |
| VBA-35. delete account | As a user, I want to delete my account | 1 | L |
| VBA-36. unlock/lock account | As a user, I want to unlock/lock my account | 1 | L |
| VBA-37. Username duplication check | As a user, I want to know if my name is already taken | 2 | H |
| VBA-38. password validation | As a user, I want the system to validate my password when I create or update my account | 1 | H |
| VBA-39. Number of log-in tries | As a user, I want the system to limit the number of log-in attempts so that my account is protected | 1 | L |
| VBA-40. save/load | As a user, I want to save/load my bedroom | 5 | M |
| VBA-41. change password | As a user, I want to change my password | 1 | L |
| VBA-42. bedroom name | As a user, I want to add bedroom name to differentiate my other generated bedroom | 1 | H |
| VBA-43. reset password | As a user, I want to reset my password in case I lost/forget my original password | 2 | M |
| VBA-44. session timer(auto-save) | As a user, I want to have a session timer that auto-save my work | 2 | L |
| VBA-45. user fee(optional) | As a user, I want to have a user fee | 1 | L |
| VBA-46. database schema setup | As a system, I need to set up a database schema to organize and store user data | 10 | H |
| VBA-47. user information storage | As a system, I want to store user information | 5 | H |
| VBA-48. user information retrieval | As a system, I want to retrieve user information | 3 | M |
| VBA-49. user information delete | As a system, I want to delete user information | 1 | L |
| VBA-50. validate user input | As a user, I want the system to validate my input | 2 | H |
| VBA-51. check user input completeness | As a user, I want the system to check my input completeness | 1 | H |
| VBA-52. calculate furniture volume | As a user, I want the system to automatically calculate if all furniture can fit by calculating the total volume of each furniture | 1 | H |
| VBA-53. calculate room volume | As a user, I want the system to automatically calculate if all furniture can fit by calculating the room volume | 2 | H |
| VBA-54. Constraint | As a user, I want the system to automatically calculate if all furniture can fit by  Taking account constraint to avoid overlaps | 10 | H |
| VBA-55. furniture upgrade | As a user, if furniture fits within the room, I want the system to  ask me if I want to upgrade my furniture | 2 | M |
| VBA-56. extra furniture | As a user, if furniture fits within the room, I want the system to  ask me if I want to add more furniture | 2 | M |
| VBA-57. furniture resize | As a user, if furniture doesn’t fit, I want the system to ask me to resize furniture | 2 | M |
| VBA-58. furniture type change | As a user, if furniture doesn’t fit, I want the system to ask me to change furniture type | 2 | M |
| VBA-59. remove furniture  Option | As a user, if furniture doesn’t fit, I want the system to ask me to remove my furniture | 2 | M |
| VBA-60. change free space for bedroom | As a user, if furniture doesn’t fit, I want the system to ask me to change free space for bedroom | 2 | M |
| VBA-61. output result | As a user, I want to see the final arrangement of my room through a text-based summary  of the room's dimensions, furniture sizes, and free space | 3 | H |
| VBA-62. output image | As a user, I want to view an image of the bedroom | 5 | L |
| VBA-63. Show free space | As a user, I want to see the free space in the room | 1 | L |
| VBA-64. show distance between furniture | As a user, I want to see the distance between furniture | 3 | H |
| VBA-65. Suggestion | As a user, I want to receive suggestion for extra furniture or decoration | 3 | L |
| VBA-66. user preference | As a user, I want to provide feedback on furniture placement | 5 | L |
| VBA-67. regenerate room base on user preference | As a user, I want to Regenerate the room layout based on my new preferences to see updated arrangements. | 10 | L |
|  |  | 135 |  |

# 1st iteration

|  |  |  |  |
| --- | --- | --- | --- |
| ID | Description | User point | Rate |
| VBA-01. Add room dimension | As a user, I want to add my room dimension | 1 | H |
| VBA-02. Modify room dimension | As a user, I want to modify my room dimension | 1 | M |
| VBA-03. Delete room dimension | As a user, I want to remove my room dimension | 1 | L |
| VBA-04. Add bed type | As a user, I want to add my type of bed | 1 | H |
| VBA-05. Modify bed | As a user, I want to change mt type of bed | 1 | M |
| VBA-06. Delete bed | As a user, I want to remove my bed | 1 | L |
| VBA-07. add number of people | As a user, I want to add the amount of people that will use this room | 1 | H |
| VBA-08. modify number of people | As a user, I want to modify the amount of people that will use this room | 1 | M |
| VBA-09. remove number of people | As a user, I want to remove the amount of people that will use this room | 1 | L |
| VBA-10.add drawer | As a user, I want to add the amount of drawer I have and say what kind of drawer I have | 1 | H |
| VBA-11. modify drawer | As a user, I want to change the amount/type of drawer | 1 | M |
| VBA-12. remove drawer | As a user, I want to remove drawer | 1 | L |
| VBA-13. add closet | As a user, I want to add amount/type of closet | 1 | H |
| VBA-14. modify closet | As a user, I want to change the amount/type of closet | 1 | M |
| VBA-15. remove closet | As a user, I want to remove the closet | 1 | L |
| VBA-16. add nightstand | As a user, I want to add nightstand and its type | 1 | H |
| VBA-17. modify nightstand | As a user, I want to modify the amount/type of nightstand | 1 | M |
| VBA-18. remove nightstand | As a user, I want to remove nightstand | 1 | L |
| VBA-19. add office table | As a user, I want to add office table | 1 | H |
| VBA-20. modify office table | As a user, I want to modify an office table | 1 | M |
| VBA-21. remove office table | As a user, I want to remove an office table | 1 | L |
| VBA-22. free space | As a user, I want to tell the program how much space I want in my room | 1 | H |
| VBA-23. modify free space | As a user, I want to modify how much space my room will have | 1 | M |
| VBA-24. remove free space | As a user, I want to remove how much free space my room can have | 1 | L |
| VBA-25. add door | As a user, I want to tell where my room door is and what is the size | 2 | H |
| VBA-26. modify door | As a user, I want to change the placement of my room door | 1 | M |
| VBA-27. remove door | As a user, I want to remove my room door | 1 | L |
| VBA-28. add window | As a user, I want to add my window and provide its size | 2 | H |
| VBA-29. Modify window | As a user, I want to change the placement/size of my window | 1 | M |
| VBA-30. remove window | As a user, I want to remove my window | 1 | L |
| VBA-31. add in-room wardrobe | As a user, I want the program to tell me if I have a add in-room wardrobe | 2 | H |
| VBA-32. modify in-room wardrobe | As a user, I want to modify placement of in-room wardrobe | 2 | M |
| VBA-33. remove in-room wardrobe | As a user, I want to remove in-room wardrobe | 1 | L |
| VBA-50. validate user input | As a user, I want the system to validate my input | 2 | H |
| VBA-51. check user input completeness | As a user, I want the system to check my input completeness | 1 | H |
| VBA-52. calculate furniture area | As a user, I want the system to automatically calculate if all furniture can fit by calculating the total area of each furniture | 1 | H |
| VBA-53. calculate room area | As a user, I want the system to automatically calculate if all furniture can fit by calculating the room area | 2 | H |
| VBA-61. output result | As a user, I want to see the final arrangement of my room through a text-based summary  of the room's dimensions, furniture sizes, and free space | 3 | H |
|  |  | 46 |  |

# 2nd iteration

|  |  |  |  |
| --- | --- | --- | --- |
| VBA-34. create account | As a user, I want to create my account | 3 | H |
| VBA-35. delete account | As a user, I want to delete my account | 1 | L |
| VBA-36. unlock/lock account | As a user, I want to unlock/lock my account | 1 | L |
| VBA-37. Username duplication check | As a user, I want to know if my name is already taken | 2 | H |
| VBA-38. password validation | As a user, I want the system to validate my password when I create or update my account | 1 | H |
| VBA-39. Number of log-in tries | As a user, I want the system to limit the number of log-in attempts so that my account is protected | 1 | L |
| VBA-40. save/load | As a user, I want to save/load my bedroom | 5 | M |
| VBA-41. change password | As a user, I want to change my password | 1 | L |
| VBA-42. bedroom name | As a user, I want to add bedroom name to differentiate my other generated bedroom | 1 | H |
| VBA-43. reset password | As a user, I want to reset my password in case I lost/forget my original password | 2 | M |
| VBA-44. session timer(auto-save) | As a user, I want to have a session timer that auto-save my work | 2 | L |
| VBA-45. user fee(optional) | As a user, I want to have a user fee | 1 | L |
| VBA-46. database schema setup | As a system, I need to set up a database schema to organize and store user data | 10 | H |
| VBA-47. user information storage | As a system, I want to store user information | 5 | H |
| VBA-48. user information retrieval | As a system, I want to retrieve user information | 3 | M |
| VBA-49. user information delete | As a system, I want to delete user information | 1 | L |
| VBA-63. Show free space | As a user, I want to see the free space in the room | 1 | L |
| VBA-64. show distance between furniture | As a user, I want to see the distance between furniture | 3 | H |
|  |  | 44 |  |

# 3rd iteration

|  |  |  |  |
| --- | --- | --- | --- |
| VBA-54. Constraint | As a user, I want the system to automatically calculate if all furniture can fit by  Taking account constraint to avoid overlaps | 10 | H |
| VBA-55. furniture upgrade | As a user, if furniture fits within the room, I want the system to  ask me if I want to upgrade my furniture | 2 | M |
| VBA-56. extra furniture | As a user, if furniture fits within the room, I want the system to  ask me if I want to add more furniture | 2 | M |
| VBA-57. furniture resize | As a user, if furniture doesn’t fit, I want the system to ask me to resize furniture | 2 | M |
| VBA-58. furniture type change | As a user, if furniture doesn’t fit, I want the system to ask me to change furniture type | 2 | M |
| VBA-59. remove furniture  Option | As a user, if furniture doesn’t fit, I want the system to ask me to remove my furniture | 2 | M |
| VBA-60. change free space for bedroom | As a user, if furniture doesn’t fit, I want the system to ask me to change free space for bedroom | 2 | M |
| VBA-62. output image | As a user, I want to view an image of the bedroom | 5 | L |
| VBA-65. Suggestion | As a user, I want to receive suggestion for extra furniture or decoration | 3 | L |
| VBA-66. user preference | As a user, I want to provide feedback on furniture placement | 5 | L |
| VBA-67. regenerate room base on user preference | As a user, I want to Regenerate the room layout based on my new preferences to see updated arrangements. | 10 | L |
|  |  | 45 |  |