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Deskkart- Furniture Mall with Augmented Reality

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Abstract: It is a trend that long has been making, thanks to the success of e-commerce sites like Amazon, Ebay, Urban Ladder, and other, and has motivated traditional interior designers' brands, sellers and buyers to change the way they operate. More options are offered online than in store, and it's becoming more common for retailers to leverage their physical locations as logistics centers and showrooms places where consumers can collect online orders or view products. But like any other products, online purchasing of product related to interior is quiet challenging. It would be difficult for consumers to get feel of interior products and so many questions emerge before purchasing e.g. How the Sofa will look? How it will fit in the living room? Is it matching with other interior? In this paper we are trying to get rid of all these questions by introducing a system using Augmented Reality. The System will consist of two major parts i.e. Mobile Application with Augmented Reality support and bringing interior decorators/sellers/end user customer on single platform based on Cloud. Product Creators can upload 3D Models and Images to the System with product details like dimensions, availability locations, price etc. End User can we all these products on the Android app. Using uploaded 3D models and in build mobile camera, end user can get look and feel of products with the help of AR. The system will also help end user to give review or contact the retailers for extra details.

Keywords: Augmented Reality, Cloud computing, Mobile information processing systems, Camera calibration, 3D imaging.

I. INTRODUCTION

It seems that every few years, people all over the world are increasingly using Augmented Reality and 3D technology in their daily life. As computer technology getting better, augmented reality and 3D technology developed more rapidly. Augmented Reality (AR) is a branch of computer science research and Virtual Reality (VR) are deals with augmenting the environment with computer-generated information. It is the technology that strengthens the view of the real world of the user with computer-generated information. AR is a field of research which deals with the combination of real-world and virtual reality. Most often, the augmentation is visual. It is not just that visual augmentation is important, but it is also necessary to possess auditory augmentation (computerized earpiece whispers information into a person's ear), touch augmentation or augmentation via a personal digital assistant. b3D computer graphics are graphics that use a three-dimensional representation of geometric data that is stored in the computer for the purposes of performing calculations and rendering 2D images. In3D computer graphics, 3D modelling is the process of developing a mathematical representation of any 3D surface of object through specialized software. The product is called a 3D model which gives a better graphics of visualization. In this paper we are trying to achieve effective way of Furniture Online Shopping by introducing a system using Augmented Reality. The System will consist of two major parts i.e. Mobile Application with Augmented Reality support and bringing interior decorators/sellers/end user customer on single platform based on Cloud. Product Creators can upload 3D Models and Images to the System with product details like dimensions, availability locations, price etc. End User can we all these products on the Android app. Using uploaded 3D models and in build mobile camera, end user can get look and feel of products with the help of AR. The system will also help end user to give review or contact the retailers for extra details. In figure 1 The input scene is acquired by the smart phone camera. The Touch-Screen interaction for 3D object is based on the input scene and the result of combining the 3D object with real scenes is shown in figure 2.



Fig. 1 Input Scene

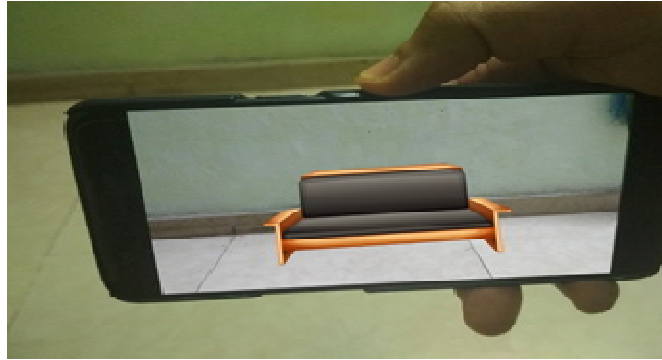


Fig. 2 Output Scene

II. RELATED WORK

A. Interaction Design in Augmented Reality on the Smartphone

In this paper [1], Augmented Reality (AR) is aimed at integrating virtual information into real world to enhance the perception ability of reality. The paper mainly presents an AR system that can complete some interactions between the user and the smart phone based on touch screen and body motion. There are three contents in this system. The first part is the building of AR scenes in Unity3D on the basis of real-time mapping access to the Web Cam Texture Class. The second part is the interaction based on the touch screen with the method of Ray cast. The third part is the interaction based on the body motion with the help of Gyro Sensor in the smart phone. Experimental results show that there is a good effect in the touch-screen interaction to realize some actions such as translation, rotation, scaling, or any combination of these. And it is also effective in the body motion interaction to control the virtual objects acting according to the user's body motion.

B. Interaction View-Input Interaction Method for Mobile AR

In this paper [2], mobile AR is very popular and used for many commercial and product promotional activities. However, in almost all mobile AR application, user only view annotated information or preset virtual objects motion in AR environment and cannot interact with virtual objects as if he/she interact real objects in the real environment. In this paper, we propose novel interaction method, called integrated view-input interaction method, which integrate viewpoint moving and virtual objects handling only by handling mobile AR device. Our proposed method has a predilection for popular touch mobile device, such as smart phone or table, does not need any additional sensor for sensing manipulation target. We implemented three integration types and evaluate efficiency in object handling task.

C. Mobile Augmented Reality System for In-situ 3D Modeling and Authoring

In This Paper [3], This paper proposes a mobile augmented reality system that can model 3D virtual objects and author augmented reality contents on site. The differences of the proposed system from the existing ones are an interaction approaches used to generate and manipulate primitives and additional features such as a shadow and a multi-freezing mode to create realistic augmented reality contents efficiently.

D. Design AR: Portable Projection-based AR system specialized in interior design.

In This Paper [4], This paper proposes a system for interior design prototyping based on portable-type projection-based AR (Augmented Reality). The DIY (do it yourself) interior designing process takes much time, monetary resources and labor. To overcome such difficulties, many research studies in the have been undertaken in the field of AR. Among those studies, projection-based AR technology provides users virtual information that is very real by projecting new digital information onto things and spaces. Most of those studies employing projection-based AR technology have been carried out in predefined spaces. In this paper, a projection-based AR system that can be used to design interiors of non-predefined spaces was proposed. This Design AR system can effectively design interiors, even in the spaces not predefined by a 3D map of the space. Also, by connecting with mobile devices, the system raises the user's degree of freedom due to the interface usability, mobility and overall convenience. In order to evaluate the effectiveness of the proposed system, we set up a scenario for interior design prototyping. A usability evaluation was conducted by questionnaire after users performed tasks based on a preset scenario.

III.PROBLEM DEFINITION

Implementing interior design application using Augmented Reality which provides a single platform for the user and vendor. On the user side, buying furniture becomes more realistic and easier. On the vendor side a larger platform to increase sales.

IV.SYSTEM ARCHITECTURE

Our interior design system includes 3 main sections: Customer, Vendor and Cloud.

- 1) Customer will be the people using the application, before being able to use the app, they will have to register with their email address or phone number so their profile is stored in our database. After successfully registering the consumer will be able to use the app to design their house or room to their liking. One mandatory requirement from the customers side is that they must have a phone with has camera access so as to scan the room and place different furniture pieces.
- 2) Vendor will be the companies who will be uploading their furniture models on our database so our consumers have a variety to choose from. Like customer, the vendor also has to register before being able to upload their models. Once registered they can view a list of their current uploaded models and will be able to provide dimensions, update stock and any new models they wish to.
- 3) Cloud is the main database method we are proposing to use. As it can be easily accessed online from any place. To maintain security of the details of both customer and vendor the admin will have to give permissions to the vendor after they register. Once the admin approves then only vendor will be able to upload their models. The admin will be the developers of the application. Hence as shown in the system architecture figure, the admin is the core and has access to both customer and vendor registration.

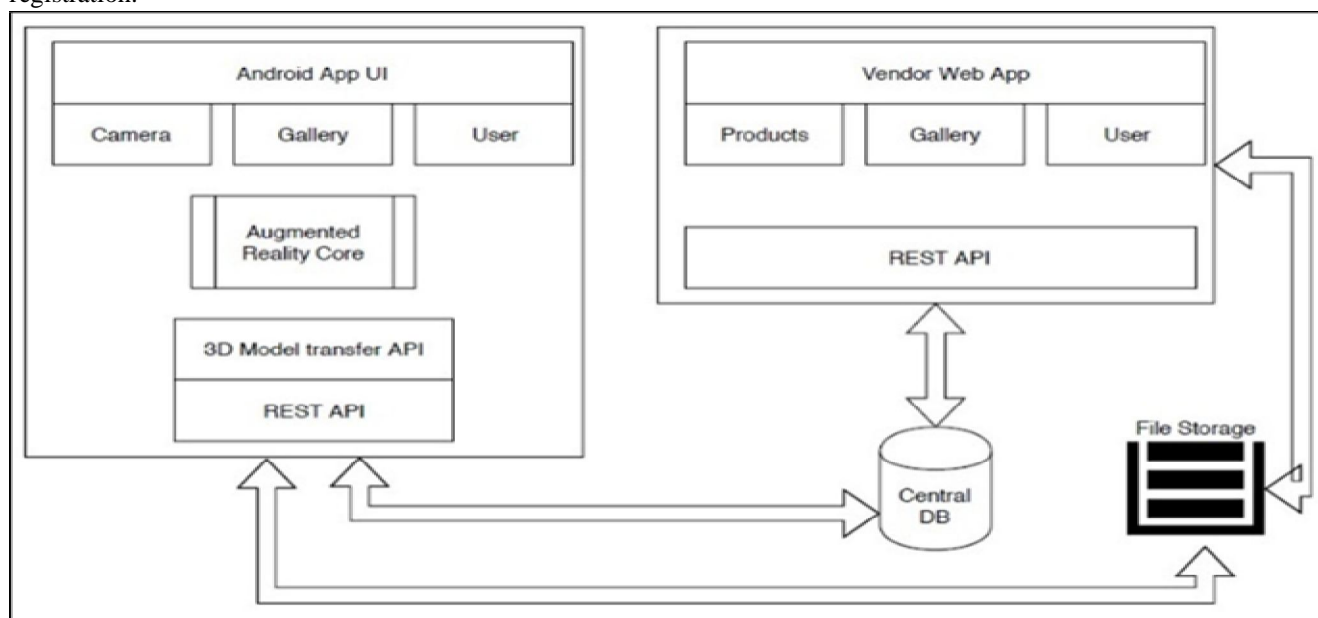


Fig. 3 System Architecture

A. Proper System Work

In this project we propose a new way of interior designing with the help of augmented reality. We propose the use of Augmented Reality as mentioned which is a new and upcoming technology and can solve day to day problems much efficiently and give the customer an enriching and realistic experience through his smart phone. We propose the method of not only restricting the application to one vendor but allowing vendors of different brands to upload their models so as to give the customer a variety of choices to pick from. The working is very easy and simple to understand. On one side customers will be registered and vendors on the other hand. Once the vendors have uploaded their 3D models with the dimensions, the customer will be able to see it in the list. First task is to allow camera access from your smart phone and then you will see a display of different models. Once you select a model to your liking you can simply click on add object and the object will be placed virtually in the centre of your room through your camera. Once you place an object, you may move it around and rotate it to your liking to see where it fits best. A small pop up box will appear asking the customer if they are satisfied and want to continue. Once the customer adds all the objects he wishes and

is satisfied, he will then be provided with the object details such as price and dimension and also the contact number of the vendor selling the product.

The customer can then place the order at his/her own convenience.

This is a fairly simple yet efficient method of buying furniture and it saves time and feels more realistic than traditional method, within a few clicks and swipes one can design his entire house virtually.

V. SYSTEM MODULES

A. User Management

At one-point multiple users will be allowed to access the application and will have to register before using the app to maintain security.

B. 3D Model/Products

Using AR, a 3d model will be generated of the product and the user will be able to see it virtually in his surrounding, side by side on vender side he/she will also be able to upload, edit, delete new 3d models of his products.

C. Augmented Reality Modules

AR brings together the real and virtual world. It takes our current reality and adds something to it. With the help of AR, we can solve everyday problems we encounter. Such as placing a piece of furniture in an empty space or looking at a 3D model of a building we want to construct. We can do much more which we couldn't have imagined of doing before AR. Essentially in AR we can interact with virtual objects as if they're in our surroundings. AR enhances your natural environment and offers an enriched experience. Examples Pokémon go and Snapchat.

D. Vendor Management

The vendors will be able to upload their 3d models and update stock and product information so that user can have enough information while deciding to buy or not.

E. Product Management

Using a vendor management system as a web application is highly beneficial as it helps in keeping track of various vendors and stock of each product. Also, the vendors can update their stock accordingly whenever they feel like if they also have a registered account. This is an efficient way of keeping track of authentic vendors and also gives them faster and easier access to the consumers on a larger platform.

VI. ALGORITHM

Flow of Augmented reality is divided in following four steps:

- A. A real-world information is obtained through input devices.
- B. Use image recognition technology to analyse the real world and camera position information.
- C. Generate a virtual model with graph system.
- D. Finally integrate virtual model into video display on terminal display.

VII. CONCLUSION

In this paper we propose an interior designing application using Augmented Reality technology. Using this technology, users will be able to perform multiple functions on pre-loaded 3D models of various pieces of furniture. In order to increase the variety, third party vendors will be able to upload their 3D models with dimensions and prices provided, on our application which will be stored in a cloud as our database.

A final screenshot will be provided to user of how his/her room will look virtually after they have selected the models as per their liking. By incorporating Augmented Reality, the user gets a realistic and enriching experience of designing with satisfactory results.

VIII. RESULTS

A. Android Application (Customer)



Fig 4: Home Page

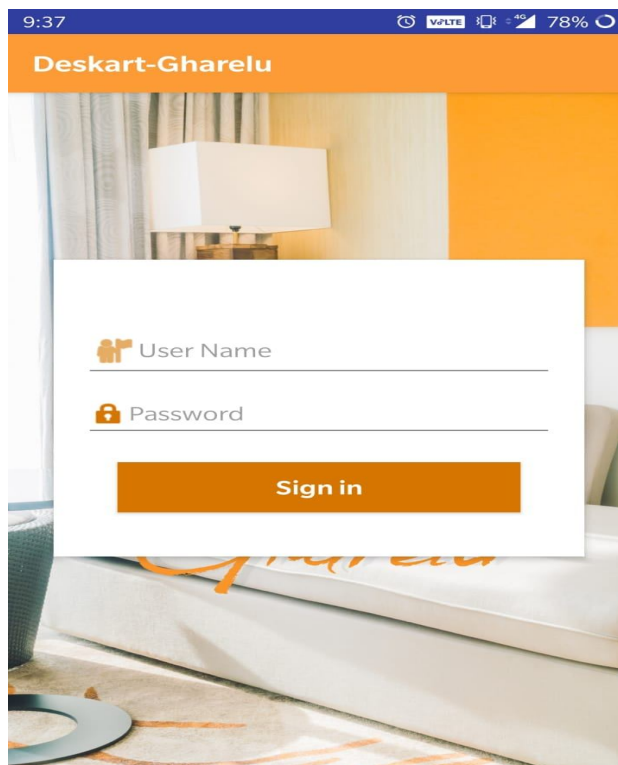


Fig 5: Login Screen

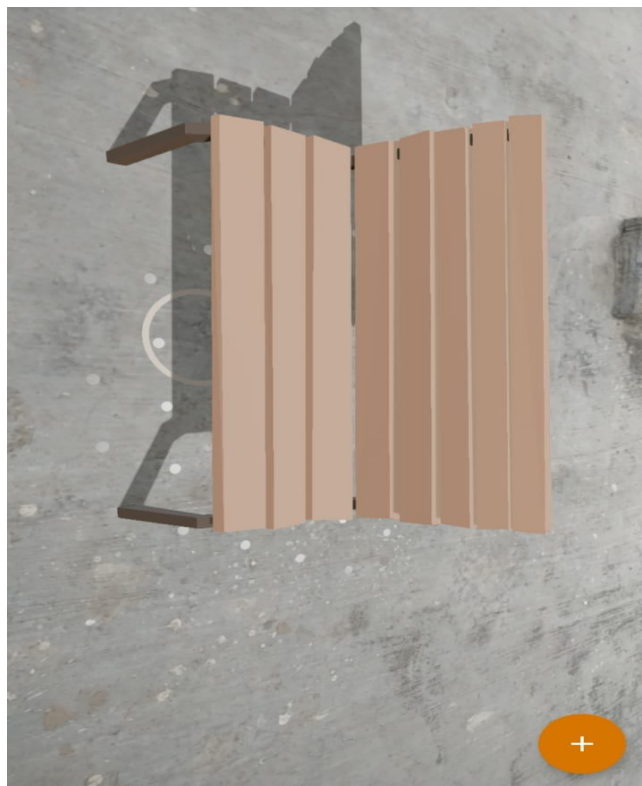
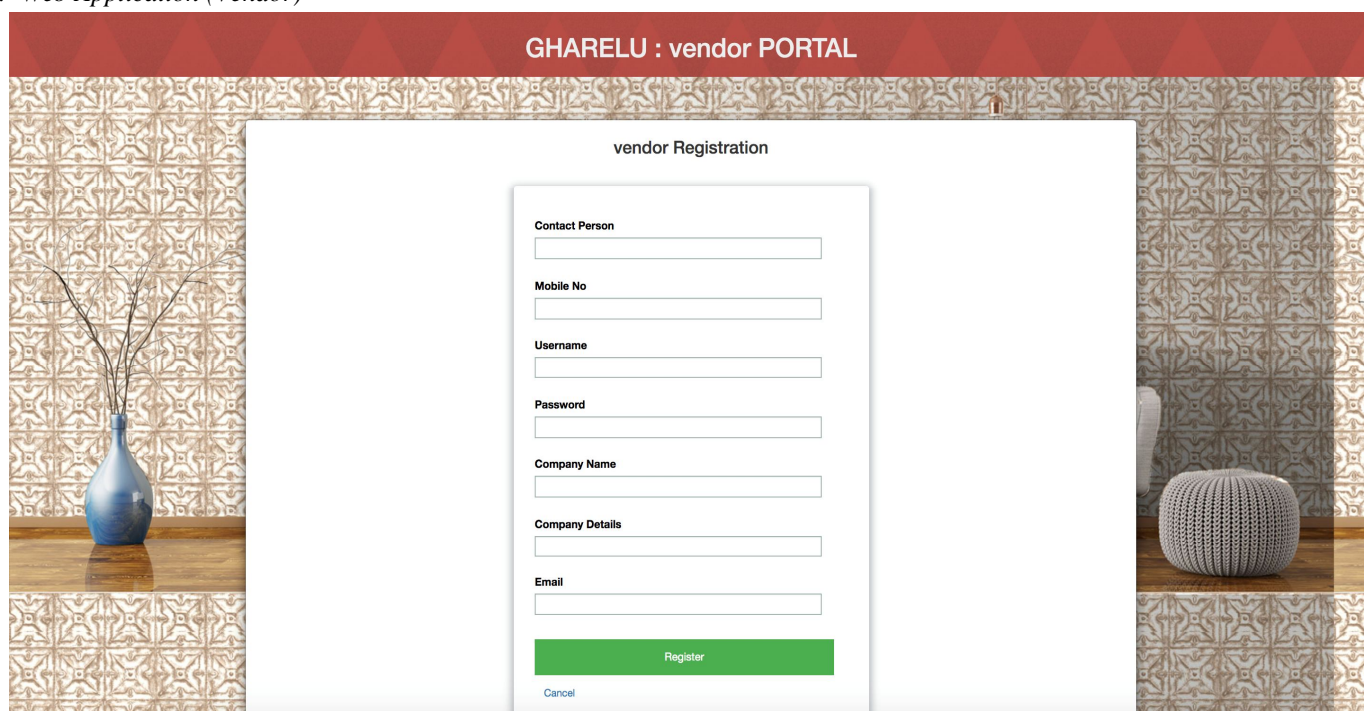


Fig 6: Scene 1(with one model)



Fig 7: Scene 2 (multiple models)

B. Web Application (Vendor)

The screenshot shows the 'GHARELU : vendor PORTAL' registration page. The page has a red header with the title. Below the header is a decorative background with a repeating geometric pattern. On the left and right sides of the page are images: a blue vase with dry branches on the left and a white knitted pouf on the right. In the center is a white registration form titled 'vendor Registration'. The form contains the following fields: 'Contact Person', 'Mobile No', 'Username', 'Password', 'Company Name', 'Company Details', and 'Email'. Each field has a corresponding input box. At the bottom of the form are two buttons: a green 'Register' button and a blue 'Cancel' button.

GHARELU : vendor PORTAL

vendor Registration

Contact Person

Mobile No

Username

Password

Company Name

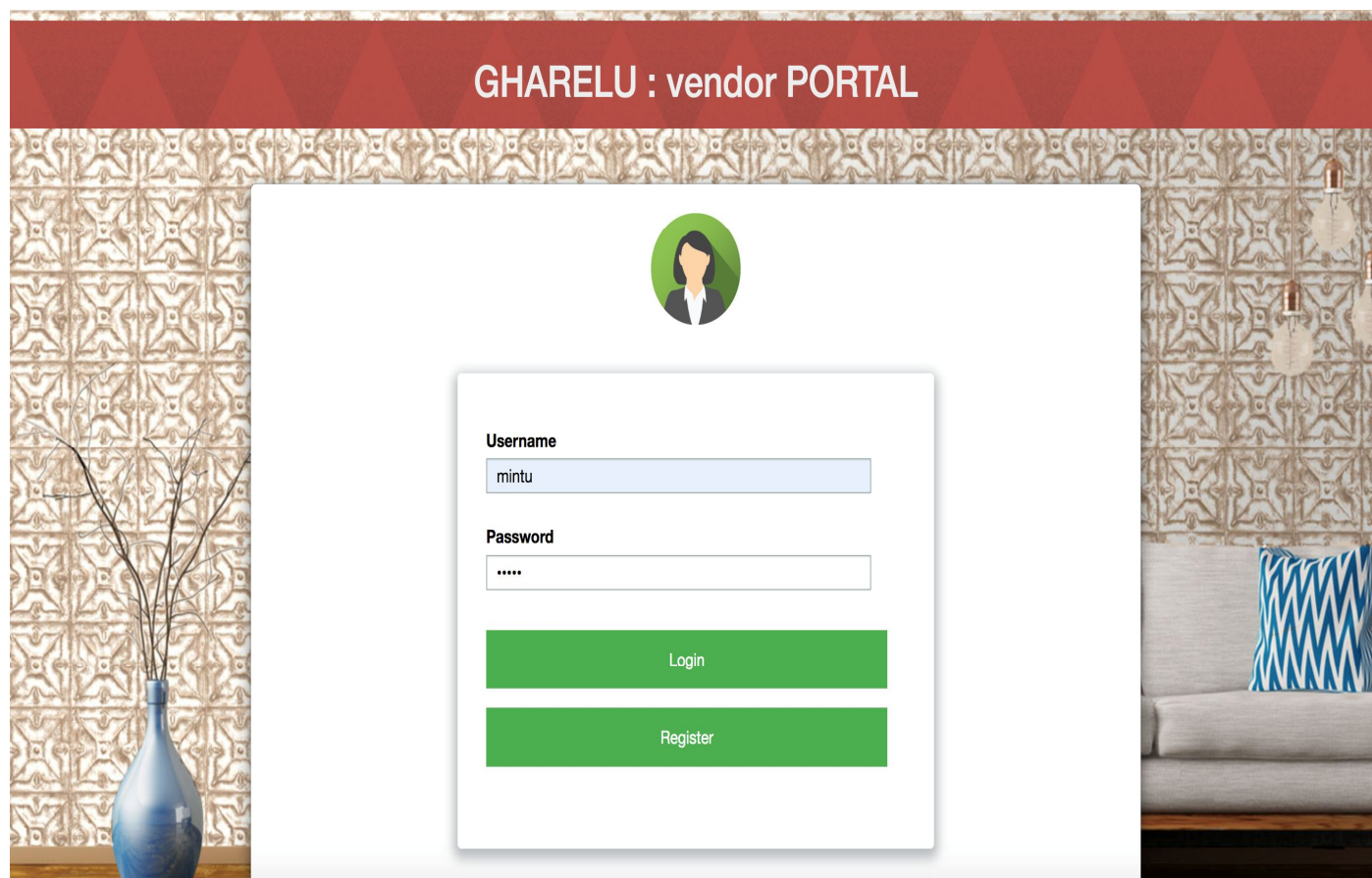
Company Details

Email

Register

Cancel

Fig 8: Vendor Registration

The screenshot shows the 'GHARELU : vendor PORTAL' login page. The page has a red header with the title. Below the header is a decorative background with a repeating geometric pattern. On the left and right sides of the page are images: a blue vase with dry branches on the left and a white knitted pouf on the right. In the center is a white login form titled 'GHARELU : vendor PORTAL'. The form contains the following fields: 'Username' (with the text 'mintu' entered) and 'Password' (with masked characters '*****'). Below the form are two buttons: a green 'Login' button and a green 'Register' button. Above the form is a circular profile picture placeholder showing a woman's silhouette.

GHARELU : vendor PORTAL

Username

mintu

Password

Login

Register

Fig 9: Vendor Login

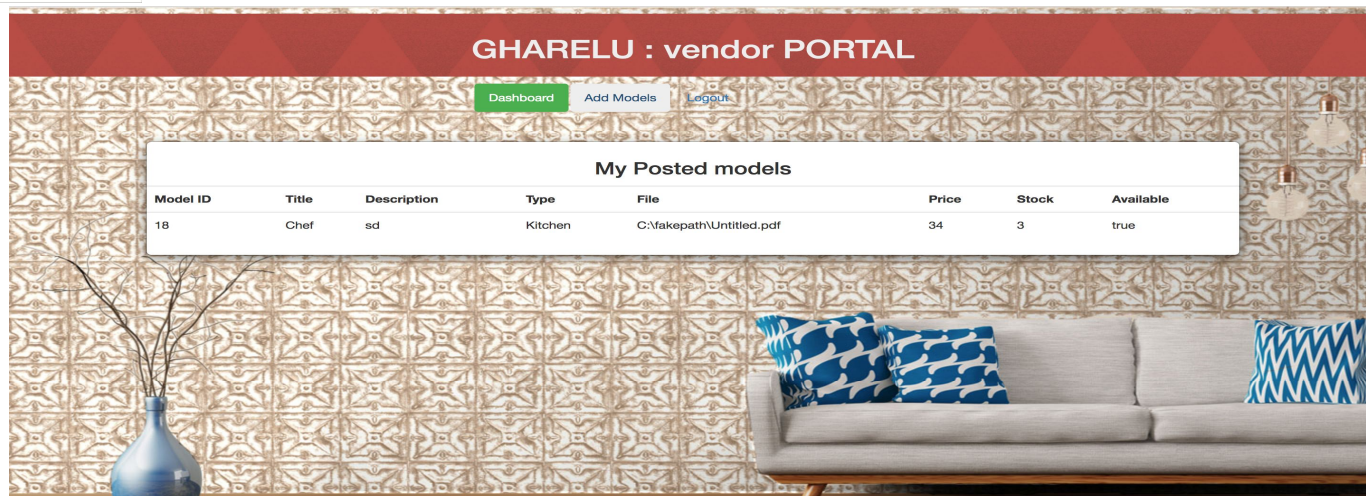


Fig 10: Home Screen

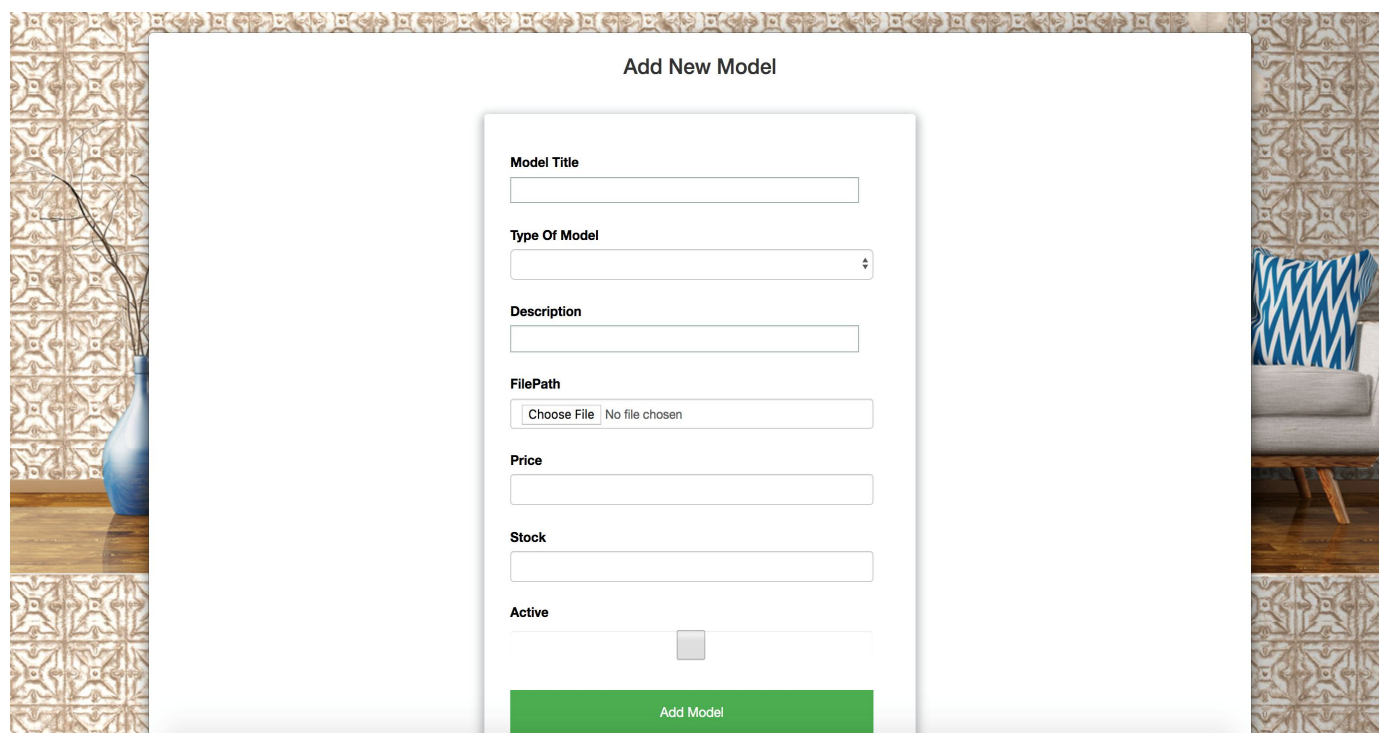


Fig 11: Add Model

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