Volume 5, Issue 3, March 2015 ISSN: 2277 128X
International Journal of Advanced Research in Computer Science and Software Engineering
Research Paper
Available online at: www.ijarcsse.com

Furniture Layout AR Application using Floor Plans Based on Planar Object Tracking

Vaibhav Raut, Umesh Sanap, Tejas Holam, Pranav Dubey
Comp Dept. Pune University, Maharashtra,
India

Abstract: In this report, we propose a new approach of Augmented Reality (AR) system for the furniture layout based on a planar object tracking. The planar object tracking methods using natural features are effective methods to estimate the object's pose and position in the AR applications because we are able to use the natural images. However, most of the feature descriptors have a lot of matching procedure. Therefore, by using an efficient feature point descriptor which is very fast both to build and to match, we track the planar objects. Especially, we use floor plans as the planar objects, and then furniture CG models are overlaid on the floor plans. This is because the floor plans are presented in the selection of rooms for rent or buy. Therefore, this system helps borrowers and buyers to select some mansion or apartment rooms. In this system, we propose to use human whistle sounds and color rectangles recognition to operate the furniture layout. In order to show the effectiveness of our proposed system, we perform some planar object tracking experiments when we applied the proposed system to some floor plans.

Keywords:

I. INTRODUCTION

'Augmented Reality' (AR) will truly change the way we view the world. Picture yourself walking or driving down the street. With augmented-reality displays, which will eventually look much like a normal pair of glasses, informative graphics will appear in your field of view and audio will coincide with whatever you see. These enhancements will be refreshed continually to reflect the moments of your head. In addition to these AR application, furniture layout AR systems are expected to realize for consumer of apartment buildings. In studies of virtual furniture arrangements, various methods have been proposed. Germer and Schwarz present a procedural approach to generate furniture arrangements for large virtual indoor scenes . This paper introduces an agent-based solution and demonstrates the flexibility and effectiveness of the agent approach. Merrell et al. present a method for automated generation of building layouts for computer graphics applications. In this study, the architectural program is realized in a set of floor plans. The floor plans are used to construct complete three dimensional buildings with internal structure. Yu et al. present a system that automatically synthesizes indoor scenes realistically populated by a variety of furniture objects. This system realizes fully automatic furniture layouts using an optimization method with considering ergonomic factors. These CG based furniture arrangements are effective for the virtual reality environments or the time before the construction of the buildings.

II. LITERATURE REVIEW

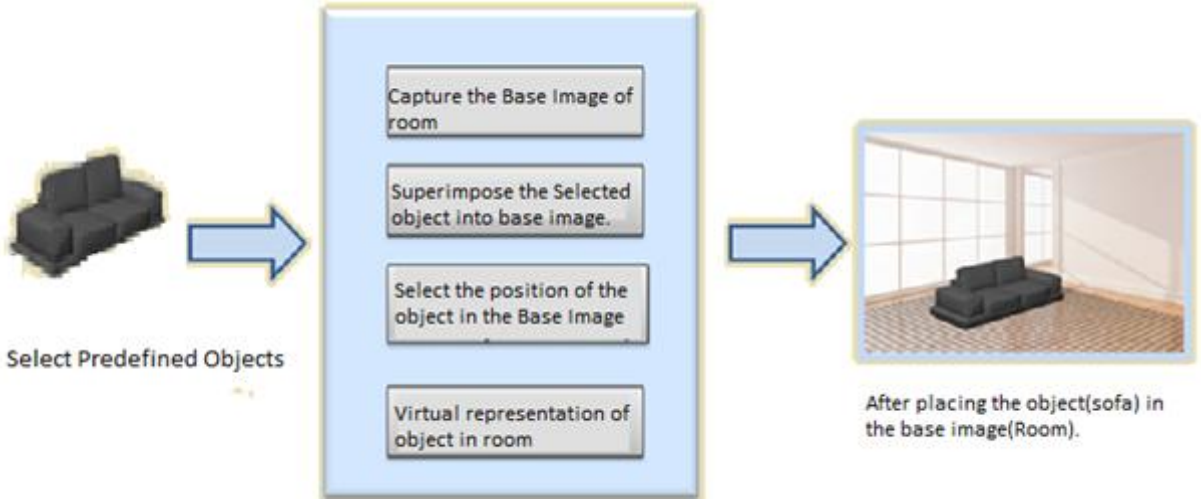
Taiki Fuji, Yasue Mitsukura and Toshio Moriya has proposed a technique Augmented Reality (AR) system for the furniture layout based on a planar object tracking in their paper 'Furniture Layout AR Applications using Floor Plans based on Planar Object Tracking'. It might be easier to use this technique in Online Shopping as a option for user to try out the furniture items in their room . User can try out multiple combinations virtually, without physical movement of furniture items. As compared with the traditional furniture method this method has two benefits One is that it does not require a real furniture or background image; another is that user have their own predefined furniture model and don't have waste time . These two benefits make the system applicable to the augmented reality systems or other real-time systems. Furniture Layout is producing better quality results since appearance-based Marker detection or gray scale technology reduces the misjudged pixels along with the color based marker detection technique. The experimental result shows the accuracy, performance and robustness of this method.

III. PROPOSED SYSTEM

Purpose

The main purpose of this project is to develop an application for trying different furniture items in furniture stores without using the usual means which is a very time consuming activity. Besides, this it might be easier to use this technique in Online Shopping as a option for user to try out the furniture items in their room they are thinking to buy and allow user to visualize the room how it will look after placing furniture in it. User can try out multiple combinations virtually, without physical movement of furniture items. Our motivation here is to increase the time efficiency and improve the accessibility of furniture try on by creating furniture layout augmented reality application

Architecture



Mathematical Model

A mathematical model is a description of a system using mathematical concepts and language. The process of developing a mathematical model is termed mathematical modeling.

Mathematical model consist of three parts:

1. Mapping
2. State Diagram
3. Set theory

Set theory

Let,

S is the system such that S= {U, L, L', T}

U is the set of system users U = {U_1, U_2, U_3…. U_n}

L is the set of logins which are successful L = {L_1, L_2, L_3….L_n}

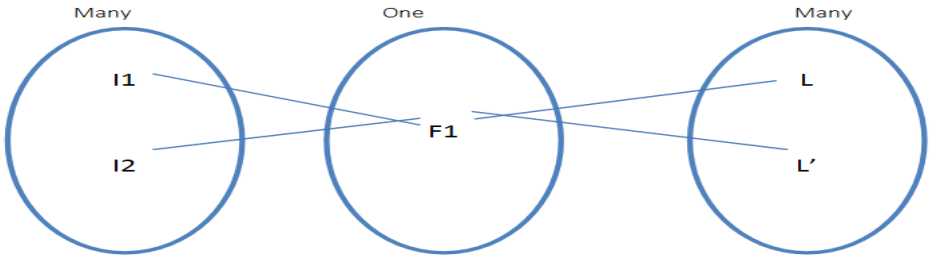
L' is the set of logins which are not successful L = {L_1', L_2', L_3'….L_n'}

F is the set of tasks that the user does after Login F = {F_1, F_2, F_3….F_n}

I is the set of inputs I = {I_1, I_2, I_3….I_n}

O is the set of outputs O = {O_1, O_2, O_3….O_n}

. Login Function



Function F1-Login Function

Input I1 and I2-Login id and Password respectively

Output L and L' –Successful Login and Unsuccessful Login respectively

IV. FEASIBILITY STUDY

Feasibility studies aim to objectively and rationally uncover the strengths and weaknesses of the existing business or proposed venture, opportunities and threats as presented by the environment, the resources required to carry through, and ultimately the prospects for success. In its simplest term, the two criteria to judge feasibility are cost required and value to be attained. As such, a well-designed feasibility study should provide a historical background of the business or project, description of the product or service .Feasibility study is conducted after finding out the system's objectives. A feasibility study evaluates the project's potential for success; therefore, the perceived objectivity is an important factor in the credibility to be placed on the study by potential investors and lending institutions. It must therefore be conducted with an objective, unbiased approach to provide information upon which decisions can be based.

V. SYSTEM FEATURES

A. Functional Requirements

i. 2.4 GHZ, 80 GB HDD for installation.
ii. 512 MB memory.

iii. Network Cards
iv. Android Phone

B. Non-functional Requirements

1. Secure access of confidential data (user's details).
2. High Scalability. The solution should be able to accommodate high number of customers and brokers. Both may be geographically distributed
3. Flexible service based architecture will be highly desirable for future extension
4. Better component design to get better performance at peak time

VI. FUTURE SCOPE

Even though in our work, we only computed the 2D affine and projective transformations of the marker, the method can easily be extended for 3D camera pose estimation and the overlaying of 3D virtual objects. We already computed the calibration parameters, and the pose estimation can be done using a slightly modified version of the DLT algorithm which we are currently working on. Moreover, we can implement a Kalman filter of the camera pose matrix, which would help us to estimate the location of the marker in the next frame and reduces the search area to a neighborhood of the estimated position, which would hopefully boost current frame rate. In addition, the built-on sensors of Droid like e-compass and the accelerometer can be employed to assist the camera pose estimation.. Sensor information and the visual marker location can be merged together after by means of nonlinear filters like EKF and Particle filters after computing the necessary calibrations. In future works, we need to consider the feedback of user'sevaluation as a human interface. In AR studies, not only the estimation of the camera pose and position, the recognition of the real environments, and the AR interfaces are necessary for realizing the AR, but also the user's evaluation are very important issue. Moreover, we will use this system to watch over for avoiding dangerous layouts of furniture, considering the space between the furniture and rooms.

VII. CONCLUSION

We proposed the furniture layout AR application based on the visual maker-base tracking methods. The proposed system made the interactive operation be possible for the user using the camera-equipped HMD device. We demonstrated our approach on a furniture layout AR application using some floor plans. This AR application did not need GPU, and realized more than 20 fps in the detection.By using some floor plans and calculating its position and pose, we conducted the furniture layout on the floor plans.For operating the system, the combinations of the 6 colors recognition in complex with human whistle sounds were used. We think that our proposed AR system including the operation methods have a possibility to be applied to other AR applications

ACKNOWLEDGMENTS

We are greatly indebted to our college Padmabhooshan Vasantdada Patil Institute Of Technology that has provided a healthy environment to drive us to do this project and thankful to our management for their guidance.

REFERENCES

[1] D. W. F. van Krevelen and R. Poelman, A Survey of AugmentedReality Technologies, Applications and Limitations, The InternationalJournal of Virtual Reality, Vol. 9, No. 2, pp. 1–20, Jun. 2010.
[2] T. Miyashita, P. Meier, T. Tachikawa, S. Orlic, T. Eble, V. Scholz,A. Gapel, O. Gerl, S. Arnaudov, and S. Lieberknecht, An augmentedreality museum guide, Proc. of Int. Symp. on Mixed and Augmented Reality (ISMAR '08), pp. 103–106, Sep. 2008.
[5] Taiki Fuji, Yasue Mitsukura, and Toshio Moriya Furniture Layout AR Application using Floor Plans based on Planar Object Tracking pp. 670-675, Sep 2012.

