Acknowledgement

We feel immense pleasure in presenting this report on "Augmented Reality Based Indoor Navigation". We wish to express true sense of gratitude towards Mrs. Renuka. S. Gound, our project guide who at discrete step in study of our seminar and project work, contributed her valuable guidance and helped to solve every problem that arose. We also thank our Project Coordinator Mrs. Jayashree Katti for the continuous support.

We take this opportunity to thank our Principal Dr. A. M. Fulambarkar and Prof. Dr. Pravin Futane (HOD IT Dept.) for believing in our potential to do justice to our project idea.

Most importantly, we would also like to express our sincere gratitude towards all the staff members of Information Technology Department. We would also like to thank Persistent Semicolons 2018 winning team and Robocon team, 2017, PCCoE, for helping us explore the domain of Augmented Reality and Computer vision respectively. Special thanks to Mast. Atharva Joshi for making us visualize the beauty, scope and future with Augmented Reality, at the very beginning, due to which we could conceptualize this project. We also express our thanks to all our friends and family for their ceaseless support and suggestions during the completion of our seminar work and project. We take this opportunity to express our thanks to all who rendered their valuable help and resources for the successful completion of our project. We owe our success to all of them.

Shivani Birajdar (B150338505) Anuja Hiwale (B150338515) Rhuta Joshi (B150338523)

Abstract

Augmented Reality Based Indoor Navigation introduces to the concept of navigation system for smartphones capable of guiding users accurately to their destinations in an unfamiliar indoor environment. Digitally enhanced guides have many advantages over traditional paper-based indoor guides. Global Positioning Systems (GPS) facilitates outdoor navigation through the best routes possible. However, it fails to work indoors due to signal attenuation by infrastructural surfaces and other obstructions.

Integrating the proposed system with augmented reality enhances and enriches the user experience by combining real and computer-based scenes and images to deliver a unified but enhanced view of the world. Image comparison techniques are applied to get features that will be useful in classifying and recognition of images captured by the user. It helps achieve accuracy by relative location detection of user's current location and comparing to landmark images saved in the database.

It will work on devices like smartphones, tablets based on Android which will guide the users accurately to their unknown destination, the services are not restricted to any specific industry the fields of this application are limitless.

Contents

Sr. No		Chapter	Page No
1.		Introduction	1
	1.1	Introduction to ARIN	1
	1.2	Introduction to Augmented Reality	1
	1.3	Motivation	5
	1.4	Aim and Objectives	6
2.		Literature Review	7
	2.1	Augmented Reality - Base Paper	7
	2.2	Indoor Navigation - Base Paper	9
3.		Project Requirements	14
	3.1	Hardware Requirements	14
	3.2	Software Requirements	14
	3.3	Technology Stack	14
	3.4	Developer System Requirements	14
4.		Proposed System Architecture	15
5.		Project Design	17
	5.1	Use case Diagram	17
	5.2	Activity Diagram	19
6.		System Implementation	21
7.		Testing	31

8.	Project Plan	36
9.	Applications	38
10.	Conclusion	40
11.	Future Scope	41
12.	References	42

List of Figures

Sr no	Figure	Page no
1.1	Optical character Recognition	2
1.2	Virtuality Continuum	2
1.3	Marker-based AR	3
1.4	Marker-less AR	3
1.5	Projection Based AR	4
1.6	Superimposition based AR	4
2.1	Effective approach for procedural workflows	8
2.2	Using Bookmark system in libraries for location required book	9
2.3	Color coded SVG map used to generate navigation instruction	10
	within libraries	
2.4	Arrangement of books in different stacks	11
2.5	Steps for bookmark navigation	12
4.1	Proposed system architecture	15
5.1	Use case Diagram	17
5.2	Activity diagram	19
6.1	Implementation Flow	21
6.2	Source Identification and results	25
6.3	Pedometer	27
6.4	AR implementation results	30
9.1	Applications	39

List of Tables

Sr no	Table	Page no
5.1	Use case diagram description	18
7.1	Capture Images landmark (valid)	31
7.2	Capture Images landmark (invalid)	32
7.3	Enter destination location (valid)	32
7.4	Enter destination location (invalid)	33
7.5	Image comparison (match found)	33
7.6	Image comparison (match not found)	34
7.7	Navigation Path (found)	34
7.8	Navigation Path (not found)	35
7.9	Augmented Reality	35
8.1	Project Plan	37