



# Hospital E-Appointment And Indoor Navigation Using Augmented Reality

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**Abstract:** *The major objective of this project is to create an online system for scheduling appointments in an effort to reduce the amount of time people must wait to schedule hospital appointments. A patient can easily schedule an appointment with the doctor and make use of the different features that are provided for both patients and doctors with the usage of this application. The major goal of this application is to link patients and doctors on a single platform, which will eliminate the need for manual appointment scheduling. Healthcare management is similar to a galaxy, it becomes even more challenging to understand the hospital's layout as departments change locations, services grow, and renovations take place. In order to effectively serve patients and visitors, hospitals should take into account indoor mapping and navigation aids. In spite of the fact that they are frequently used in outdoor settings, indoor navigation systems are still in their infancy. For interior positioning and en route support, navigation systems are essential. In an open environment, it works better than it does in a complicated inside situation. However, in this project, our main objective is to develop an interior navigation tool based on augmented reality that would aid people in navigating through expansive, intricate hospital infrastructures. The Unity 3D framework has been used in the development of the augmented reality-based smartphone application. It has been noted that the user interface and experience of this augmented reality-based application are superior to those provided by the conventional 2D maps or paper maps that are posted outside the hospital to assist with navigation.*

**Keywords –** Indoor Navigation, Augmented Reality, Unity.

## INTRODUCTION

To solve the issues that existed with practicing manual approach, the "Doctor Appointment System" was created. The difficulties our current system faces, are supported by this application which aims to eliminate and, in some circumstances, lessen them.

The issue of managing and arranging appointments in accordance with the user's preferences or wants is resolved by this application. The compounder or doctor himself may occasionally find it extremely difficult to manually arrange appointments for the users based on their availability.

Because of this, this application offers a practical solution that enables users to browse the many booking slots that are available and select the perfect time and day. This method allows users to cancel or reschedule their appointments at any time.

When it comes to indoor navigation, we have created a special platform based on the Real-Time Location System for hospitals since we have seen that medical staff, patients, and visitors have navigational problems.

This platform is suited for every activity that healthcare facilities must complete every day. By implementing indoor hospital location, navigation, and asset monitoring technologies, our platform is dedicated to eliminating these challenges. The implementation of indoor navigation boosts customer loyalty, enhances the level of customer service, and may even boost the clinic's overall profit.

## NEED OF THE STUDY

Reducing operational costs and achieving efficiency goals is the most frequent problem faced by hospital administrators and staff. Meanwhile, the majority of hospitals struggle to make ends meet. The major goal is to efficiently offer appointments online so that patients don't have to wait for hours to see a doctor and receive a diagnosis.

In light of the COVID-19 pandemic's current status, an appointment system enables spreading out patient visits throughout the day in order to preserve social distance and prevent congestion. Patients can even check themselves in upon arrival using an appointment booking system that includes self-check-in and mobile tickets, doing so without interacting with any staff members or actual ticket kiosks.

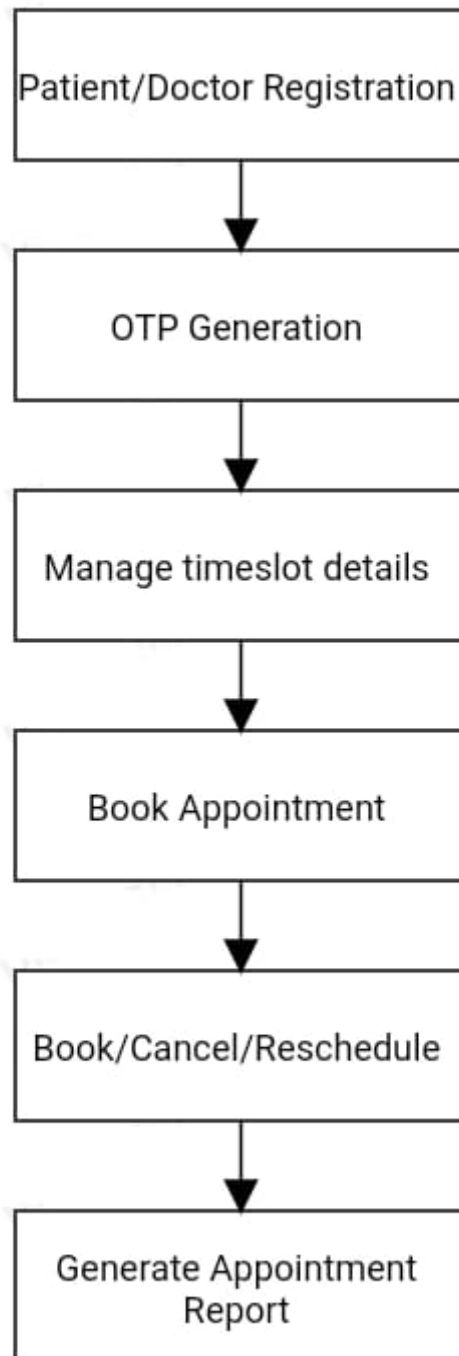
Patients have historically found it difficult to move around freely during their appointments and follow-up visits due to the frequent renovations and alterations made to healthcare facilities.

Visitors, patients, and staffs all find indoor navigation to be quite useful at hospitals. Hospitals have difficulties when patients and visitors try to discover their destinations. Turn-by-turn directions can make traversing the normal hospital hallway maze less unpleasant, especially in tense or time-sensitive circumstances.

Even hospital employees frequently struggle to locate the supplies they want, such as IV pumps and medicine carts. That issue is resolved by asset tracking and indoor navigation. Equipment is tagged so the IPS system knows where it is and workers can find it using indoor navigation.

## LITERATURE REVIEW

1. Digvijay H, Gadhari, Yadnyesh, P Kadam, Prof. Parineeta Suman (2016) "Hospital Management System", IJREAM, 01:11. described that patient can easily make an online reservation and make changes to an existing reservation through the online programming framework, access the website or web application and interface with the specialist. The person can reserve their space according to their convenient timing. The patient can choose a fantastic doctor and make an appointment.
2. Shafaq Malik, Nargis Bibi, Sehrish Khan, Razia Sultana, Sadaf Abdul Rauf (2016) "Mr. Doc: A Doctor Appointment Application System". International Journal of Computer Science and Information Security, 14(12):452-460. This paper shows the creation of an internet arrangement framework made access to medical care administrations both permanent and proficient so that we don't have to make clinical arrangements by waiting in the line until it is time our turn as it is time consuming and can also disturb the patients. We can receive emergency medical examinations using this clever programme. People can choose specialists in this location as well as nearby medical facilities.
3. "A hospital resource and patient management system based on real-time data capture and intelligent decision making" Author(s): Musa, A. Lancashire Bus. Sch., Univ. of Central Lancashire, Preston, UK Yusuf, Y, Meckel.M. Systems and Informatics (ICSAI), 2012 International Conference. Operational efficiency and wait times across various procedures, departments, and people are two of the biggest problems that current hospital management systems must deal with. This paper highlights these shortcomings of current systems and suggests a framework for location and information management based on RFID (Radio Frequency ID) and wireless sensors that enables real-time tracking of hospital assets, staff, and patients as they move through pre-set procedures as part of daily operations of the hospitals. The system includes visual simulation and gives users the ability to examine current operations and make necessary corrections to improve process efficiency and service levels.
4. K W Cheung, J H M Sau, and R D Murch, "A New Empirical Model for indoor Propagation Prediction," Hong Kong, 1997. This paper describes the creation of a smartphone based indoor navigation system. The present location is located using a fingerprint technique. A specific user can utilize an indoor navigation system to go their location. By using Wi-Fi router signal intensities, it may be feasible to determine interior navigation. Thus, a fingerprint can be made by noting this signal strength at a certain location. They are extremely distinctive in that positions may be identified.
5. Mehdi Mekni and Andre Lemieux," Augmented reality: Applications challenges and future trends", Applied Computational Science—Proceedings of the 13th International Conference on Applied Computer and Applied Computational Science (ACACOS '14), pp. 205-209,2014. This study examines the state-of-the-art in augmented reality at the moment. It gives an overview of work done in several application sectors and highlights the current problems encountered while developing augmented reality applications taking into account the financial and technological constraints of mobile devices. Future directions are introduced, along with topics that need more study.

**METHODOLOGY**

**Fig. 1 Methodology of Hospital E-Appointment Application**

There are several steps involved in making an online hospital appointment:

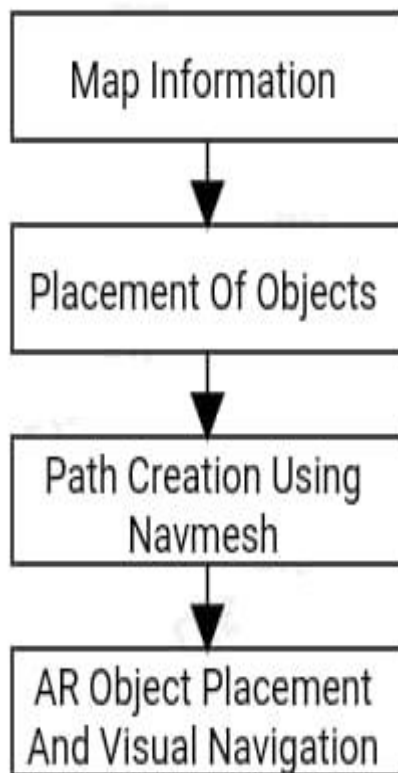
1. Choose a hospital: A patient must find a hospital that offers online appointment booking. Most hospitals have a website that allows patients to schedule appointments online.
2. Register: If a doctor/patient is a first-time user, they may need to register on the hospital's website. They'll be asked to provide their personal details, such as name, contact information, e-mail and password details in case of patients and education details in case of doctors.
3. Choose a doctor: Once patient is registered, they'll need to select the doctor they want to see. They can search for doctors by specialty, location, or name.
4. Select an appointment slot: Once patient has selected a doctor, they'll be shown a list of available appointment slots. They need to

Choose a time that is convenient for them. In case of doctor, he/she must enter the timings he/she is available.

5. Confirm your appointment: Once patient has selected their appointment slot and provided any necessary medical information, they'll need to confirm their appointment. The same is done in case of doctors.

6. Attend your appointment: On the day of the appointment, patient has to arrive at the hospital at least 10-15 minutes early and bring any necessary documents, such as health insurance card or ID.

The above features are designed using Android Studio using XML and Java.



**Fig. 2 Methodology of Indoor Navigation**

This Augmented reality application has been created with the help of Unity framework. The different components that are present in Unity and are used in this project are:

- 1) AR Foundation
- 2) NavMesh

**AR Foundation:** You select which AR features to enable in an AR Foundation project by including the necessary manager components in your scene. You can create once and deploy to the top AR platforms by using AR Foundation, which makes these functionalities available when you build and run your app on an AR device.

**NavMesh:** The area in which the agent's centre can move is represented by the NavMesh. The NavMesh's shortest path is determined by Unity using the A\* formula. A\* operates on a network of linked nodes. The algorithm begins at the node closest to the path's beginning and travels via the connect nodes until it reaches the goal.

Using these components, we have created Indoor infrastructure of the hospital using 3D objects. We use AR camera for real-time experience. The programming language that we have used here is C#.

## RESULTS AND DISCUSSION

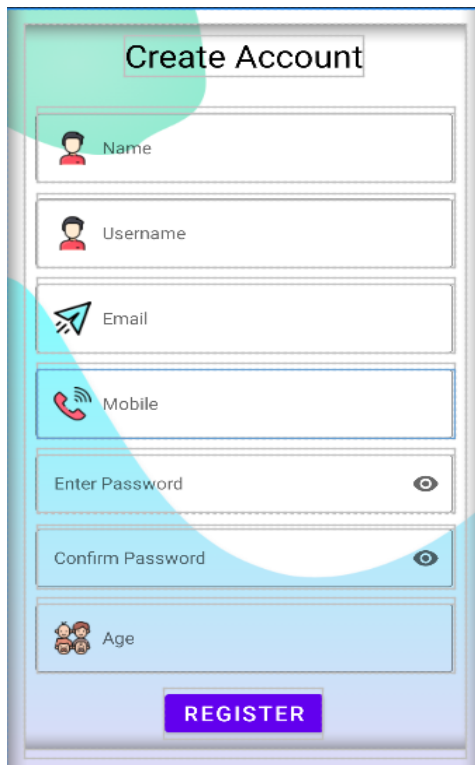


Fig. 3 Registration page of patient

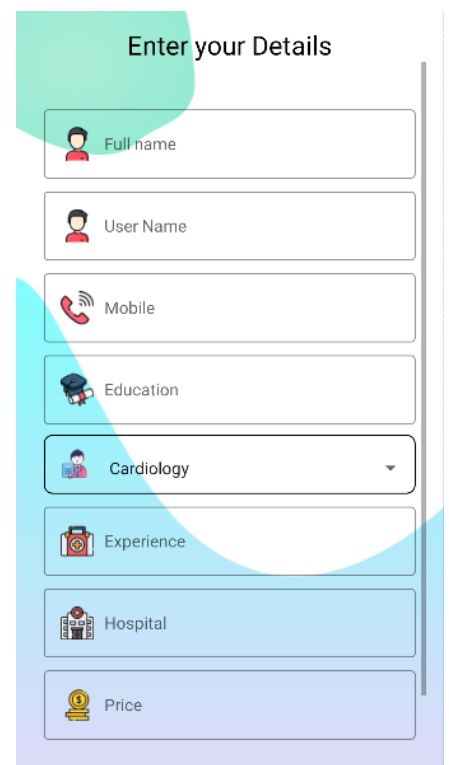


Fig. 4 Registration page of doctor

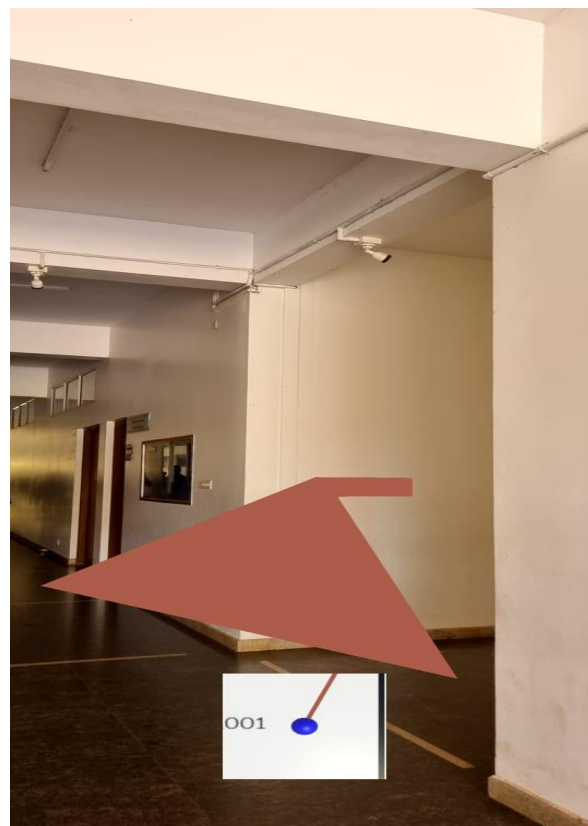


Fig. 5 Result Page of Indoor Navigation

## CONCLUSION

A summary of hospital appointment and indoor navigation was presented in this paper. Using Hospital E-Appointment Application the patient need not to go to hospital for booking. The patient only needs internet for booking purposes and doesn't have to directly contact hospital authorities while booking. Both doctors and patients can adjust their schedule time through online. The system gets rid of the issues appeared during traditional booking system. This paper provides a clear understanding of online appointment scheduling to patients coming to the hospital.

Hospitals have complex infrastructures, and indoor navigation deals with navigating within those. Wi-Fi or Bluetooth beacons can be utilised for interior navigation because GPS reception is usually nonexistent within buildings. However, they are expensive to install and only have a 5 to 15 metre accuracy range. When you can see your surroundings, navigating indoors is simpler. Thus, in this project, we plan to create an augmented reality-based indoor navigation application.

We used Unity framework for indoor positioning since it can be used with all Android devices API above 24. Thus, no additional costs or installation are required for the implementation. UNITY handles motion tracking and environmental understanding so that they can be used more conveniently. Along with all those features, UNITY can create a better augmented reality navigation system which will be accurate and efficient.

## REFERENCES

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