Indoor Navigation System Using QR Code

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Abstract - Indoor navigation can be challenging, particularly in large, complicated structures with numerous rooms and floors. It might be challenging to follow maps and signs, and they might not contain correct or current information. We suggest an augmented reality and QR code-based indoor navigation system to solve this issue (AR).

Our solution consists of a web-based application that displays information about the user's surroundings in real-time using camera and augmented reality (AR) technologies. Strategically placed QR codes are scattered around the structure; when scanned with the app, they activate AR overlays that show navigational guidance and details on surrounding sites of interest. For instance, users can observe labels and directional arrows overlaid on the camera view to indicate the direction.

Even those who are unfamiliar with the building should have no trouble using the system. The usage of AR enhances the navigation experience by making it more immersive and interesting while also giving users access to more precise and current information. Overall, a navigation system for complicated indoor settings employing QR codes and augmented reality offers a simple and efficient solution. Users will have an easier time navigating thanks to the smooth and immersive navigation experience offered by the combination of QR codes with AR technology.

Key Words: QR Code, Unique Image, Navigation System

1.INTRODUCTION

In today's technologically dependent society, all industries use technology to accomplish their goals as well as to improve and secure people's lives. Here, we have created the Indoor Navigation System, which utilizes augmented reality technology via the scanning of QR codes, to help users find their destinations inside buildings with very big infrastructures.

The necessity for navigation systems in huge infrastructure facilities is growing in the modern world. These ideas were developed in order to reach locations in the smallest amount of time. Users can effectively reach their location without getting lost or confused thanks to these navigation systems. Prior to a few years ago, there were indoor navigation systems that used GPS, however, it has been observed over time that the GPS signal is no longer detectable beyond a certain range of distance. It thus fails to correctly direct the user to their goal.

In our project, we created a navigation system that makes use of augmented reality and shows the user's path in accordance with their destination. In order to exploit augmented reality technology, we have used special photos. The QR code must only be scanned once for the user to simply reach their destination.

2. Body of Paper

Our project contains these modules: Indoor Positioning in QR Code, Motion Tracking, and AR Model.

Once the desired destination has been chosen, the user will be able to access the AR Model, which is nothing more than access to the camera with distinctive images containing the data. The user will first scan the QR Code, which contains all of the information about the indoor positioning of the building. Next, the user must scan the distinct image, which is essentially a motion tracking of the pathways. In order to provide direction to a certain location, distinctive graphics will be put at key intersections between the start and the desired destination.

The user must scan each unique image along the road till they arrive at their destination. It will exit when it arrives at its final location.

The Special Images/Visual Markers include:

Using the Unique Images will guarantee an interior positioning system. Each image has a distinct ID of its own. The information about the user's position in 3D space is contained in the photographs utilized in this system. Because each floor can be explained by a user's vertical coordinates, this includes the floor the user is currently on as well as their location.

The user will need to scan an image for navigational purposes once the unique images with all the data for motion tracking are enabled.

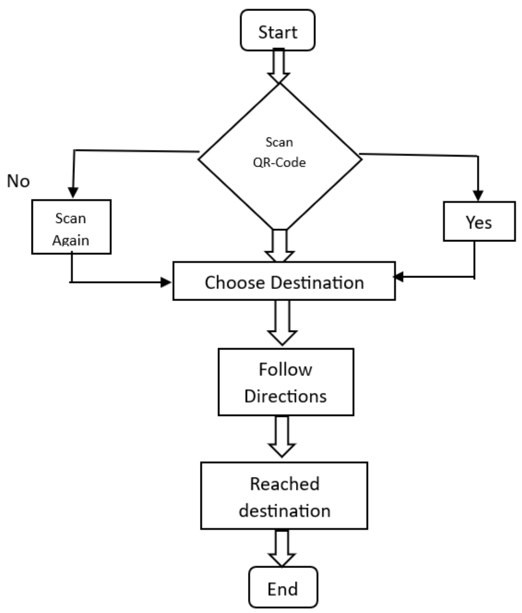
The stability of the images is the only prerequisite for scanning because the path displayed will be entirely based on how steady the image is.

how it actually operates?

• Navigation Device - To begin navigating a building, users require a mobile device with a display and camera.

• Technical Setup - The technical setup entails installing distinctive images and QR codes in particular places of the building. A smartphone may be used as this device.

Fig. 1 Working Process Flow Chart



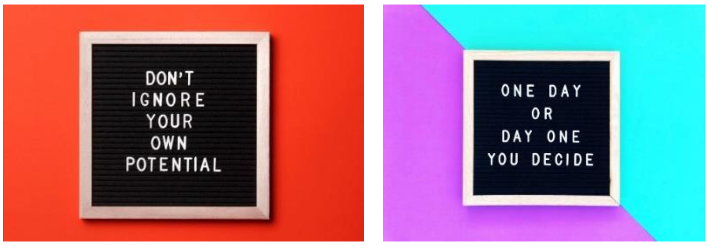
1) Indoor Positioning System Using QR Code

The QR Code essentially contains the location of the entire structure. The user will have the option to select his or her intended destination after the QR code has been scanned. Its entire information is contained within the QR Code.

Fig. 2 QR Code Scanning

2) Motion Tracking: Using the mobile device's camera, motion tracking is employed to illustrate the path that is revealed after scanning each unique image.

Fig.3 The example set of Unique Images



3) AR Model: We are utilizing augmented reality with the aid of a meta server. After selecting a destination, the user's mobile device's camera is opened, and he or she is then asked to scan certain images to be guided by virtual directions displayed on the device's screen. The journey will come to an end once the goal is attained.

Fig.4 Working of AR

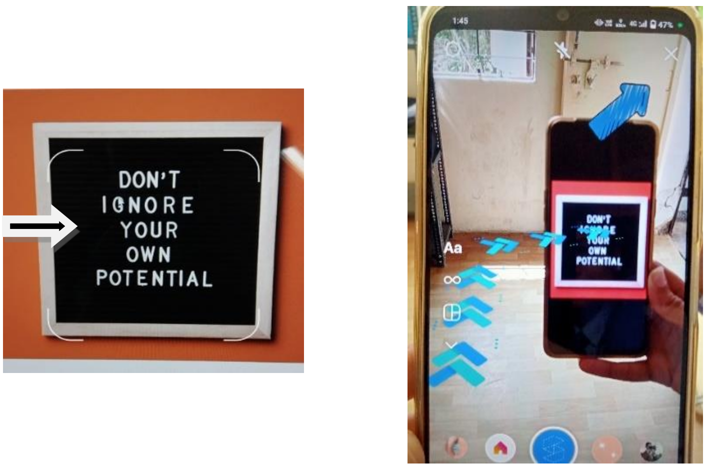
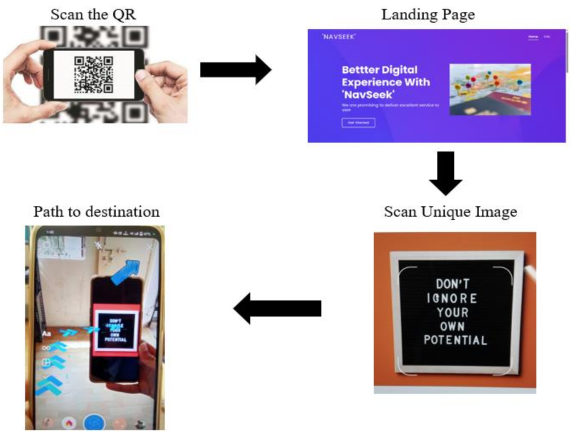


Fig.5 Steps to reach the destination



1. Scan the QR Code: After scanning the QR Code, we will be taken to our webpage. This is the first step.

2. Selecting Destinations (Landing Page): Following our arrival to the homepage, we are presented with alternatives for selecting our destinations. You must look through the distinctive photographs to determine the route after selecting the destination.

3. Scan the Unique Images: Scan the unique images at each location to get a virtual route to your desired location.

4. Arrival: As a result, you have arrived at your destination.

3. CONCLUSIONS

Here, we offer a cutting-edge solution for indoor navigation in the absence of GPS signals. The suggested technique for smartphone-based interior navigation is accurate as well as affordable. Using the Augmented Reality approach of QR code-based interior navigation has superior dependability when compared to other methods like Bluetooth and Wi-Fi. Here, we employ a QR code that contains all of the building's indoor positioning information and allows the user to choose the desired destination. Once the user has chosen the destination, we have access to an augmented reality model with a distinctive image. In order for the web app to simply utilize these QR codes and unique keys to give accurate navigation in the absence of GPS signals, unique images, and codes are placed within the building as well as between the starting point and the destination.

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