SIR (Smart Indoor Route)

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Abstract— In the project designed as QR Code supported indoor navigation; indoors such as hospitals, airports, shopping malls, libraries, stadiums, and parking lots; The campus will be developed to solve the transportation problem of many large buildings and structures located in limited outdoor areas such as the zoo, picnic areas, housing, and estates. Although it may seem easy to adapt to the great living architectures in which today and the future will be sustained, the time lost is too great to be underestimated. Especially in buildings such as hospitals, where human density reduces productivity, rapid transportation is extremely important. On the other hand, the density of people caused by the transportation problem (maybe due to other reasons) can be seen as an income source for shopping centers, but the difficulty of reaching customers in large buildings should not be ignored. We are trying to implement our project to prevent such negative or negative situations and to have applications that can serve when necessary.

Index Terms— QR Code, 3D QR Code, color QR Code, indoor navigation, transportation, route, horizontal architecture, limited open space

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INTRODUCTION

The structures discussed in our project, in which the subject of horizontal architecture is handled; have wide areas and high they are innovative buildings with multiple floors and many types in terms of design. increasing demand these architectural structures are built to meet the needs of the user and to serve the user in every sense. (hospitals, airports, shopping malls, libraries, stadiums, parking lots, campuses, zoos) gardens, picnic areas, lodging, and sites) the transportation problem in indoor and limited outdoor areas gives birth. To solve this problem [1], escalators or roads, warning signs, and any ideas, such as elevators, are stretched to life. But they all know their route makes people's lives easier. Other people, the big and ever-changing It has difficulty finding its route in architectural structures. Our project solves this problem and aims at its solution. It is easy to adapt to the great living architectures in which today and the future will be sustained. Even if it seems like the lost.

- In hospitals where human density reduces productivity,
- In shopping malls that may cause problems in reaching customers,
- The internal structure is similar to each other and there are only plates to distinguish it in parking lots,
- At airports where transportation is provided and time is of great importance,
- It may result in a stampede where large masses enter and exit at the same time.
- in stadiums,
- In hotels that serve their customers in multi-story and large areas, Moreover
- Picnic areas and zoos to reduce stress,
- In schools and faculties that need to be visited for education and training,
- Problems that may arise in transportation in housing and estates, which are living spaces. It is planned to implement our project to prevent
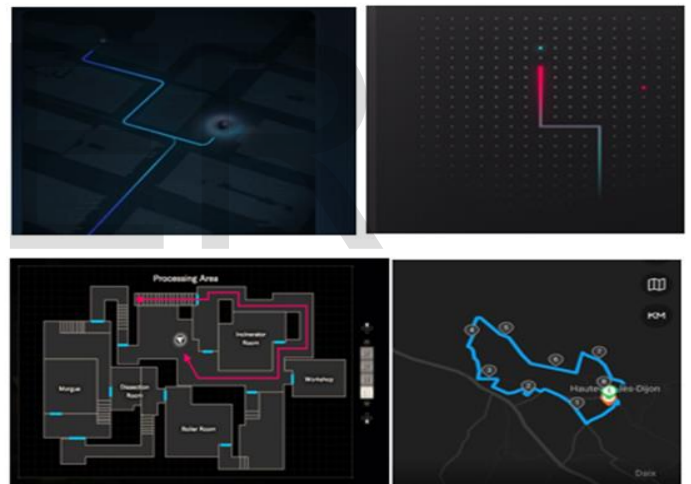

Figure 1. SIR project design view

SOLUTION

In architectural structures developed to meet the increasing demand of the developing population and changing society, It is seen that the elements that provide a solution to the transportation problem are insufficient. This deficiency is mainly The reason that the problem is thought to be only transportation and existing solutions are tried to stay, is to continue. However, in each of the areas that constitute the problem, transportation disruption problems that may arise should be considered.

In the areas evaluated within the scope of our project, we will try to convey the situations that may occur with the transportation problem and the different solutions to be applied to each area.

• Hospitals: With the pandemic, we understand the importance of social distance and we understand how critical in-hospital transportation is at times when density, such as an epidemic, can have dangerous consequences.

Panels with QR code support will be used to provide in-hospital transportation. Thanks to the QR codes on these panels, the person's location, and destination information will be obtained. With the receipt of the information, transportation to the destination will be provided by following the route presented to the user. Considering that the proximity to the panels may cause problems with the importance of social distance, 3d or color QR code design will be made to ensure QR code readability from every angle. In addition, thanks to the (optional) beacon to be placed in each department, information flow will be provided to the user.

• Shopping centers: In the project to be done to prevent lost time and opportunities in shopping centers, where human density is high and is considered a source of income, services will be provided with QR code panels placed in critical areas such as hospitals. Again, optionally, information flow will be provided to the customer thanks to the beacon placed at the entrance of the store.

In addition, the system can be applied in the interior of the stores that provide services in large areas. Again, thanks to the panels, the department to go to will be easily found in the system where information flow is provided.

• Car parks: It is very difficult to find a parking place in open or closed car parks where our vehicles are parked. The reason for this is the large structures built with the increasing number of vehicles. When you look at the architecture of the parking lot, you can see that the interior is constantly repeated. Since this situation increases similarity, it makes it difficult to find the vehicle's location. In the solution to this problem, it will be possible to benefit from the memory feature of the QR code placed in the parking area in our program. You can leave the area with the QR code registered in the application during parking. Then, by reading the QR code in the section where you will enter the area, the route of the place registered in the system and the area you are in will be determined. The user will be able to reach the location of his vehicle by following the route.

• Airports and stations: It is seen that problems to be experienced in transportation to vehicles that will provide transportation are generally time-related. The solution of problems to be experienced in transportation in these buildings, which are large and wide, causes great loss of time. In our project that we want to develop to avoid these situations, the information about the area you will arrive will be transmitted with the QR code placed on the ticket. Thanks to the QR code placed in the sections where the building is entered, the information will be compiled and route determination will be made. At the same time, transportation will be supported by the panels in the building. Thanks to the application offered to the user, smooth travel to the destination area will be provided.

Note: In pre-planned situations such as tickets and appointments, the user will be able to reach the building where the application will be made with the QR code (on the ticket or in the system) and access the entrance area of the building from its name. The continuation of the route will be provided with the help of the panels in the entrance area.

• Stadiums and concert venues: In these structures, where large crowds of fans move in and out at the same time, this project has been developed to prevent crowding and to prevent problems that may arise from opposing fans.

• Hotels: It is seen that the hotels that meet the accommodation needs are growing day by day. As with all large structures, transportation problems are experienced in these structures. There is a staff team working to solve this problem, but this team guides and makes simple introductions at the first entrance to the accommodation room. However, our project will be developed to prevent difficulties for each entry exit to be made in and around the hotel and to ensure exploration. The project can also be used to solve problems with language differences. Access to the room will be provided with the QR code placed on the card/key given to the customer. It is planned to prevent the transportation problem in the indoor and limited outdoor spaces supported by the panel.

• In limited outdoor areas: Thanks to the panels placed in certain areas, the location information and the location information they want to go will be obtained and the shortest distance will be presented to the user. Since the tracking is in the open area, it will be provided by satellites.

MATERIAL AND METHODS

It is necessary to map the indoor and outdoor areas of the building to be able to locate and draw a route inside the building and in the limited outdoor area. The maps that will be produced separately for each floor and section will be registered in our system [3]. During the registration, the common features of the indoor and outdoor spaces (stairs, elevators, WC, canteen, prayer room, etc.) and the features of the building (polyclinics for the hospital, shops for shopping centers, and parking spaces for the car parks, etc.) seating for stadiums and picnic areas; lodging, building location for the site and campus) will be labeled on the map to be drawn with unity. The mapping system will be made with the unity program. On the panel to be placed at the designated locations within the building, the names of all the features of the building and the QR code of that feature will be found next to them. This QR code consists of two types, 3d, and color. With 3d design, solutions will be produced to the problems that can be experienced on the right / left and with color. Relationships between labels and QR codes of maps drawn with Unity will be coded. The location of the place where it is read, the destination, and the algorithm of the routes that can be followed up to this place will be placed in the QR code.

In the user panel, each floor and area will be designed separately on the screen scale and will change according to the user's movement or command. There will be two different user systems[2]. The first of these is the manual tracking system. In the manual tracking system, if there is a cost (or other reason) equipment usage problem at the end of the negotiations regarding the building evaluated within the scope of the project, the application will continue manually. In the manually continuing system, distance tracking will be provided by personal feedback. The distance flow will be adjusted according to the number of steps of the person.

The second system is the digital tracking system. In this system, tracking will be provided thanks to GPS modules placed on the ceiling of the building or beacons placed in certain areas (or two systems can be used at the same time) [2].

The project, which provides controlled tracking from its location to its destination, is planned to be presented to the user as a mobile application with scenarios created for every situation and different environments designed. Our project consists of 2 stages (Mapping system (admin panel) – Mobile application (user interface)) in total [4].

RESULT

Considering that the architectures are preferred horizontally by calculating the work and population density of the society, indoor and limited outdoor transportation problems arise. Although this density provides an advantage to areas such as shopping centers, hospitals, airports, parking lots, etc. areas are at a disadvantage. If we consider today's pandemic process, it is obvious how much trouble this density causes [5]. We believe that these and similar projects are necessary for every segment of people who have transportation problems to overcome such problems and plan the time correctly.

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