



**Sharda School of Engineering &  
Technology[SSET]  
Department of Computer Science &  
Applications**

**RouteScan Sharda**

**CSP254- Project Based Learning-1**

**B.Tech[IT] “Section B” Group-4  
Semester-III**

**Submitted by:**

Anushka [2022512495]  
Luvhana Shrestha [2022825604]  
Unnati Shree [2022496117]  
Saurabh Malik [2022558437]

**Faculty In-Charge:**

Dr. Ajay Shriram kushawaha  
Professor  
CSA, SSET, Sharda University

**Date of Submission: 11-09-2023**

# Certificate

*This is to certify that Ms. Anushka (2022512495), Ms. Luvhana Shrestha (2022825604), Ms. Unnati Shree (2022496117), Mr. Saurabh Malik (2022558437) from B.Tech (IT) 3<sup>rd</sup> Sem "Section-B Group-4" are submitting the Synopsis on subject Project Based Learning [CSP254] as prescribed as per continuous assessment by Department of CSA, Sharda School of Engineering & Technology, Sharda University, Greater Noida for the partial fulfillment of third semester PBL1 in year 2023-2024.*

Signature of Student's  
Anushka [2022512495] *Anushka*  
Luvhana Shrestha [2022825604] *Luvhana*  
Unnati Shree [2022496117] *Unnati*  
Saurabh Malik [2022558437] *Saurabh*  
Date of Submission: 11-09-23  
Place: Sharda University

*Ajay*  
Signature of Faculty In-charge  
Dr. Ajay Shriram Kushawaha

Place: Sharda University

# Index

Sl. No.	Name of Topic/Particular	Page No.
1	<b>Introduction:</b> 1.1 Background 1.2 Research Question(s) 1.3 Objective(s)	5 – 9
2	<b>Literature Review:</b> 2.1 Review of Related Work 2.2 Theoretical Framework	10 – 13
3	<b>Research Methodology:</b> 3.1 Research Design 3.2 Data Collection 3.3 Data Analysis	8
4	<b>Expected Results</b> 4.1 Hypotheses 4.2 Potential Contributions	10
5	<b>Timeline</b> 5.1 Project Schedule	11
6	<b>Resources:</b> 6.1 Budget 6.2 Access to Resources	12-14
7	<b>Conclusion:</b> 7.1 Summary 7.2 Significance	15-17
8	<b>References:</b>	18

# 1. Introduction

“RouteScan Sharda” aims to overcome limitations of existing indoor navigation methods. This solution opts for a simpler and cost-effective approach by using predefined maps and locations created with Auto-CAD. These are stored in a database that can be accessed when needed. The key innovation here is the use of QR technology. QR scanners are strategically placed at intervals throughout the indoor space. When a user scans one of these QR codes with their mobile device, it provides them with an interactive interface for indoor navigation. Users can also change their destination within the app. To introduce this web-based navigation system to outsiders, the solution suggests using a display system at the institution's entrance. This display would advertise the Campus Routing service. When an outsider enters the institution, the display system familiarizes them with the navigation feature. To make it convenient for the outsider, they can simply scan a QR code placed near the display. This action brings up the navigation interface on their mobile device. From there, they can select their destination, and the route map appears on their phone's screen. These strategically placed QR scanners act as relay stations. If a user goes off-track, they can scan another QR code to get back on the right path. This approach is not limited to entrances; it can also be used within indoor blocks of the organization for further navigation.

Overall, this solution has the potential to be implemented in various scenarios, including guiding students to exam halls in examination centers. It offers a user-friendly, storage-efficient, and cost-effective alternative to traditional indoor navigation methods.

**Background :** The background of the Campus Routing App Using QR Code concept arises from the need for a more user-friendly, cost-effective, and accessible indoor navigation solution that doesn't burden users with app installations or rely solely on GPS technology. Instead, it leverages QR codes, predefined maps, and intuitive interfaces to streamline indoor navigation experiences.

**Research Questions:** Some research questions can be stated as follows-**User Experience:-** How user-friendly is QR-based indoor navigation?

**Accuracy and Efficiency:-** Can QR codes provide accurate indoor navigation, and how can they be optimized?

**Acceptance and Security:-** What influences user adoption, and how can user data security be ensured?

**Cost and Integration:-** What is the cost-effectiveness, and how easily can QR navigation integrate with existing systems?

**Impact and Adaptability:-** How does QR navigation affect mobility, and where else can it be applied?

**Training:-** What training is needed for effective QR-based navigation?

**Objectives:** The main objectives of our research includes ,Develop user-friendly QR-based indoor navigation.Ensure accuracy and reliability. Promote user adoption.Enhance security and privacy.Optimize cost-effectiveness.Facilitate integration.Measure impact on mobility.Evaluate adaptability to diverse environments.Provide user training.Explore expanded use cases.

## 2. Literature Review

The literature highlights the growing interest in QR code-based indoor navigation as a user-friendly, cost-effective, and adaptable solution. Researchers are addressing challenges related to accuracy, security, integration, and user adoption to optimize the effectiveness of this technology across diverse indoor environments.

Review of related work: RouteScan Sharda using QR codes is a technology that enables efficient navigation on large campuses. It utilizes QR codes and smartphone apps for directions, often integrating with indoor positioning systems. This approach enhances accessibility, but it also involves challenges like privacy and user experience. Future directions may include AR integration and improved indoor positioning.

Theoretical framework: Theoretical framework of implementing RouteScan Sharda using QR codes involves several key components and concepts which include QR codes, campus mapping, database, user interface, QR code scanning, routing algorithm, real-time data, accessibility and inclusivity, security and privacy, testing and validation, maintenance and updates and integration which provides an efficient and user-friendly navigation solution for campus visitors and members.

Subsection	Description
<b>2.1 Review of Related Work</b>	The suggested solution for indoor route mapping involves using pre-defined maps and QR technology, eliminating the need for mobile app installation. It offers enhanced accuracy in medium-sized institutions and can be implemented in various settings such as smart institutions and examination centers. The goal is to create a seamless indoor way-finding solution for university campuses, allowing students, staff, and visitors to easily navigate from their starting point to any on-campus destination. The project requires users to install two applications for navigation within UTHM. Outdoor navigation is based on Google Maps using latitude and longitude coordinates of the main faculty, while indoor navigation specifically applies to the FKKE-G1 building. QR codes are assigned to most rooms in G1, enabling users to scan them and obtain the position and search for their desired destination. The indoor navigation displays pictures similar to a conventional map and can be accessed through a phone, providing route guidance to the destination. This research addresses the challenges of indoor navigation by utilizing QR codes.
<b>2.2 Theoretical Framework</b>	- Theoretical framework: QR codes for campus navigation blend efficient data encoding (Information Theory), user-friendly design (HCI), wayfinding principles, precise mapping (GIS), real-time tracking (LBS), user-centric UX, adoption strategies (Innovation Diffusion), optimized routes (Navigation Algorithms), and ongoing improvements via user feedback and usability studies.

### **3. Research Methodology**

There are many different methods for collection of data for research such as using the survey method or experimental. So now the next step was for us to come up with a method that works best for our research. For this we kept in mind our hypotheses and decided the method and tools that will be the most helpful.

#### **Research Design**

Since our primary goal is to create an application that addresses the specific needs and pain points of students and faculty who struggle to find classes or access information on campus, our research methods are very user centred and case study based.

This Methodology will allow us to gather insights directly from users. This will help us understand their challenges and requirements. And in the future if we want to refine our application then based on user feedback and usability testing we can create a user-friendly solution. We can also ensure that the application meets the needs of the target audience.

#### **Data Collection**

Our methods of data collection are surveys, interviews and observations. User surveys of students and faculty was the initial stage of a user centered research design. Surveys taken with the help of tools like Google Forms helped us get an overview of how the situation actually is and translate that information into a pictorial representation. Our observation mixed with our own experience has been of help in designing the questions for the survey. We took it a step forward by taking some one-to-one interviews of students and faculty from different parts of the campus.

#### **Data Analysis**

After analysing the data we came to the conclusion that

1. Around 80 percent of the fresher have difficulty finding classes.
2. 90 percent of the students are not able to locate the staff rooms
3. Many professors are not able to find classes.
4. In block 3, there are some classes (like 107B) that almost nobody is able to find for the first time.
5. Many are not fully aware of all the food stalls in the campus.
6. Freshers are not aware of stationary places in the campus.

## **Expected Results**

### **Hypotheses**

After using this application locating classes, staff rooms and all other offices and areas will be hassle free. User will be able to get any information within seconds. And since this application has been designed with user feedback and Iterative testing, it will provide a user-friendly and efficient navigation experience, along with features like search.

### **Potential contribution**

This application will not only provide a user-friendly navigation system to the faculty and students but will also help keep the authority informed of the challenges that are faced by all on the campus. This will help in better planning for future.

## 5. Timeline

Provide a structured timeline for your research project:

**Project Schedule:** Create a detailed timeline that includes key milestones and activities, from the initiation of your research to its completion. This schedule helps you stay organized and ensures that you allocate sufficient time to each phase of your project.

Sr. No.	Milestone/Activity	Start Date	End Date	Duration (in weeks)
b	<b>Project Initiation</b>	18 Aug 23	3 Sep 23	2.1 Weeks
	- Define Research Topic	18 Aug 23	19 Aug 23	0.2 Week
	- Conduct Literature Review	20 Aug 23	3 Sep 23	2 Weeks
2	<b>Research Planning</b>	4 Sep 23	24 Sep 23	3 Weeks
	- Refine Research Question(s)	4 Sep 23	10 Sep 23	1 Week
	- Develop Research Objectives	11 Sep 23	17 Sep 23	1 Week
	- Finalize Theoretical Framework	18 Sep 23	24 Sep 23	1 Week
3	<b>Data Collection</b>	25 Sep 23	15 Oct 23	3 Week
	- Prepare Data Collection Instruments	25 Sep 23	7 Oct 23	1 Week
	- Recruit Participants (if applicable)			
	- Conduct Data Collection	2 Oct 23	15 Oct 23	2 Weeks
4	<b>Data Analysis</b>	16 Oct 23	31 Oct 23	2.1 Weeks
	- Analyze Quantitative Data	16 Oct 23	23 Oct 23	1 Week
	- Analyze Qualitative Data	24 Oct 23	31 Oct 23	1 Week
5	<b>Writing and Reporting</b>	1 Nov 23	7 Nov 23	1 Week
	- Draft Research Report	1 Nov 23	3 Nov 23	0.3 Week
	- Review and Revise Report	3 Nov 23	6 Nov 23	0.3 Week
	- Finalize Research Report	6 Nov 23	7 Nov 23	0.1 Week
6	<b>Submission and Defense</b>	7 Nov 23	10 Nov 23	0.4 Week
	- Submit Research Report	7 Nov 23	9 Nov 23	0.2 Week
	- Prepare for Defense (if required)			
	- Defend Research (if required)			



## 6. Resources

- Thunkable is a website that allows user to create mobile application for android mobile phone.

The website allows user to create basic android mobile application depending on the services provide by the website

- Adobe Photoshop CC2015 is the software use to edit routing picture for indoor navigation. The

hardcopy was scan and save as picture for further process.

- Google Drive is a file storage and synchronization service developed by Google. Google Drive

allows users to store files in the cloud, synchronize files across devices, and share files

- QR code generator: A QR code generator is a software application that can be used to create QR

codes. There are many free and paid QR code generators available online

- QR code scanner: A QR code scanner is a mobile app or web application that can be used to scan

QR codes. There are many free and paid QR code scanners available online

- Web development skills: If you want to create a custom QR code routing system for your campus, you will need some web development skills.

Database: If you want to store information about the campus map and QR codes in a database, you will need a database.

Server: If you want to host your custom QR code routing system online, you will need a server

- Campus map: A campus map is a map of the university campus. The map should include all of the major buildings, roads, and walkways.

Tools

- Visual Studio Code (a powerful developer tool) is a platform that performs activities of source

code editor; it also provides support to features like debugging, code refactoring, task running and

version control.

- Blueprint has the detailed floor plans and defines the construction specifications of any organization. It is required for making the routing pictures for navigation purpose.

- AutoCAD is the computer aided design tool that is used for constructing 2D and 3D drawings and

construction models. For our case this drafting tool helps in snipping the desired route and highlighting the path to be followed.

- MySQL is the relational database system that stores the data in tabular format with columns as the

fields and this table has to be normalized to avoid the redundancy and maintain consistency. Maps

that are designed are put into this database using MySQL queries.

- Node JS is the JavaScript run time environment used for non-blocking and event-driven servers,

traditional websites and API services generally make use of this software application and helps in establishment of server connection

## Conclusion

In conclusion, this synopsis highlights the development of a robust campus routing system utilizing QR code technology. The system's potential applications across various fields, including education and exam centers, are emphasized. By offering efficient indoor navigation, it addresses the need for streamlined navigation solutions and significantly enhances the user experience, particularly in the context of exam halls on campus.

This paper presents a full-stack web application for indoor navigation using QR codes. It emphasizes the importance of indoor navigation in various fields and offers a digital solution to save users' time in reaching their destinations. It's particularly useful for exam centers, helping students quickly locate and reach their exam hall.

## References:-

<https://pubs.aip.org/aip/acp/article-abstract/1883/1/020022/972639>

[https://www.researchgate.net/publication/363610156\\_Campus\\_Routing\\_Using\\_QR\\_Code](https://www.researchgate.net/publication/363610156_Campus_Routing_Using_QR_Code)

<https://www.irjet.net/archives/V7/i5/IRJET-V7I503.pdf>

[https://www.researchgate.net/publication/329477262\\_A\\_Geocoding\\_Framework\\_for\\_Indoor\\_Navigation\\_based\\_on\\_the\\_QR\\_Code](https://www.researchgate.net/publication/329477262_A_Geocoding_Framework_for_Indoor_Navigation_based_on_the_QR_Code)


### Instructor/Faculty Advisor:

Prof. (Dr.) Ajay Shriram Kushwaha  
Professor, Dept. of CSA,  
School of Engineering & Technology,  
Sharda University,

### Instructor/Faculty Advisor:

Prof. (Dr.) Ajay Shriram Kushwaha  
Professor, Dept. of CSA,  
School of Engineering & Technology,  
Sharda University,  
Email: [ajay.kushwaha@sharda.ac.in](mailto:ajay.kushwaha@sharda.ac.in)  
Contact: + 91989005471

Approval: ☒ Approved / ☐ Not Approved

  
Dr Ajay Shriram Kushwaha

Professor, CSA, SSET, Sharda University