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# Virtual Ally: A Tableau-Based Campus Navigation System

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## Article Info

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**Abstract:-** A huge influx of freshmen is accepted annually by the institution. Despite the presence of floor maps, finding one's way about the campus and locating various administrative buildings, departments, libraries, and cafeterias may be quite a challenge. Because of this, it is not easy for a newbie to reach the necessary location in a timely manner. When it comes to finding specific places and the fastest way to go from one place to another on campus, a map-based program like Virtual Ally is invaluable. Consequently, no one on campus will be as confused or irritated. The primary goal of this system is to design a prototype for an app that can be used on smartphones to navigate the university campus. Tableau and Android Studio are used in the development of the suggested system. The system maps each spot using the tableau sketching tool and utilizes coordinates derived by studying map pictures to find each region.

## KEYWORDS

A smart campus, indoor navigation, Tableau, and a mapping positioning system are all terms that describe this campus navigation system.

## INTRODUCTION

Navigating entails precisely identifying the user's position and then displaying instructions to lead them in practical ways to reach their goal. The college campus is enormous, making it difficult for first-time visitors and students to locate common areas like the cafeteria, classes, and administration. There is a lot of chaos since many students become disoriented and wander about the campus during the festivities.

In order to aid students, workers, and visitors with location-search and route-planning, this study primarily aims to create a system that can provide an ideal navigation solution by showing the fastest

way. To help students find their way around campus, "Virtual Ally" A new system called tableau for UCoE has been created. It lets users find certain spots on campus and shows them the environment around those regions. Data analysts, scientists, and statisticians may all benefit from Tableau, a robust data visualization tool, when trying to make sense of large amounts of data and draw clear findings from their studies. Quick data processing and the ability to generate the necessary data visualization output are two of Tableau's most renowned features. Based on the coordinates entered into the Tableau drawing tool, a floor plan is being generated and a route is being provided from origin to destination using Tableau.

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Additionally, it is a visual analytics platform that is enabling consumers and companies to maximize their data, therefore transforming the way data is used to solve issues. Connecting and retrieving data from several sources is the main purpose of Tableau software. Data may be retrieved from any source. Any database, including Excel and PDF documents, may have data extracted using Tableau. You may connect to any database using the included data connectors in Tableau. With Tableau Desktop, you can establish a real-time connection between the extracted data and the Tableau data engine. With the retrieved data, a data engineer or analyst may build a visualization. Whether on a desktop computer, a laptop, or even a mobile phone, end users have global access

When using CBI Studio, the user's creative experience is elevated and finished. You may get all the tools you need for custom shapes in CBI Studio, so there's no need to go between programs. In CBI Studio, users have access to a more feature-rich and intuitive environment that allows them to build upon Tableau with additional capabilities in an easy-to-follow approach. You may use CBI Studio to work with images or maps. It is easy to follow the path on the map. So, you're interested in creating a map of the Tulsa metro area that includes the locations of five obscure businesses. Instead of looking for GPS coordinates, entering them by hand, and then converting them, CBI Studio lets you plug in an address and utilize Tableau's store data location. Below is the map's route.

This paper is structured as follows: The first section provides a comprehensive overview of the system, The literature review is in Section II, the suggested system is in Section III, the findings and discussion are in Section IV, the system's conclusion is in Section V, the future scope of the system is described in Section VI, and the references are in Section VII.

## 1. Related Work

We have selected the following research articles for this assessment. Susovan Jana and Matangini Chattopadhyay detail the planning and development of a Google Maps-based Android app. A university may consist of a single site or a network of campuses. Every year, the institution admits a big class of first-year students. Many new buildings are going constructed, new classes are starting, and some departments could even be relocating on campus. At the moment, I am unable to find any means of obtaining instructions to the various buildings, departments, libraries, cafeterias, etc.; on campus. The difficulty of readily and swiftly reaching one's goal increases for a newbie. After developing it using the Android SDK, the app was tested at two campuses of Jadavpur University.

[1] Shir Ni Ler and Wan MohdNazmee Wan Zainon devised a smart phone system. Accessible from anywhere on the main USM campus, it enables users find the fastest routes between various points of interest. Finding the optimal navigation system that provides shortest-path calculation is the primary goal of the project. We have developed an Android app that facilitates easy navigation and allows users to collaborate on improving route planning. [2] Sunil Bendre, Narendra Patil, Dhananjay Kanawade, Sagar Kandekar, and Rutuja Kirpal developed an app that can retrieve the current location, directions, and description of an event. It could be a real pain to register for every single event that takes place on college campuses these days, especially if there are a lot of them. An android app is available using this technology that participants may use to sign up for these events and get real-time information. If the main administrator wants to change, add, or remove an event, they may do so. Additionally, participants have the chance to access to Google Maps, facilitating the journey to a certain event. the following

Tableau is one of many data visualization tools covered in the article "Learning Tableau:" by authors Paul Tomolonis, Oskar R. Harmon, and Steven Batt. The free, sophisticated, and extensively used data visualization program Tableau Public is ready to be

utilized. Undergraduate research projects heavily emphasize data literacy. In order to help readers understand how to use Tableau to make charts and graphs, put them together, and use them to illustrate patterns in data, this article presents an activity that does just that. [4] This study provided a clear picture of the expanding COVID-19 data and the tools that may aid more effectively, precisely, and efficiently by Akhtar, Nikhat, Tabassum, Nazia, Perwej, Dr. Asif, and Perwej, Dr. Yusuf. Tableau is a very effective program.

to make it easy to see large datasets. Its drag-and-drop interface is simple and straightforward. You may quickly and simply create stunning visuals. Tableau is compatible with many different types of data sources. analysis of COVID-19 We can better grasp the effect of using Tableau to build dashboards that reveal the narrative inside our data. A distance cartogram (DC) is a method that changes the distances between a user-specified origin and other points on a map with regard to trip time. It was introduced in this work by Sungsoo (Ray) Hong, Rafal Kocielnik, Min-Joon Yoo, Sarah Battersby, Juho Kim, and Cecilia Aragon. Since DC projects journey durations in a linearly interpolated time space from the origin, users may quickly compare the relative expenses of travel time between the origin and probable destinations. People who are careful about their journey time often find that being able to quickly peek at their destinations is helpful. [6] The method for interactively visualizing and analyzing healthcare data using Tableau as a business intelligence tool is detailed in a paper by Ko, Inseok& Chang, Hyejung. The Health Insurance Review and Assessment Service supplied the sample data of colon cancer patients from health insurance claims in 2012 and 2013. Final Product This article explains how to create a basic view for the average length of stay of colon cancer patients using Tableau, which is a great way to learn about healthcare data visualization for beginners. [7]

Raja Abdullah, Raja Syamsulazmir, Ismaeel, Hasan Ahmed, Samsudin Khairulmizam, Ramli Abd Rahman, As part of their work on navigation systems, Salam provides a review of algorithms and

integration in their article Here we take a look back at some of the most noteworthy innovations and current trends in navigation systems technology. One major advancement in contemporary navigation is the combination of GPS with INS, or Inertial Navigation System. This study also delves into the research, analysis, evaluation, and performance evaluation of current integrated navigation systems, focusing on their accuracy, performance, low cost, and all the factors that contribute to their operational efficiency optimization. [8]

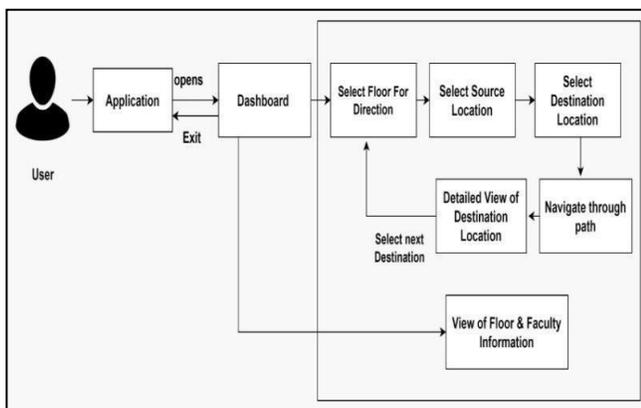
A thorough overview of the development of interior navigation and positioning technologies is given in the paper "Indoor positioning and way finding systems: a survey" by JayakanthKunhoth, AbdelGhaniKarkar, Somaya Al Maadeed, and Abdulla Al Ali. Specifically, the article discusses several indoor scene recognition algorithms that may assist with indoor navigation and various indoor positioning systems that rely on computer vision. This paper proposes a number of criteria for evaluating indoor navigation systems. A quick look at where indoor positioning and navigation systems are headed in the future is provided at the end of the essay. [9]

Agrawala, Dae Hyun, and Setlur, Vidya The authors of the article conduct a crowdsourcing research to investigate the manner in which viewers get meaning from combined chart and caption information. Participants are asked to describe their takeaways after watching chart-caption pairings. Following this, text captions are generated based on the notable aspects. According to their findings, when a high-prominence feature is described in both the chart and the caption, readers tend to focus on the doubly-emphasized high-prominence feature as the takeaway. On the other hand, when a low-prominence feature is described in the caption, readers tend to rely on the chart and report a higher-prominence feature as the takeaway. The researchers also discovered that adding additional information that gives context to captions helped

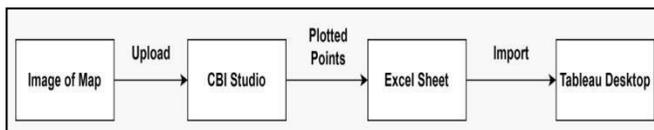
readers understand them better. Guidelines for producing excellent chart-caption pairings were derived from these observations.[10]

## 2. Methodology

Virtual Ally – Campus Navigation System using Tableau works as an online portal or a webpage interface. All visitors and newcomers can use the system to access maps of the college campus on their smart devices. This system can also be used during college events to help participants familiarize themselves with the campus. The architecture of the system is shown in Figure 1. System Architecture.



**Figure1. System Architecture**



**Figure 2: Procedure of getting coordinates of map**

Following are the modules of the system:

- a) Dashboard's Gui
- b) Upon launch, the dashboard is shown to the user. There are buttons on the dashboard that show the floors; clicking on one of them will bring you to a screen where you may choose both your current and desired locations. Clicking the "Access Floor and Faculty Information" button on the dashboard will bring up a page where the user may choose the desired floor to see the associated faculty information.
  - a) Deciding Where to Receive and Send Data The floor map will be shown depending on the floor the user selects. In the top right corner, you'll see a list of laboratories and classrooms. To pick one, click on it and then choose the one you want to go to.
  - b) Strolling along the route The process of displaying the route starts after the user chooses the starting point and ending point. The fastest way to get there is

shown, facilitating the user's navigation as they reach their destination.

a) Access the Floor Plan On the dashboard, you'll see a button for floor information. Anyone visiting or new to the school may use their mobile device to look up the exact number of classrooms and labs. A portion of the system will available to them that provides details such room names, room numbers, and an image of the rooms/laboratories.

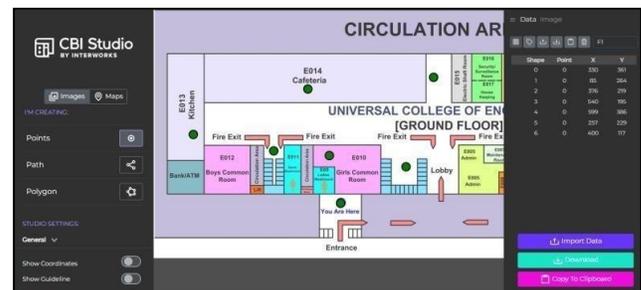
a) Read Up on the Professors On the dashboard, you'll see a button that shows faculty information. Sometimes it's unclear how new students and visitors may find professors to meet. One part of the system will provide them with faculty information like name, desk number, and picture to help them out.

c) Info Source All of the connections between the sheets are shown in the Data Source.

### 3. Results and Discussion

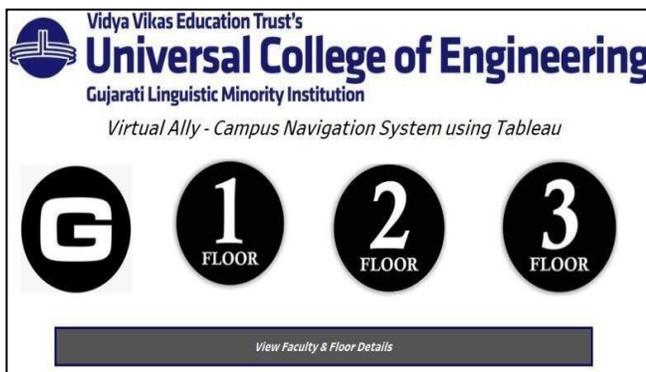
This section depicts the “Virtual Ally – Campus Navigation System using Tableau”. The screenshots below are from the system we built to make it simple for new students and visitors to find their way around the campus. This system is simple to use because it is both cost-effective and efficient.

Figure 3 indicates how to use CBI Studio to generate the map's coordinates table.



**Figure 3: Plotting points on map using CBI Studio**

Figure 4 depicts the Dashboard's user interface, which includes buttons for accessing floor and faculty information as well as displaying directions.



**Figure 4: Dashboard**

Figure 5 represents the faculty information displayed on the system. Image of the faculty and name along with the room name and room number is displayed.

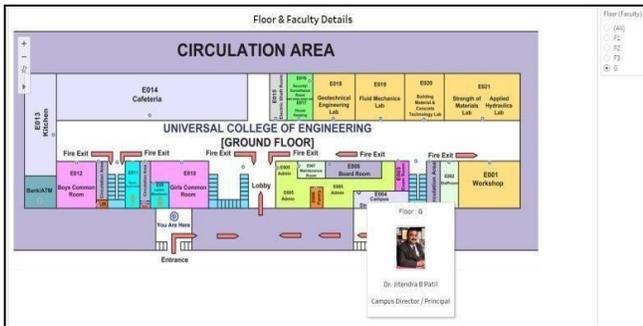


Figure 5: Faculty Information

Figure 6 shows the laboratories and classrooms information displayed on the system. Here name of the laboratories is displayed.

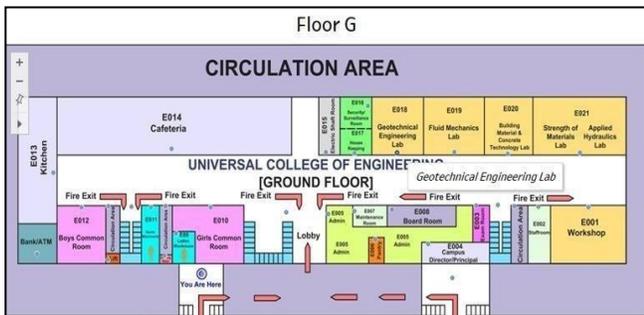
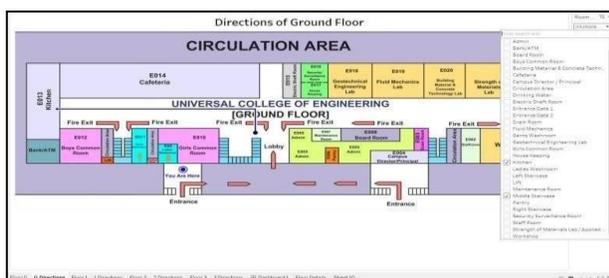
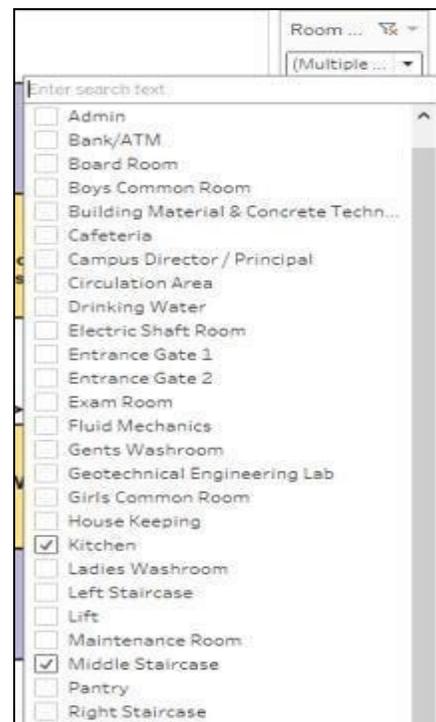


Figure 6: Floor Information

Figure 7 shows the user's list of suggested sources and destinations. Here source location is Middle Staircase and destination location is Kitchen.

Figure 7: Selecting the Source & destination



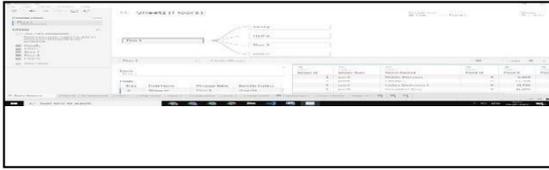


Figure 8 depicts the shortest path shown on the system from source to destination. In the below image path from middle staircase to kitchen is shown.

Table 1 represents the qualitative analysis of our system which are based on numerous parameters.

**Table 1: Qualitative Analysis of our system**

Parameter	Description
Cost	Cost Efficient
Usability	Easy to use
Path Description	Shortest Path
Visualizing Direction	Direction according to user SourceLocation
Mapping Area	Co-ordinates Plotted on the map
Navigation Area	A line drawn from Source to Destination Location
User's work	Less
Time	Use Less time
Accuracy	90%

Since we haven't put any funds into the system just yet, it's economical. Its user interface is intuitive. The user has easy access to all floor and faculty information. The system created the map's coordinates and the mapping area using CBI Studio. After that, a line connecting the starting point and ending point will be shown to represent the Navigation zone. Data visualization The user's starting point is reflected in the direction account. The quickest route will be shown. Using it is a breeze. The level of activity shown by use will decrease. It is more cost-effective and

requires less time to finish. The accuracy rate of this method is 90%.

## 4. Conclusion and Future Scope

This method is applicable to colleges, businesses, and organizations with a large campus. Any given authorized user has constant, unfettered access to the data stored in the system. Based on their starting and ending points, the user may peruse all available floor plans and follow the system's navigational instructions. Viewing staff information, including pictures, names, room

numbers, and desk numbers, is possible via this system. Following are the main areas of future work scope.

1. Floor-to-floor navigation: We've implemented a system that allows users to browse via a single level at a time. It is, nevertheless, feasible to go from one level to another.

2. Presenting faculty members' present locations: Our system only displays the professor's name, image, and the room number where they will be accessible. In other words, the system can detect the faculty member's dynamic position, which is their present on-campus location.

The Praise Due Our campus director, Dr. J.B. Patil, our head of department, Dr. Jitendra Saturwar, and our project manager, Mrs. Vishakha Shelke, deserve our gratitude for all the help they gave us throughout the project.

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