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Visitors Robotic Guide

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Abstract: This guide introduces an avant-garde campus navigation system, seamlessly integrating cutting-edge internal mapping technology to transform the traditional campus exploration experience. Aptly titled " Visitors Robotic Guide " this guide is designed to cater to the diverse needs of students, faculty, and visitors, offering an intelligent and interactive solution for efficient navigation within the campus confines. The internal mapping system embedded in the guide provides detailed, user-friendly maps of campus buildings, ensuring users can effortlessly locate classrooms, offices, amenities, and points of interest. Beyond mere wayfinding, the guide offers a personalized experience, adapting to individual preferences and schedules to provide the most efficient and enjoyable routes. One of the standout features of "Visitors Robotic Guide " is its interactive information platform, delivering real-time updates on campus events, ongoing activities, and essential services. This ensures that users are not only well-directed but also engaged with the dynamic life of the campus. Voice assistance adds an extra layer of convenience, allowing users to navigate hands-free while receiving clear and concise directions. The guide is designed with inclusivity in mind, providing accessibility support to ensure that every user, regardless of ability, can benefit from this innovative navigation solution. As we usher in a new era of campus exploration, "Visitors Robotic Guide " redefines how we interact with our academic surroundings. Whether you're a new student finding your way, a faculty member optimizing your schedule, or a visitor eager to explore, this guide promises to enhance your experience, making each journey on campus a seamless and informative adventure.

Welcome to the future of campus navigation—welcome to "Visitor Robotic Guide."

Keyword:Navigation,Guide,voice assistant, detailed indoor maps, Personalized Routes, Raspberry pi 3b+.

I. INTRODUCTION

Navigating a large college campus can be daunting, especially for freshmen or visitors unfamiliar with the layout. Internal mapping comes to the rescue, providing a visual representation of the campus interior to help people find their way around efficiently. This project aims to create a comprehensive and user-friendly system for directing individuals within the campus grounds.

Detailed Indoor Maps: Get step-by-step directions inside buildings, helping you locate classrooms, offices, libraries, and more.

Personalized Routes: Tailor your journey based on your preferences and schedule, ensuring the most efficient and convenient path to your destination. **Interactive Information**: Access real-time information about events, campus services, and ongoing activities at the touch of a button. **Voice Assistance**: Enjoy a hands-free experience with voice-guided navigation, allowing you to keep your eyes on the surroundings while receiving directions. **Accessibility Support**: Our internal mapping system is designed to accommodate all individuals, including those with specific accessibility needs, ensuring an inclusive and user-friendly experience.

Whether you're a new student trying to find your way around, a faculty member with a busy schedule, or a visitor eager to explore our campus, our internal mapping system is here to make your journey effortless and informative. Welcome to a new era of campus exploration with the Guide!

II. LITERATURE SURVEY

[1] “K. Manohar, L. Sai Kishore, G. MEERAGANDHI”, in this paper the "Raspberry Pi Based Voice-Operated Personal Assistant" is a voice-controlled processor with a camera that interacts with picture to text conversion utilizing Open CV and OCR algorithms for visually impaired people. Infrared sensors aid in the recognition of the voice direction of those conversing with the visually impaired. The Open CV and OCR algorithms recognize the letters contained in the taken photographs from the camera and convert them to audio, which is then communicated to the consumer equivalent using the built- in voice. By incorporating theRaspberry Pi as a computing device, the disabled will be able to connect with their surroundings while also reducing stress by exposing them enlightening outlets. This emphasizesthe importance of reducing screen-based interaction

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[2]"Asst. Prof. Emad S. Othman, Senior in their paper", "Voice Controlled Personal Assistant Using Raspberry Pi‖ uses this approach, which works on the principal input of a user's voice, is implemented using the Raspberry Pi as the main hardware. Using a speech to text engine to convert voice to text as an input. The text that resulted was then utilized to process queries and get relevant data. After the information was retrieved, it was transformed to speech using text to speech conversion, and the user was provided the appropriate output. In addition, various other modules based on the concept of keyword matching were implemented.

[3]Dhiraj S. Kalyankar, Prof. Dr. P. L. Ramteke", Personal Google API Assistant System using Raspberry Pi . The work seeks to create a personal assistant that lets consumers engage with home appliances via speech and gesture commands, resulting in a more interactive and user-friendly living experience, as well as the integration of many tools and aspects produced over the model's execution. The design and development of an IOT system is addressed in this paper, which includes providing voice commands and receiving output in the form of audio and visuals.

[4]"P Srinivas,T Sai Teja, CH Bhavana,R Likith ",‖Raspberry Pi Based Personal Voice Assistant Using Python‖, in these paper deals with a voice assistant that can perform a variety of tasks for the user, such as setting an alarm, setting daily reminders, knowing the weather forecast, reading the latest news feed, playing a song from a playlist, asking about the details of a movie, finding the meaning of an unknown word, reading a Wikipedia article, and controlling electronic devices.

[5]Kishore Kumar R, Ms. J. Jayalakshmi, Karthik Prasanna S , Python based Virtual Assistant using Raspberry Pi for Home Automation**.** The paper presents a Python-based virtual assistant that utilizes a Raspberry Pi for home automation. The virtual assistant can perform a variety of tasks, including controlling the lighting and temperature of the home, playing music, and setting reminders. The authors describe the hardware and software components of the system, including the Raspberry Pi, microphone, speaker, and various sensors.. The paper concludes that the virtual assistant system is an efficient and cost- effective solution for home automation. The system can be easily customized to meet the specific needs of the user and can be extended to include additional functionality as required. The authors suggest future improvements to the system, such as integrating machine learning algorithms for more advanced voice recognition and natural language processing capabilities.

[6]Ass. Prof. Emad S. Othman, "Voice Controlled Personal Assistant Using Raspberry Pi" Senior Member IEEE - Region 8, was published in the International Journal of Scientific &Engineering Research, Volume 8, Issue 11 in November 2017.The paper presents a voice- controlled personal assistant system using a Raspberry Pi. The system can perform various tasks, such as playing music, answering questions, and controlling smart home devices, through voice commands. The paper provides a detailed description of the hardware and software components of the system, including the Raspberry Pi, microphone, and speaker.The author also discusses the limitations of the system and suggests potential areas for future research and development. They also discuss the implementation of the virtual assistant using the Python programming language and various open-source libraries. The paper concludes that the virtual assistant system is an efficient and cost-effective solution for home automation. The system can be easily customized to meet the specific needs of the user and can be extended to include additional functionality as required

[7]S. Amritas. **Tulshan and Sudhir Namdeoraodh** age Monsieur Thampi et al (2021) Online Assistant Survey: Siri, Cortana, Alexa" © Nature Springer Singapore Pte Ltd‖. . The study found that all three digital assistants had similar levels of accuracy, with a success rate of over 80%. However, Siri and Cortana were found to be faster in providing responses compared to Alexa. The study also analyzed the use of these digital assistants among different age groups and found that younger participants were more likely to use Siri and Alexa, while older participants preferred Cortana. Additionally, the study found that users who had more experience with digital assistants were more likely to prefer Siri over Cortana and Alexa. Overall, the study provides valuable insights into the performance of digital assistants and their popularity among users..The study also highlights the importance of considering user preferences and demographics when designing and developing digital assistants.

[8]"Autonomous tour guide robot using embedded system control‖. **Diallo, Alpha Daye, Suresh Gobee, and Vickneswari Durairajah.** Autonomous navigation is achieved through wall following using ultrasonic sensors and image processing using a simple webcam. The bitwise image processing comparison method introduced is writing in Open CV and runs on the Raspberry pi. It grabs images and looks for the tags to identify each lab. A recognition accuracy of 98% was attained The user interaction was achieved through voice recognition on an android tablet placed on top of the robot. Google speech recognition APIs were used for communication between the robot and the visitors.

[9]Aman,M. S., Quint, C. D., Abdelgawad, A., & Yelamarthi, K "Sensing and classifying indoor environments: An Iota based portable tour guide system‖. The proposed system can provide personalized audio-visual information based on the location of the visitor, making the visitors independent of following a guide. The core of the module is a Raspberry Pi 3 with Bluetooth Low Energy (BLE) and Wi-Fi transceivers. Localization is performed using iBeacons, and RFID technology is used to identify certain objects. The Thingworx platform has been used as the application cloud server while YouTube has been used to present visual feedback to the user. The system uses machine learning algorithms to classify the indoor environment based on the sensor data. The sensors used include a temperature sensor, humidity sensor, light sensor, and air quality sensor.

The nursing robot uses an array of sensors to gather data about the patient's physical condition and send it to the fuzzy logic-based controller. Based on the controller's analysis, the robot provides appropriate medical aid to the patient. The wireless beacon network allows the robot to navigate and locate the patient's position accurately. The proposed system is evaluated in terms of response time, efficiency, and accuracy, and the results show that it can significantly improve the quality of care for patients.

[10]Dharmasena, T & Abeygunawardhana P, "Design and implementation of an autonomous indoor surveillance robot based on raspberry pi‖. this paper describes an autonomous surveillance robot that is being developed while keeping the development costs as low as possible and is capable of performing routine patrols autonomously in indoor environments and detect anomalies around it such as temperature fluctuations, unauthorized personals and report them back to a central easily.The paper presents the design and implementation of an autonomous indoor surveillance robot based on the Raspberry Pi platform. The robot is equipped with a Raspberry Picamera module, ultrasonic sensors, and a motor control module for obstacle avoidance and navigation. The results of the experiments conducted on the robot show that the system is capable of detecting and tracking intruders in indoor environments. The proposed system provides a cost-effective solution for indoor surveillance and can be easily adapted fora wide range of applications, including home security and industrial automation.

[11]Umam Faikul, Firmansyah Adiputra, Ach Dafid, and Sri Wahyuni. "Autonomous Museum Tour Guide Robot with Object Detection Using TensorFlow Learning Machine‖. The tool's implementation is controlled by the deep learning Convolutional Neural Network method using the Tensor flow framework to recognize and classify the detected objects. The robot that will be createdis a

3-wheeled robot with one camera as a sensor to detect objects around the robot. The robot is equipped with an audio speaker to provide object detection information. The robot detected six objects at the Sumenep Palace Museum, which were integrated into a robot with a 100% success percentage in the 5th epoch with the 175th iteration. The time required was 117.11 error of 0.393. Weaknesses in this study are the need for control throughout the tour guide robot so that it runs more stable and the use of a camera with a higher resolution, but when run on the system, it does not affect system performance.

The paper presents an autonomous tour guide robot for a museum that uses TensorFlow-based object detection techniques to identify artifacts and navigate the museum. The robot is designed to work in indoor environments and can detect and avoid obstacles. The authors used a Raspberry Pi for the control system and a camera for object detection. The robot can recognizeand classify several artifacts in real-time and provides audio and visual information about them to the users. The system is tested in a real museum environment, and the results showed that the robot can navigate and provide useful information to the users. The study concludes that the proposed system can enhance the museum visitor's experience by providing an interactive and informative tour.

[12]Chen, Y., Li, J., Ni, R., & Liu, X. Design and Implementation of an Interactive Docent Robot for Exhibitions‖. The service robot completes the functions of multi-point navigation, autonomous obstacle avoidance and explanation in the local embedded device through path planning algorithm. To achieve the anthropomorphic interaction effect, an anthropomorphic robotic head for interaction is designed to realize the facial action change in the process of explanation and interaction. In addition, the functions of human-robot dialogue and facial recognition based on convolutionalneural network are realized on the cloud platform. The experimental results in navigation accuracy evaluation and human-robot interaction show that the service robot designed in this paper can maintain stable motion, accurate navigation, and natural interaction. The paper presents the design and implementation of an interactive docent robot for exhibitions. The robot can conduct tours, answer questions, and provide information about exhibits to visitors. It is equipped with a variety of sensors, including a depth camera, microphonearray, and touch screen, allowing it to interact with visitors in a natural way.

[13]Shashidhar, R., & Tippannavar, S. S , EEG based Smart Wheelchair using Raspberry Pi for Elderly and Paralyzed Patients‖**..** This research presented a wheelchair development control framework for the disabled that is dependent on EEG signals of the human cerebrum using face movements, eye blinks, electrical signals, human ideas, and muscle contractions... The paper presents the design and development of an EEG-based smart wheelchair system for elderly and paralyzed patients using Raspberry Pi. The proposed system can assist such patients in controlling their wheelchairs using EEG signals obtained from the brain. The system uses an EEG headset to acquire the EEG signals and Raspberry Pi to process and control the wheelchair movements. The system consists of three modules, namely the EEG acquisitionmodule, the signal processing module, and the motor control module. The proposed system is tested and evaluated using a prototype wheelchair with four wheels. The results show that the system can accurately detect theuser's intended movements and control the wheelchair movements accordingly. The system can be helpful in providing a safe and independent mobility solution for elderly and paralyzed patients.

[14]Narayanan, K.L., Krishnan, R.S., Son, L.H., Tung, N.T., Julie, E.G., Robinson, Y.H., Kumar, R. and Gerogiannis, V.C, Fuzzy guided autonomous nursing robot through wireless beacon network‖**..** The system performance was evaluated on a PC with an Intel Core i5 processor, while solar power was used to power the system. Several sensors, namely HC-SR04ultrasonic sensor, Logitech HD 720p image sensor, a temperature sensor and a heart rate sensor are used together with acamera to generate datasets for testing the proposed system. In particular, the system was tested on operations taking place in the context of a private hospital in Tirunelveli,Tamilnadu, India.A detailed comparison is performed, The experimental system validation showed that the fuzzy controller achieves very high accuracy in obstacle detection and avoidance, with a very low computational time for taking directional decisions. Moreover, the experimental results demonstrated that the robotic system achieves superior accuracy in detecting/avoiding obstacles compared to other systems of similar purposes presented in the relatedwork

III. METHODOLOGY

Raspberry pi is a small computer which can be used for computing. It is able to run Linux and other OS from the raspberry pi family, we are using Raspbian OS for functioning below figure shows the picture of our model. **1** Initially, the model will be placed at the entrance gate of our college near the security room. So that new visitors, students, or anyone who is new to our campus can evidently see the model.**2** To activate and operate the model, the user needs to speak in front of the model using the some activation key. The moment the user says activation key , the model will start working.**3** Continuing to the second step, after saying key, the model itself requests the user to select the language, among Kannada, English, Hindi, Tamil, and Telugu.**4** Eventually, the user needs to select any one language among those. Based on that selected language, the pedestrian robotic guide proceeds to communicate in the selected language.**5** Then it will again ask the user to select the branch where they need to go. Similar to the third step it shows the list of branches.**6**

The visitor must choose one of the branches that are displayed on the screen.**7** Based on the branch selected by the visitor, the Raspberry Pi's control thread will perform a task that finds the related address and presents the result on the smart screen and via speaker.**8** Once the Visitors robotic guide completes telling the route path to their particular destination branch, the model will ask the user if they want the route map, if a visitor wants that route map, he/she can get it by scanning the QR code with their smart phone

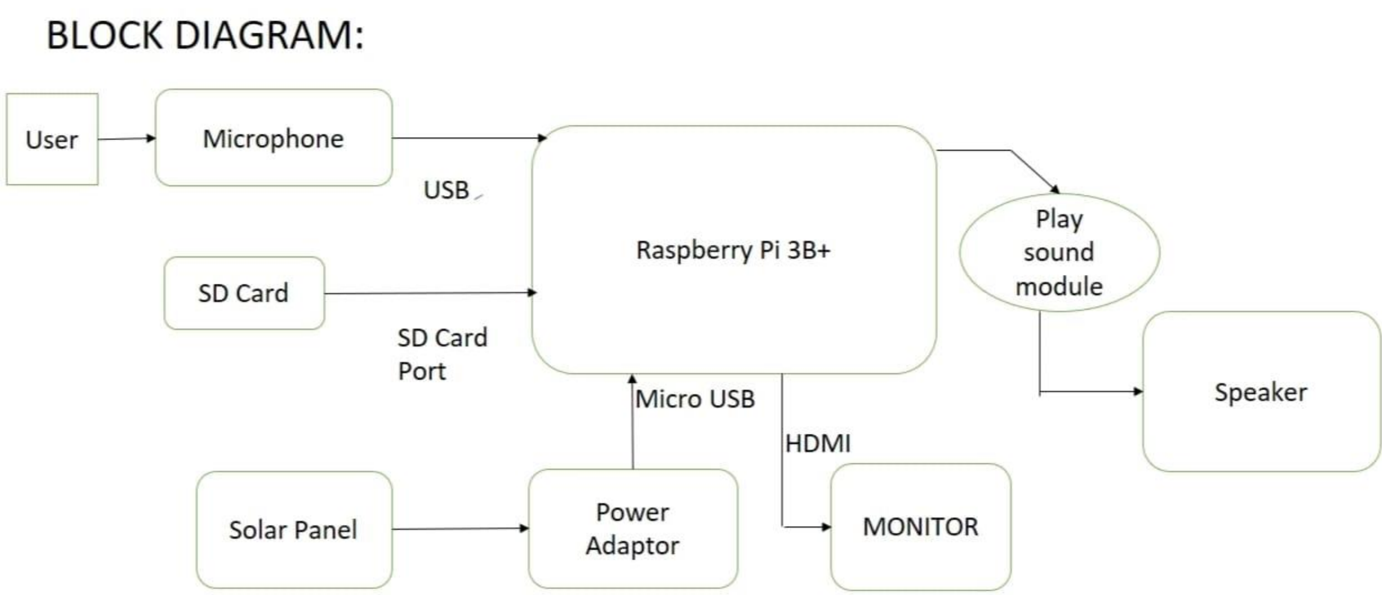

Figure 1: Block diagram

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