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A Survey on Trip Planning Systems

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Abstract: ***These days, there are plenty of online trip planning tools that can automatically whip up a selection and itinerary for visiting Points of Interest (POIs) that match travelers' interests. These systems come packed with a variety of features tailored to cater to different visitor profiles. Some of the key features gaining traction include estimating tourists' personal interests, selecting POIs, routing paths, identifying must-see POIs, recalculating dynamic trip plans, planning multi-day trips, checking POI opening hours, managing budget constraints, and considering weather conditions. In this paper, we will take a closer look at these trip planning systems by highlighting their features and functionalities. Additionally, we will evaluate several current systems based on how effectively they incorporate the latest features for organizing travel experiences. Our selection criteria for the catalog are based on research into travel planning systems. We aim to compare these systems and showcase what sets our trip planner apart as a sustainable travel option.***
Keywords: POI's (point of interest), recalculation, functionalities, path routing, sustainable.

I. INTRODUCTION

The travel industry is exploding and has become one of the most popular ventures of the recent years. With technology and information available to us at the tap of a screen, more and more people are turning to planning their travels and vacations online. The advent of travel websites has changed the way we plan our holidays entirely, but for the better. These also serve as a one-stop-shop offering complete details and services, specially designed to cater to the traveller's requirements.

Problem statement: With the growing challenges of climate change and environmental degradation, there is a rising demand for sustainable travel options. The Sustainable Trip Planner seeks to offer an eco-friendly alternative by guiding travelers in making informed choices that reduce their environmental footprint.

II.EASE OF USE

A. Integration of Eco-Friendly Options:

One of the most applicable features of sustainable trip planning systems is their ability to incorporate green choices. The systems t end to present travelers with options that value sustainability, like advising on public transport, cycling, or walking as alternatives to car rentals. For example, sites like Eco Trip and Green Travel Guide give users choices that reduce carbon emission ns using alternative routes and transport means.

B. Importance of Sustainability in Travel and Transportation

The value ofsustainabilityin transportation and travel cannotbe overemphasized, considering that transportation is a major contributo r to greenhouse gas emissions across the globe. With populations in cities still on the rise, the need for effective and sustainable ways of traveling grows ever more pressing. Sustainable trip planning systems come in to help address this need by promoting the use of low emission travel modes and discouraging dependency on personal cars. In addition, these systems help build sustainable cities by encouraging the incorporation of green infrastructure and improving the quality of urban living. The use of sustainable travel habits not only has environmental benefits but also fosters economic development and social justice by enhancing access to transport for everyones.

C. Objective and Structure of the Survey

The aim of this survey is to present a thorough overview of the situation regarding sustainable trip planning systems today, emphasizing their main features, advantages, and limitations. The survey seeks to determine the current trends and innovations in the industry, as well as evaluate the efficacy of these systems in helping individuals achievemore sustainable traveling habits. Survey structure is divided into several sections starting with an introduction to the notion and relevance of sustainable trip planning.

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This is followed by an elaborate discussion of current systems and technologies, a discussion of their implications on sustainability objectives, and a review of directions and possibilities for research and development.
The survey is concluded with findings and recommendations for stakeholders in the design and implementation of sustainable trip planning systems.

D. Abbreviations and Acronyms

To make it easier to understand and read, the following abbreviations and acronyms are utilized throughout this paper:
• GHG: Greenhouse Gas
• ICT: Information and Communication Technology
• ITS: Intelligent Transportation Systems
• EV: Electric Vehicle
• PT: Public Transportation

E. Methodologies and Technologies in Sustainable Trip Planning

The terrain of trip planning has undergone a dramatic change with the introduction of digital technologies, which have revolutionized the way people and organizations plan their travel. Today's technologies in trip planning cover a broad range of tools and platforms aimed at improving user experience, streamlining travel routes, and lowering costs. Such technologies include mobile apps, web platforms, and integrated systems that utilize real-time data to offer customized travel suggestions. Examples of note include Google Maps, which provides route optimization and traffic information, and TripIt, which aggregates travel itineraries into one usable format. In addition, the incorporation of artificial intelligence (AI) and machine learning (ML) has facilitated the ability of these websites to forecast user preferences and provide environmentally friendly travel alternatives, such as public transport or carpooling, thus working towards reducing environmental depletion. The spread of these technologies indicates the increasing need for effective and sustainable trip planning options in the world .

F. Key Features of Sustainable Trip Planning Systems

Sustainable trip planning systems are increasingly being hailed as critical instruments in fostering green and efficient travel. They work to maximize convenience and accessibility for users while minimizing environmental footprint by optimizing trav el routes and modes. The defining characteristics of sustainable trip planning systems involve incorporating real-time data, user-focused design, and smart city and urban infrastructure compatibilityThrough the use of innovative technologies and data analysis, these systems hope to lower carbon emissions, decrease traffic congestion, and encourage the use of public transport and non-motorized travel modes.

G. User-Centric Design for Sustainable Options

A user-centric design is fundamental to the success of sustainable trip planning systems. This approach prioritizes the needs and preferences of users, ensuring that the system is intuitive, accessible, and responsive to individual travel behaviours. Features such as personalized route recommendations, real-time updates, and integration with mobile applications enhance user engagement and satisfaction. Furthermore, user-centric design involves incorporating feedback mechanisms that allow users to report issues or suggest improvements, fostering a collaborative environment for continuous system enhancement. By placing users at the centre of the design process, sustainable trip planning systems can effectively encourage the adoption of eco-friendly travel options.

H. Integration with Urban and Smart City Infrastructure

The integration with urban and smart city infrastructure is an essential element of their sustainability. This is achieved through an effortless connection of modes of transport and urban services to enable convenient and sustainable journeys. Smart city technology, such as IoT devices and data analysis platforms, can deliver useful intelligence about traffic volumes, public transit patronage, and environmental issues. Through the use of these technologies, trip planning systems can provide real-time travel information and dynamic route optimization, which improves the overall travel experience. Moreover, co-operation with policymakers and city planners ensures that trip planning systems are in conformity with urban development objectives and help create liveable and sustainable cities.

III. CASE STUDIES AND APPLICATIONS OF SUSTAINABLE TRIP PLANNING

Review of Successful Implementation Cases

Successful examples of sustainable trip planning systems have been applied in different parts of the world, demonstrating their capabilities to transform city mobility with reduced environmental footprint. A prime example is Copenhagen, Denmark, where sustainable trip planning was integrated with the city using next-generation data analytics and real-time information to rationalize public transport and cycling pathways. This system not only saves carbon but also makes commuter life more convenient by giving real-time travel time estimates and suggested alternative routes. Another success story is in Singapore, where the Land Transport Authority has introduced a holistic trip planning system that covers public transport, cycling, and walking modes.

This system combines GPS information, user input, and predictive algorithms to provide sustainable modes of travel that are efficient as well as green. These examples demonstrate the impact of sustainable trip planning systems on alleviating city congestion, decreasing emissions, *and encouraging healthier lifestyles*

IV. FUTURE PROSPECTS

Emerging Trends in Sustainability and Trip Planning

The face of sustainable trip planning systems is changing very fast with the growing concern for environmental issues and the imperative to protect the world from further climate change effects. Trends in this area point towards a change in the use of sophisticated technologies like artificial intelligence, machine learning, and big data analytics to make trip planning more efficient and effective. These technologies facilitate the creation of more adaptive and customized travel solutions that can optimize the route, lower carbon emissions, and encourage the use of sustainable modes of transport. There is also an increased focus on integrating real-time data from multiple sources, such as weather conditions, traffic, and public transport schedules, to give travellers the most sustainable and efficient means of transport. As these trends progress further, they are bound to become decisive drivers of sustainable trip planning system's future, creating substantial avenues for innovation and progress in this sphere**.**

V. LITERATURE SURVEY

Sustainable tourism aims to minimize environmental impact while supporting local communities. The tourism industry contributes significantly to carbon emissions, making sustainable trip planning essential.

Existing Solutions & Limitations:

Google Maps Eco-Friendly Routes: Improves routes for reduced fuel usage but does not include wider sustainability factors.

Eco-Friendly Accommodation Platforms (Eco Bnb, Green Key): Provides certification of sustainable stays but excludes transport and activities.

Limitations:

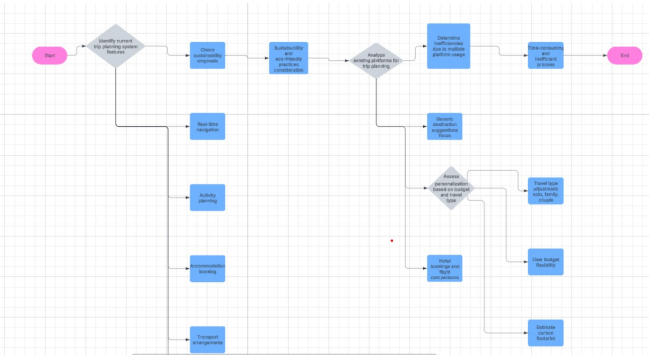
Current solutions target discrete aspects and not a complete, individualized, and combined trip-planning strategy

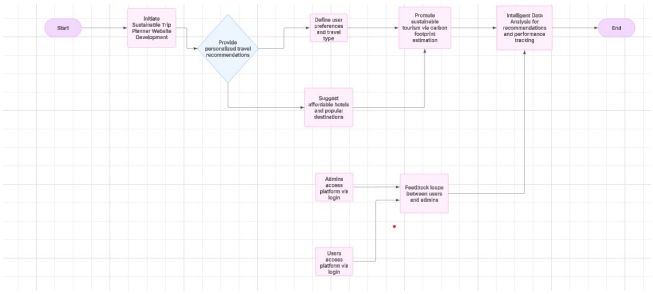
VI. FUTURE SCOPE

Carbon Footprint Estimation: AI models estimate emissions for various transport modes.

Route Optimization Algorithms: Minimizes emissions by indicating the most sustainable routes.

Sustainable Accommodation Selection: Employs certifications and machine learning to offer green stays.





Positioning Figures and Tables:

Applicability	Symbol	Description
All		Indicates the presence of certain functionality.
Navigation		Navigation information in form of map. User can download or print the map for use in on trip phase.
		Ad hoc navigation information when the user is traveling from one POI to another one, such as which train/bus to take or existence of additional direction information for driving or walking.
POI recognition		Recognition of tourist attractions based on augmented reality.
Transport		Information for traveling by driving.
		Information for traveling by walking.
		Information for traveling by public transport.
Group profiles & tours		Inclusion of more than one tourist while preparing the trip itinerary.
		Possibility to take in to account personal preferences of individual group members.
		Possibility to divide the trip itinerary into sub trips to match preferences of individual members (or sub groups). E.g. the whole group (in some parts of the trip) might be divided in two smaller groups, so that each sub group can visit specific attractions that are of more common interest for the sub group members.

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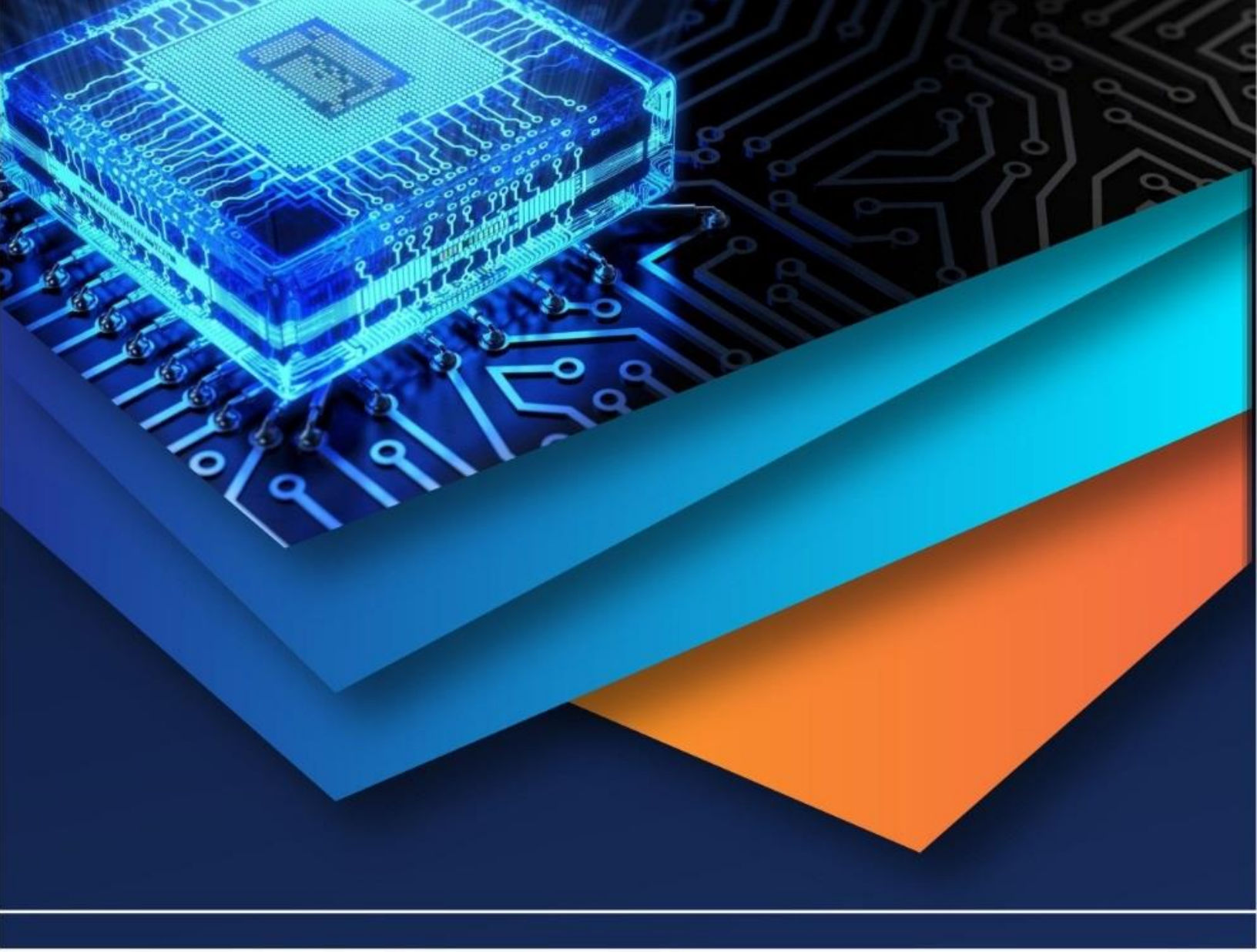

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