Literature survey on A last mile connectivity App

Vivek Jambhulkar[1], Sakshi Raut[2], Sujan Sheikh[3,] Sufiyan sheikh[4], Leena Patil [5]

Student, Department of Computer Science and Engineering, Priyadarshini College of Engineering, Nagpur, India[1]

Student, Department of Computer Science and Engineering, Priyadarshini College of Engineering, Nagpur, India[2]

Student, Department of Computer Science and Engineering, Priyadarshini College of Engineering, Nagpur, India[3]

Student, Department of Computer Science and Engineering, Priyadarshini College of Engineering, Nagpur, India[4]

HOD, Department of Computer Science and Engineering, Priyadarshini College of Engineering, Nagpur, India[5]

Abstract: A last mile connectivity app provides efficient and effective connectivity for the final leg of the transportation network for the users. This kind of app studies the route an individual has to travel and then determines his/her path in the most convenient way possible. Keeping the users updated about the modes of transport in his/her way is the main aim of this app. EasyTrans plays a crucial role in determining the overall quality and accessibility of services in a networked society. The use of this application have a high perceived time savings among users, and it is found that there is a measurable modal shift from personal vehicles to these solutions for bridging the last mile gap.

Keywords: last mile connectivity, rapid transit systems, accessibility, intermediate public transport, feeder services

I. INTRODUCTION

In an era characterized by unprecedented connectivity, the concept of "Last Mile Connectivity" has emerged as a pivotal component of our interconnected world. The "last mile" represents the final segment of the transportation network, and it often proves to be the most intricate and crucial link in the chain. As our society becomes increasingly reliant on digital services, e-commerce, online education, and IoT (Internet of Things), the effectiveness and efficiency of last mile connectivity have taken on paramount significance.

The term "last mile" is utilized across various sectors such as telecommunications, e-commerce, transportation, and urban planning. It commonly refers to the concluding segment of the telecommunications network that connects with the end user. This last portion of the network often serves as a bottleneck, restricting the speed and capacity of data delivered to the end user. In the context of delivery chains, last mile delivery is the crucial final stage where an item is transported to its ultimate destination, typically a residential address. This phase is particularly significant as it ensures the successful completion of the delivery process.

The term "last-mile" or "first and last-mile" connection pertains to the initial or final segment of an individual's journey, mainly relying on public transportation. Often, individuals may opt to walk to a transit station if it's conveniently situated. Nevertheless, at the commencement or conclusion of a public transit trip, the starting or concluding point may be challenging or impractical to reach on foot. This disparity between public transit and the ultimate destination is referred to as a last mile connection.
Intercity rail is a common example: a traveller reaches their local train station, but after getting off the train has no way to access the final destination. The traveller might have
driven to the train station at the start, or perhaps they took a local bus or walked. The train carries them a long distance to another city where the final destination is too far to walk to from the station. Without some form of connection in the destination city, travellers become effectively stranded near the end. This example can be applied to any mode of transit.

In the realm of transportation, it involves the journey from a transportation hub to the user's ultimate destination. The quality and reliability of this last mile link can significantly impact the overall user experience and the accessibility of services. In an increasingly interconnected world, the concept of "last mile connectivity" has become a pivotal and transformative element in the realm of transportation, technology, and access to essential services. Often overlooked, yet fundamentally crucial, the last mile connectivity addresses the vital link between individuals and communities and the broader networks that facilitate their access to transportation, information, and resources. It embodies the challenge of bridging the gap between the core infrastructure and the end-user, and it plays a pivotal role in shaping our daily lives. Imagine a bustling metropolis with a well-established public transportation system or a rural village striving to access high-speed internet. Both scenarios necessitate efficient last mile solutions to ensure that people can effortlessly reach

their destinations, whether physical or virtual, without undue complications. The term "last mile" symbolizes that critical leg of the journey, whether in physical or digital spaces, where the final connection is made.

II.   LITERATURE REVIEW

A literature review on the topic of "Last Mile Connectivity" in the context of various projects and initiatives can provide valuable insights into the challenges, solutions, and best practices associated with improving access to essential services, information, and infrastructure for underserved communities.

[1]   The authors have analyzed new mobility enterprises that are piloted as last-mile solutions at a metro station . It focuses on the solutions that have a high perceived time savings among users, and it is found that there is a measurable modal shift from personal vehicles to these solutions for bridging the last mile gap. At the same time, it shows that there is a need for supporting regulatory frameworks and greater multimodal integration for enabling public-private collaboration for seamless and sustainable urban mobility.

[2]   The writer emphasizes shared mobility and its role in linking the initial or final segments of a journey with the public transportation system. Shared mobility methods have the potential to alleviate strain on urban transport systems and contribute to a more balanced distribution of transportation modes. To gather opinions on the adoption of new sharing economy modes, the authors conducted a traffic- sociological survey. The results revealed that over 80% of individuals commute to work daily, yet more than half of them do not rely on public transportation.

[3]   The authors have analyzed the effects of an autonomous vehicle (AV) shuttle service as a last-mile solution using NetLogo. They investigated the change of mode share in four neighbourhoods of Chicago with various streetscape designs and different socio-demographic characteristics.

[4]   The researchers investigated a system named Automated Last-Mile Transport (ALMT), which involves a collection of compact, fully automated, electric vehicles designed to enhance the final leg of a journey taken by train. They developed an agent-based simulation model for ALMT, incorporating a dispatching algorithm. This algorithm allocates travel requests among the accessible vehicles in a First-In-First-Out (FIFO) sequence and chooses a vehicle based on specific control conditions, such as the time required to reach a requesting passenger.

[5]   It is important to note the unpredictable effects of the Covid-19 pandemic on future mobility. These impacts could be better managed through the automation of non- individually owned vehicles. There is also the possibility that individuals may show a heightened willingness to alter their habits, behaviors, and thought patterns in response to the evolving situation.

III.   PROBLEM STATEMENT

In an era marked by growing digital dependence and the increasing reliance on online services, the efficient and equitable provision of "Last Mile Connectivity" stands as a paramount challenge. This research paper seeks to address the multifaceted issues associated with the last mile, emphasizing the critical nature of this challenge and its diverse implications across domains, including telecommunications, e-commerce, urban development, and digital inclusion. concern for researchers, policymakers, and industry leaders.

The last mile serves as the conduit through which digital services, information, and goods reach the end-users. Despite its central role, it is plagued by a range of issues, including technical limitations, access disparities, and logistical complexities. The significance of this problem extends to:

1.   *Digital Inclusion*: Bridging the digital divide and ensuring that all members of society have equitable access to technology and information is an essential aspect of last mile connectivity.

2.   *Economic Competitiveness*: In an increasingly digital economy, efficient last mile logistics and access are pivotal for the competitiveness of business.

3.   *Smart City Development*: The integration of last mile solutions into smart city initiative is instrumental in achieving urban sustainability, enhanced services, and improved quality of life.

Research Objective:

The objectives of this research study include the following key components:

1. Identification of Last Mile Challenges*:* Thoroughly examining the distinct obstacles and hindrances that hinder the connection in the final segment of transportation, considering both urban and rural environments.

2. Assessment of Technological Solutions*:* **Appraising the effectiveness of emerging technologies, such as wireless** mesh networks, 5G, and fiber-optic deployment, in enhancing access during the last mile of connectivity.

3. Analysis of Digital Inclusion Strategies: Investigating policies and approaches designed to diminish the digital divide through connectivity in the last mile. This involves drawing insights from global case studies and identifying best practices.

4. Impact on Smart City Development: To analyse the role of last mile connectivity in smart city development, focusing on its integration into urban infrastructure and services.

5. E-commerce Logistics and Consumer Expectations: To explore the impact of changing consumer expectations on last-mile logistics, and to assess innovative solutions in the e-commerce industry.

6. Socioeconomic Implications*:* To examine the broader societal impact of last mile connectivity, particularly its influence on education, healthcare, and economic opportunities.

Through tackling these research objectives, our goal is to offer a thorough insight into the intricate nature of the last mile connectivity challenge and its impact on shaping our globally interconnected environment. The ultimate aim of this research is to play a role in the formulation of strategies, policies, and technological innovations that foster effective and fair connectivity in the last mile. In doing so, we aim to address the broad and significant implications associated with last mile connectivity.

IV.   PROPOSED APPROACH

It holds significant importance to recognize and attend to the crucial connection between individuals, communities, and the extensive networks that enable their access to transportation, information, and resources. Considering our daily travels, the effectiveness and dependability of the last mile link significantly influence the overall user experience and the accessibility of services. Therefore, enhancing the integration and accessibility of mass transit networks for a larger urban population can greatly benefit users, making it easier for them to reach their destinations seamlessly.

 A. User Registration A user-friendly interface is a fundamental aspect of our application, designed to facilitate seamless transportation options for user. The initial page of our application takes the user details that will be needed for accessing the application.
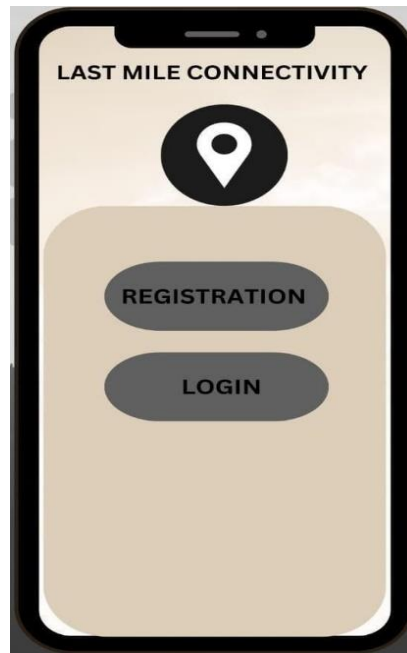
Fig 1. Login/ Register Page

B. Location Details

This section of our application gathers information about the user's location. Subsequently, the following page serves as an entry point, offering users various choices of transportation modes they can utilize.

This serves a dual purpose:

1) *Collecting User Location:* It takes the current location of the user from where he/she will start the journey with the help of GPS. In addition to this, if the user wishes to predict the journey from different location, he/she can enter any other location as well.

2) *Collecting Destination Location:* It will take the final destination location of the user where his/her journey will end.

These location-specific details are just a starting point. The success of last mile connectivity initiatives depends on a thorough understanding of the specific challenges and opportunities presented by the location, as well as a tailored approach to address them effectively.
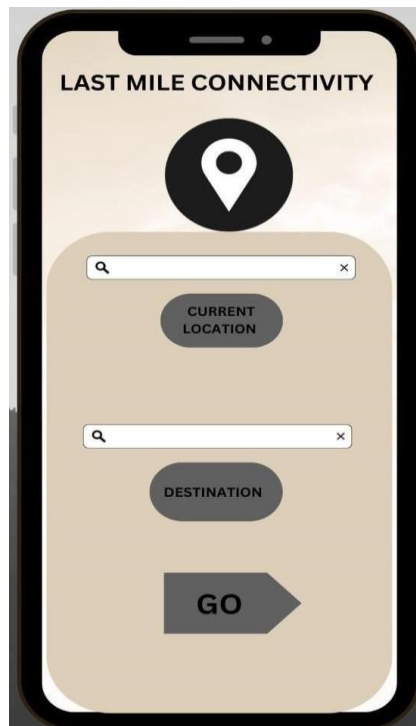
Fig 2. User's Location Page

C. Navigate the path with multi-modal options

Encourage a diverse approach that combines different transportation choices, encompassing walking, cycling, electric scooters, public transit, and ride-sharing services. Identify areas where these options can be introduced or improved to create a seamless transportation network. It will show the route that is most convenient for the user wherein the user will get options to choose the mode of transport.

The path chosen by the application will be optimized one. This proposed approach serves as a comprehensive strategy for tackling last mile connectivity challenges in a specific area. Customizing and fine-tuning this approach to match the unique characteristics of the target region is essential for success. Multi-modal options can vary by location, and the success of your journey relies on the accuracy and up-to- date information provided by your chosen navigation app. Be flexible and patient, especially when combining multiple transportation modes, and always prioritize safety during your journey.

Fig 3. *Navigate the path with multi-modal options*

V. CONCLUSION

Last mile connectivity is a crucial component of urban transportation and infrastructure planning, representing the final leg of a person's journey from a transportation hub to their ultimate destination. It addresses the challenges of bridging this last gap efficiently and conveniently in densely populated urban areas. The key aspects of last mile connectivity include multi-modal transportation options, digital platforms for route planning and payment, smart infrastructure integration, public awareness and education, public-private partnerships, accessibility and inclusivity, supportive regulations and policies, ongoing monitoring and feedback, environmental sustainability, scalability, and community engagement. Customizing solutions to the specific needs of the target area and building upon related research and initiatives are essential for successful implementation. Last mile connectivity plays a significant role in improving urban mobility, reducing congestion, and enhancing the overall quality of life in cities.In the ever- expanding landscape of transportation, technology, and access to essential services, last mile connectivity stands as a critical bridge between individuals, communities, and the broader network of resources. It has become clear that the challenges of this final stretch are not to be underestimated. The implications of efficient and accessible last mile connectivity extend far beyond mere convenience; they encompass economic development, collaboration among diverse stakeholders, and a keen awareness of the specific needs of communities. As we navigate the complexities of our interconnected world, the importance of overcoming the last mile problem remains paramount.

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