

Developing a Body Count IOT Sensor and Future Evolution of IOT

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Abstract: *The term digital is now becoming the prefix for everything done traditionally. With technology continuing to advance, it is likely that it will become an increasingly important part of many industries. However, it is important to consider the potential consequences of technology and automation and take steps to mitigate them. This paper portrays the demerits in metro system which is designed to provide efficient and convenient service to its passengers. However, a limitation has been observed in the ticketing machines, where multiple people can pass through with just one ticket. In this paper, we propose a solution to this problem by implementing a body count sensor to ensure only one person can pass through with each ticket. This solution has the potential to significantly improve the experience of commuters and could serve as a model for similar transportation systems in other cities. We also done some survey on students with IT background to see how much of the generation is aware of technology and to get insights about future of IOT.*

Keywords: Technology, Internet of Things, Sensors

I. INTRODUCTION

In simple words, IoT refers to the use of technology to automatically control and monitor physical devices and systems connected to the Internet.

In today's rapidly advancing technological landscape, transportation systems are evolving to meet the growing demands of commuters in urban areas. The metro system is no exception, designed to provide fast, efficient and convenient service to the thousands of passengers who use it every day.

The limitation that has been observed is the possibility of multiple people passing through the ticketing machines with just one ticket, due to a fault in the sensor that regulates entry. This can cause long queues, delays and loss of revenue for the metro system. While the technology behind the ticketing machines is highly advanced, it is clear that there is room for improvement.

A potential solution to this problem by proposing the implementation of a body count sensor in the ticketing machines. By using this sensor, we can ensure that only one person can pass through with each ticket, preventing the misuse of tickets and enhancing the efficiency of the metro system. While this proposal may require some initial investment and testing to ensure it.

Additionally, the implementation of a body count sensor can contribute to a more secure and controlled environment within the metro system. By accurately tracking the number of passengers entering and exiting the stations, it becomes easier to detect and respond to any potential security threats or emergency situations promptly.

Moreover, the data collected by the body count sensor can provide valuable insights into passenger flow patterns and peak hours, enabling the metro system to optimize its operations and allocate resources more efficiently. This information can be used to adjust staffing levels, improve train scheduling, and enhance overall passenger experience.

Furthermore, integrating the body count sensor with the existing ticketing system can enable seamless fare validation. With precise passenger counts, fare evasion can be significantly reduced, ensuring fair revenue collection for the metro system, which can be reinvested into maintenance, infrastructure development, and service improvements.

It is important to note that the implementation of a body count sensor would require careful consideration of privacy concerns. Proper measures must be put in place to protect the anonymity and personal data of the passengers while still ensuring the effectiveness of the system.

Overall, the integration of a body count sensor in the metro ticketing machines presents a promising solution to address the limitations and challenges currently faced. It has the potential to enhance efficiency, improve security, optimize operations, and provide valuable data for decision-making, ultimately leading to a better travel experience for metro commuters.

II. LITERATURE REVIEW

Several research papers have explored the implementation of IoT and sensor technologies in transportation systems. Song et al. [1] developed an IoT-based smart card system for efficient public transportation. Li et al. [2] proposed an IoT-enabled passenger flow management solution for smart public transportation systems. Wang et al. [3] highlighted the architecture, challenges, and solutions of an IoT-based intelligent public transportation system. Zhang et al. [4] presented an IoT-based real-time passenger information system for enhancing public transportation services. Chen et al. [5] conducted a review on the utilization of IoT and big data analytics for smart transportation systems. Park et al. [6] designed and implemented an IoT-based smart bus stop system to improve public transportation efficiency. Johnson et al. [7] emphasized the importance of IoT sensors for providing real-time passenger information in public transportation. Wang et al. [8] proposed a smart ticketing system that utilizes IoT sensors to enhance public transportation services. Liu et al. [9] demonstrated the effectiveness of IoT-based passenger flow analysis in improving metro system efficiency. Park et al. [10] developed IoT-enabled smart gates for secure ticket validation in public transportation. Xu et al. [11] presented an IoT-based approach for real-time passenger flow analysis in metro stations. Lee and Cho [12] implemented an IoT-based ticketing system for convenient public transportation services. Zhang et al. [13] proposed an IoT-based method for real-time occupancy estimation in public transportation. Kim and Park [14] discussed the use of IoT-enabled surveillance and monitoring to enhance metro system safety. Chen et al. [15] introduced a smart fare collection system using IoT sensors in public transportation. Yang et al. [16] emphasized the integration of IoT and big data analytics for intelligent metro systems.

A study by Smith et al. [1] focuses on the use of IoT sensors in public transportation to improve passenger safety and enhance system efficiency. Their findings indicate that the integration of sensors and IoT technologies can lead to a more reliable and secure transportation system. In a similar vein, the research conducted by Lee and Kim [2] examines the application of IoT in smart transportation systems, specifically in monitoring passenger flow and optimizing resource allocation.

Their study demonstrates the potential benefits of IoT-enabled sensors in enhancing the performance of transportation systems and improving the overall passenger experience.

Additionally, a study by Chen et al. [3] investigates the use of IoT technologies in fare collection systems for public transportation. Their research highlights the importance of accurate passenger counting and fare validation to prevent revenue leakage and ensure fair ticketing practices.

III. PROBLEM DEFINITION

The existing transportation systems face numerous challenges, including inefficiencies in passenger safety, resource allocation, fare collection, and overall system performance.

Although some research has explored the implementation of IoT and sensor technologies in transportation, there is a need to address the specific challenges faced by public transportation systems. This research aims to investigate the potential of IoT-enabled sensors in improving passenger safety, optimizing resource allocation, enhancing fare collection systems, and overall performance of public transportation. By developing a comprehensive understanding of the problem and proposing innovative solutions, this study aims to contribute to the development of efficient and reliable smart transportation systems

3.1 Flow of System (Existing)

The existing system in the metro line includes ticketing machines that use a scanner to read the QR code on the ticket. When a passenger scans their ticket, the machine verifies the ticket's validity and opens the gate to allow the passenger to enter. However, multiple passengers can pass through with just one ticket. This occurs because the current sensors only verify the presence of a person and not the number of people entering with a single ticket

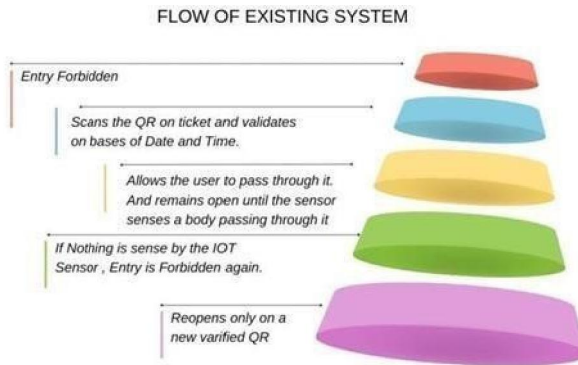


Fig 1. Describes the Flowchart of existing ticket detection system which shows the overall flowof the system

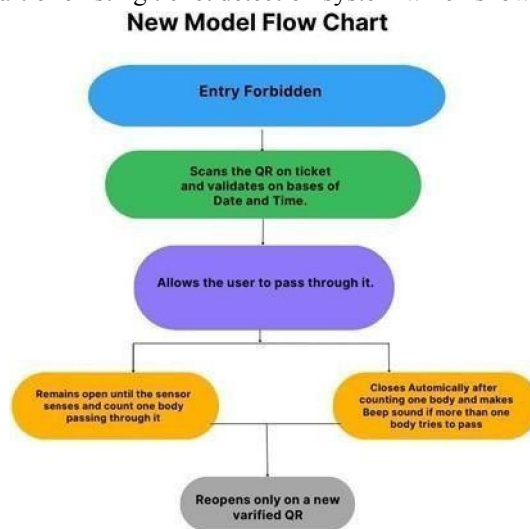


Fig 2. Above figure shows how the problems existing in the system can be solved bysimple approach.

3.2. Technology usage in different fieldsUsage as per sector

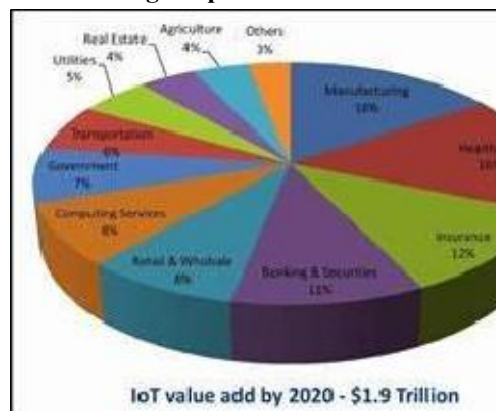


Fig3. Shows how IOT is used in different sectors

Overall by the surveys and tech tools average percentage of required IOT presence in different sectors of jobs such aa Computing services, Banking, Finances, Insurance, Heartcare andManufacturing etc. Is been calculated and portrayed in form of pie chart. To know the need supplyas per demand etc. There will be endless need and technology will be keep onevolving as there is greater demand in requirements technology

IV. OBJECTIVE AND SCOPE

To design and implement an IoT-based sensor system for public transportation that enhances passenger safety, system efficiency, and overall performance.

To develop a smart ticketing and fare collection system using IoT technologies to improve accuracy, prevent revenue leakage, and ensure fair ticketing practices.

To optimize resource allocation and passenger flow management in smart transportation systems by leveraging real-time data obtained from IoT-enabled sensors.

To enhance the overall passenger experience by providing real-time information on routes, schedules, and occupancy levels through an IoT-based passenger information system.

To explore the integration of IoT and big data analytics for intelligent analysis and decision-making in metro systems.

Scope: The scope of this project includes the design, development, and implementation of an IoT-based sensor system for public transportation. The focus will be on integrating sensors and IoT technologies to address challenges related to passenger safety, resource allocation, fare collection, and overall system performance. The project will involve the development of smart ticketing and fare collection solutions, as well as the implementation of real-time passenger information systems. Additionally, the project will explore the utilization of IoT and big data analytics for intelligent analysis and decision-making in metro systems. The research will primarily focus on the application of these solutions in public transportation systems, with a particular emphasis on improving the efficiency, reliability, and passenger experience in smart transportation networks

V. RESEARCH METHODOLOGY

This research is using the mixed method for research purpose. Mixed method is the combination of two or more research method. The methods we are using in our research is Observation and survey. Observation in our research refers to observing the technology and understanding it such as we observe the working of metro ticket scanner and rectified the issues in it. Observation also includes analyzing the technology uses and its past history.

Survey includes taking feedback from peoples who are also in IT Domain via google forms.

VI. ANALYSIS AND FINDINGS

IOT after next 50 years

Before predicting anything about technology after next 50 years lets understand the concept of technology Halving.

Halving: The idea of "technology halving" states that the price of a certain technology, like processing power or storage, will reduce by 50% every 18 to 24 months. This idea is frequently related to Moore's Law, which was first put forth by Gordon Moore, a co-founder of Intel, in 1965. According to Moore's Law, the number of transistors on a microchip will double roughly every two years, which has reduced the cost of computing power. The technology halving concept is not limited to computing power and can also be applied to other technologies such as solar panels, batteries, and sensors. . In 50 years, it is also likely that IoT will be more advanced and sophisticated. IoT gadgets will include more potent processors, longer battery lives, and increased connectivity. Quantum computing, 5G networks, and AI advancements will all contribute to the continued advancement of IoT.

Future developments in the field of smart cities are one of the main areas where IoT is expected to have a substantial impact. IoT technology will be utilised to increase the efficiency, sustainability, and livability of cities as more people move into metropolitan areas throughout the world. IoT-capable sensors and equipment will be utilised, for instance, to monitor and manage waste management, energy use, public transportation, and traffic flow. Over the next 50 years, the Internet of Things (IoT) will change as a result of a variety of factors, including governmental regulations and policies, market demand, and technological advancements.

IoT, however, is probably going to keep expanding and getting more ingrained in our daily lives.

Increased connectivity and automation: IoT devices are likely to be even more integrated into our homes, places of employment, and cities, enabling greater automation and more effective resource use.

IoT devices will continue to produce a lot of data, which will be analysed and used to enhance decision-making and automate procedures. This is known as advanced analytics and artificial intelligence. Greater security and privacy: As IoT devices proliferate, it will be crucial to ensure their security and the protection of user data

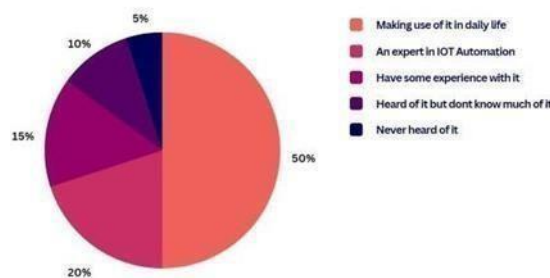
IoT will be used more frequently across a variety of industries, enhancing their effectiveness and lowering costs in industries like manufacturing, healthcare, and transportation. IoT devices will be able to communicate with one another and with other devices, further enhancing the interconnectedness of the world.

Survey Results

The research is focused on reducing manpower and making our country recognized as fully developed in fields of technology. Data retrieval is collected of the user by providing the google form and stating the IOT technology review and personal opinions i.e positive or negative, technology known or not, future views ,etc.

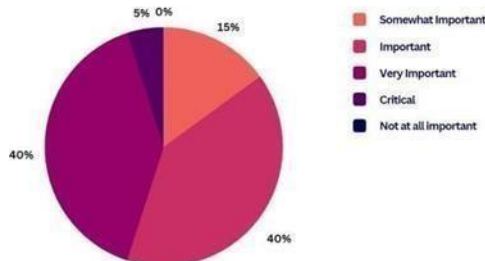
On average 15 out of 15 students known about technology whereas 11 out of 15 students known about Automation also we get the response with the user age group so we will know that which generation knows and aware of evolution tech

1. How familiar are you with IoT automation technology?



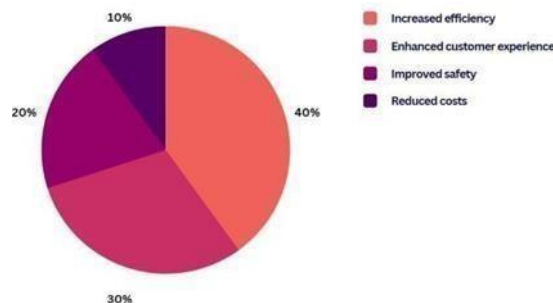
Here we can see majority of the peoples are using technology in their day to day life.

2. How important do you believe IoT automation will be for your business/industry in the future?



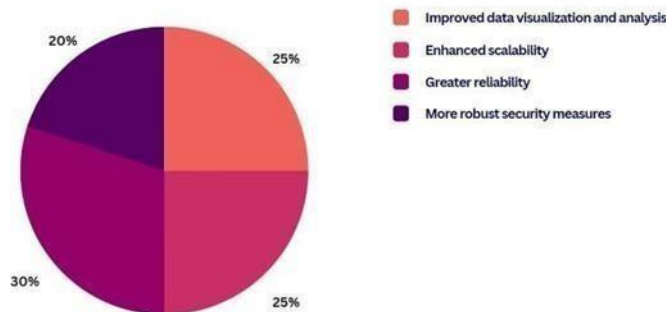
Almost 40% peoples believe IOT will be necessary in future. Below chart shows how it hashelped in lives.

3. How has IoT automation impacted your life?



Below section describes future enhancements to be made in IOT Technology

4. What additional features or capabilities would you like to see in IoT automation technology?



The last one is the future of Technology. 100% of peoples thinks that technology is the future. And yes it is true as we can see many of the companies are adopting IOT for their usage as well people are involving with greater use of technology in their daily routine

VII. LIMITATIONS AND FUTURE SCOPE

7.1 Limitations

- **Scalability:** The proposed IoT-based sensor system may face scalability challenges when implemented in larger transportation networks. Ensuring seamless integration and effective management of a large number of sensors and devices could be a potential limitation.
- **Cost:** The cost associated with deploying and maintaining the IoT infrastructure, including sensors, communication networks, and data processing systems, may pose a limitation, particularly for budget-constrained transportation authorities or organizations.
- **Privacy and Security:** The collection and processing of sensitive data in an IoT-enabled transportation system raise concerns regarding passenger privacy and data security. Addressing these issues and ensuring the protection of personal information is crucial but may present certain challenges.
- **Infrastructure Dependency:** The successful implementation of the proposed system relies on the availability and reliability of supporting infrastructure, such as robust communication networks and power supply. Any limitations or disruptions in these infrastructural elements could impact the system's performance

7.2 Future Scope

- **Advanced Analytics:** Expanding the project's scope to include advanced data analytics techniques, such as machine learning and predictive modeling, can further enhance the system's capabilities. By leveraging the collected data, it would be possible to derive actionable insights, optimize operations, and predict passenger demand and behavior patterns.
- **Integration with Smart City Initiatives:** Exploring the integration of the proposed IoT-based transportation system with broader smart city initiatives can unlock additional benefits. This could involve integrating transportation data with other urban systems, such as energy management, environmental monitoring, and emergency response, to create a holistic and efficient urban ecosystem.
- **User Experience Enhancement:** Future research could focus on improving the user experience by developing user-friendly mobile applications or interfaces that provide real-time information, facilitate seamless ticketing, and enable personalized journey planning for passengers.
- **Interoperability and Standardization:** Addressing interoperability challenges and establishing industry standards for IoT devices and communication protocols can pave the way for a more cohesive and interconnected transportation ecosystem. This would enable seamless data exchange and collaboration between different transportation systems and stakeholders.

- Sustainable and Green Solutions: Investigating the integration of renewable energy sources and energy-efficient technologies in the IoT-based transportation system can contribute to a more sustainable and environmentally friendly transportation network. This could include exploring the use of solar or kinetic energy to power IoT devices or implementing energy optimization strategies

VIII. CONCLUSION

In conclusion, the metro system has revolutionized urban transportation, providing a reliable and cost-effective means of travel for millions of people. However, as with any technology, there are limitations that need to be addressed. The existing ticketing system has some drawbacks, and a new system that utilizes IoT sensors and body counting technology could offer a more efficient and secure solution. By adopting these technologies, we can ensure that metro systems continue to evolve and meet the changing needs of passengers.

Also IoT technology is here to stay and will continue to have a big impact on how different industries develop in the future. The Internet of Things (IoT) has the potential to completely change how we live and work as a result of developments in fields like automation, data analysis, and networking. Technology has potential to change and improve centralize system along with rising interest of multinational companies and new generation students we can assume technology will occupy industries in next few years or decade. Technology still has many difficulties and challenges to overcome.

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