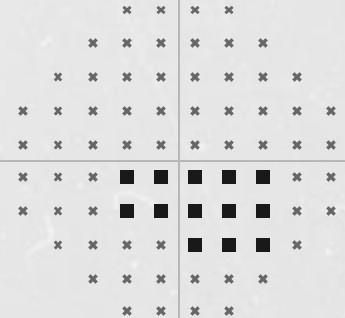


APPLICATIONS OF **COMPUTING** IN THE TRANSPORTATION FIELD

A presentation by:
GROUP 6, **BSIT 1-B**

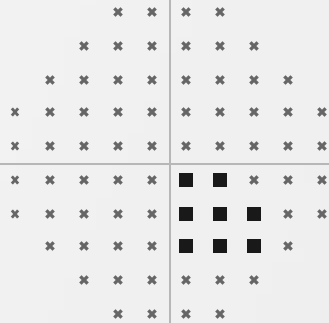


OVERVIEW

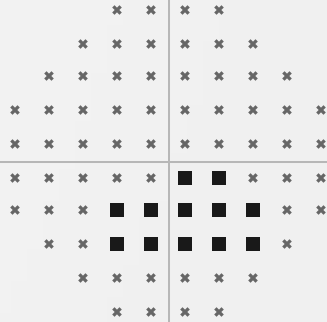
In this presentation, I aim to share the research I compiled to give you a deeper knowledge about the applications of computing in transportation. In this presentation, we will take a look at the following:

- Innovation
- Advantages & Disadvantages
- Contributions
- Future Trends



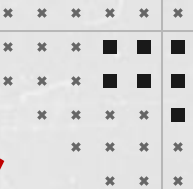


INNOVATION



INNOVATION IN **TRANSPORTATION**

Computing technologies have profoundly transformed transportation over the past few decades. From early traffic light control systems to today's autonomous vehicles, innovations in computing have led to significant advancements in safety, efficiency, and convenience.

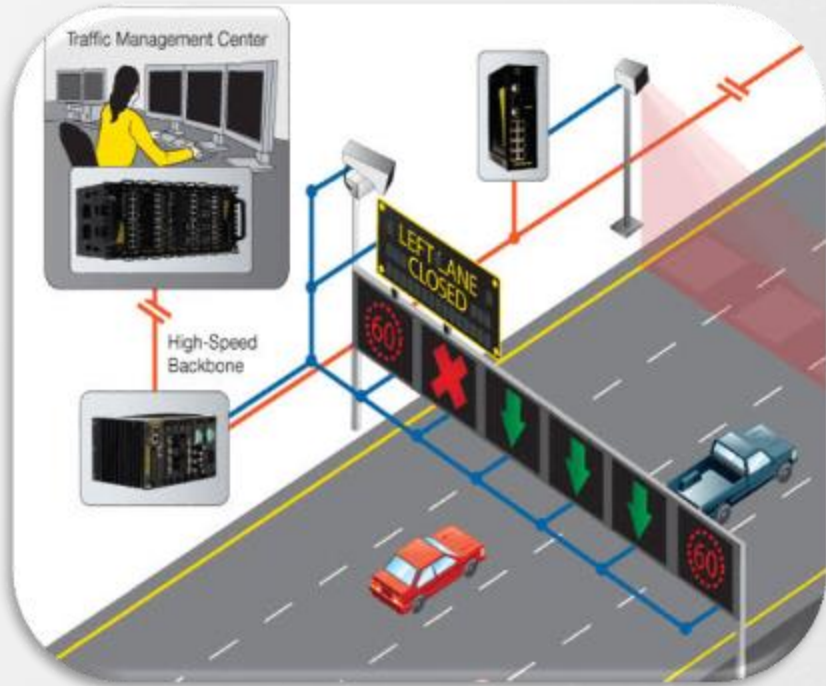


AUTONOMOUS VEHICLES

- The development of self-driving cars began with basic computer vision and sensor technologies in the early 2000s. Today, autonomous vehicles use advanced AI algorithms and a combination of sensors like LIDAR, radar, and cameras to navigate roads safely.
- Examples: Waymo, Tesla Autopilot, and Cruise Automation.



TRAFFIC MANAGEMENT **SYSTEMS**



- Modern traffic management systems use real-time data analytics to monitor and control traffic flows. This technology helps reduce congestion and improve travel times by adjusting traffic signals and providing real-time traffic information.
- Examples: Adaptive traffic signal systems, Waze, and Google Maps traffic data.

SMART INFRASTRUCTURE

- Computing innovations have led to the development of smart infrastructure, such as connected traffic signals and road sensors. These systems gather data to optimize traffic flow and enhance safety.
- Examples: Intelligent Transportation Systems (ITS), smart traffic lights, and roadside sensors.



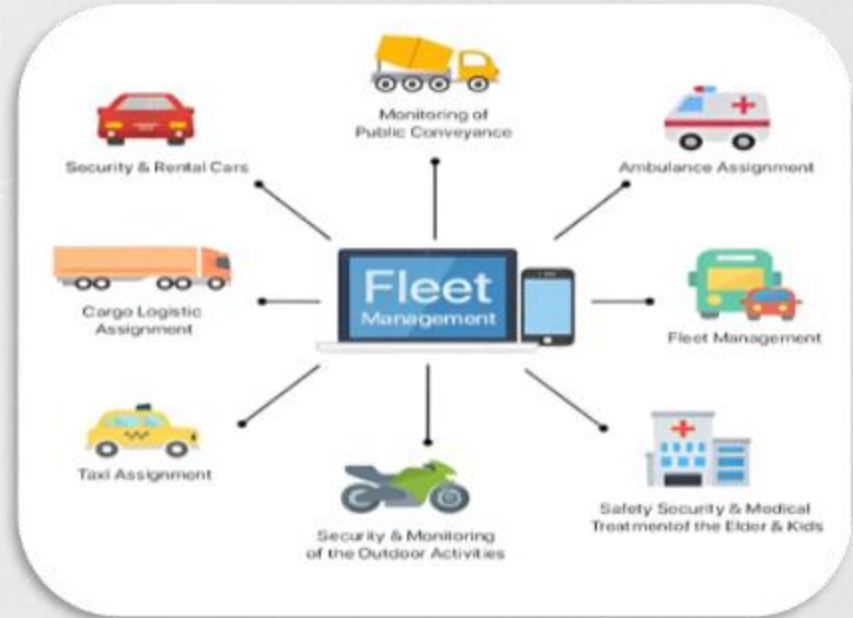
ELECTRIC & HYBRID VEHICLES

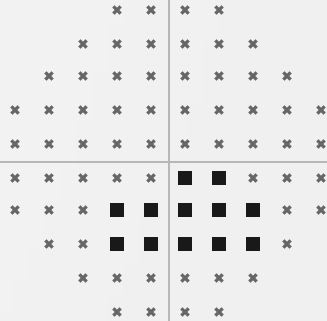


- Advances in computing have improved the efficiency of electric and hybrid vehicles. Battery management systems and energy-efficient algorithms have increased the performance and range of these vehicles.
- Examples: Tesla Model S, Nissan Leaf, and Toyota Prius.

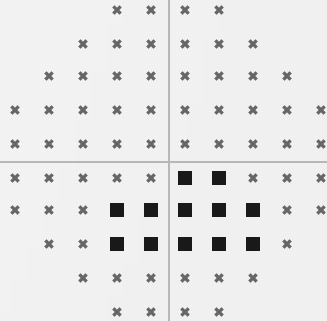
FLEET MANAGEMENT

- Fleet management systems use GPS and data analytics to optimize vehicle routes, monitor fuel usage, and schedule maintenance. This technology helps companies reduce costs and improve operational efficiency.
- Examples: Uber Fleet Management, Verizon Connect, and Geotab.





ADVANTAGES & **DISADVANTAGES**



WHAT ARE THE ADVANTAGES & DISADVANTAGES?

The integration of computing technologies in transportation has led to significant advancements, improving efficiency, safety, and environmental sustainability. However, these innovations also come with challenges and limitations.

ADVANTAGES

INCREASED EFFICIENCY

- Computing technologies optimize transportation systems through real-time data analysis and advanced algorithms. This leads to improved traffic flow, reduced congestion, and more efficient route planning, ultimately saving time and resources.

ENVIRONMENTAL BENEFITS

- Electric and hybrid vehicles, supported by advanced computing for battery management and energy efficiency, help reduce emissions and fuel consumption. This contributes to lower environmental impact and supports sustainability goals.

ENHANCED SAFETY

- Autonomous vehicles and advanced driver-assistance systems (ADAS) use sensors and computing power to detect and respond to potential hazards, reducing the risk of accidents. Smart infrastructure also contributes to safer roads by monitoring traffic conditions and adjusting signals accordingly.

REAL-TIME DATA & ANALYTICS

- Real-time traffic management systems provide up-to-date information on traffic conditions, which helps drivers avoid congestion and plan better routes. Data analytics also supports predictive maintenance and operational decision-making.

DISADVANTAGES

HIGH COST

- Implementing advanced computing technologies in transportation often requires significant investment. The costs of developing and deploying autonomous vehicles, smart infrastructure, and sophisticated management systems can be substantial.

TECHNICAL LIMITATIONS

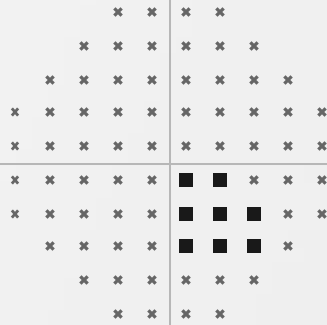
- Computing systems may face technical issues such as software bugs, hardware malfunctions, or integration problems. These issues can impact the reliability and effectiveness of transportation technologies.

CYBERSECURITY RISKS

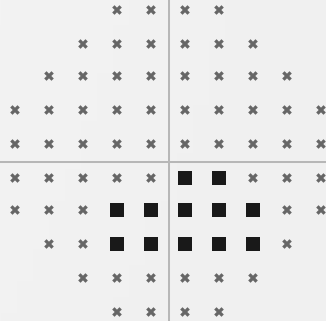
- As transportation systems become more connected and reliant on computing technologies, they become more vulnerable to cyber-attacks. Ensuring the security of data and systems is a critical challenge.

ETHICAL & LEGAL ISSUES

- Autonomous vehicles and other computing technologies pose ethical and legal challenges, such as determining liability in case of accidents and addressing the ethical implications of decision-making algorithms.



CONTRIBUTION



CONTRIBUTIONS TO THE MODERN SOCIETY

Computing technologies have profoundly impacted society through advancements in transportation. These innovations have not only improved operational efficiency but also addressed critical issues such as safety, environmental sustainability, and accessibility.



ACCESSIBILITY

WHY?

- Computing technologies have made transportation more accessible to various segments of society. For example, autonomous vehicles and ride-sharing apps provide mobility options for individuals with disabilities and those without access to traditional transportation methods.

EXAMPLES

- Companies like Waymo and Uber have developed solutions that cater to people with mobility challenges.

HOW?

- These advancements have increased independence and mobility for individuals who may otherwise be unable to drive or use conventional transportation options.



ECONOMIC IMPACT

WHY?

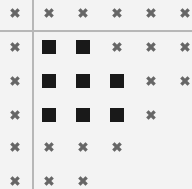
- The integration of computing technologies in transportation has stimulated economic growth by creating new industries, job opportunities, and business models. Innovations in transportation technology have led to the growth of tech startups, automotive companies, and infrastructure projects.

EXAMPLES

- The rise of companies like Tesla and startups focused on autonomous driving technology has contributed to job creation and economic development.

HOW?

- These technological advancements support economic growth by driving innovation, creating employment opportunities, and fostering new business ventures.



QUALITY OF LIFE IMPROVEMENT

WHY?

- Advances in transportation computing have enhanced the quality of life by reducing travel time, improving safety, and increasing convenience. Real-time traffic information and smart transportation systems contribute to more efficient and stress-free commuting.

EXAMPLES

- Traffic management systems and navigation apps like Google Maps improve daily commuting experiences and reduce travel-related stress.

HOW?

- Improved transportation efficiency and safety contribute to a better overall quality of life for commuters and urban residents.



ENVIRONMENTAL STEWARDSHIP

WHY?

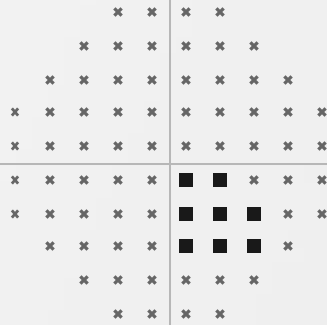
- Computing technologies play a key role in promoting environmental stewardship by supporting the development of green transportation solutions. Innovations like electric vehicles and advanced traffic management systems contribute to reduced emissions and resource conservation.

EXAMPLES

- Electric vehicles from companies like Tesla and energy-efficient public transportation systems contribute to lower environmental impact..

HOW?

- These efforts help in addressing environmental challenges, promoting sustainability, and reducing the carbon footprint of transportation.



FUTURE TRENDS

THE FUTURE?



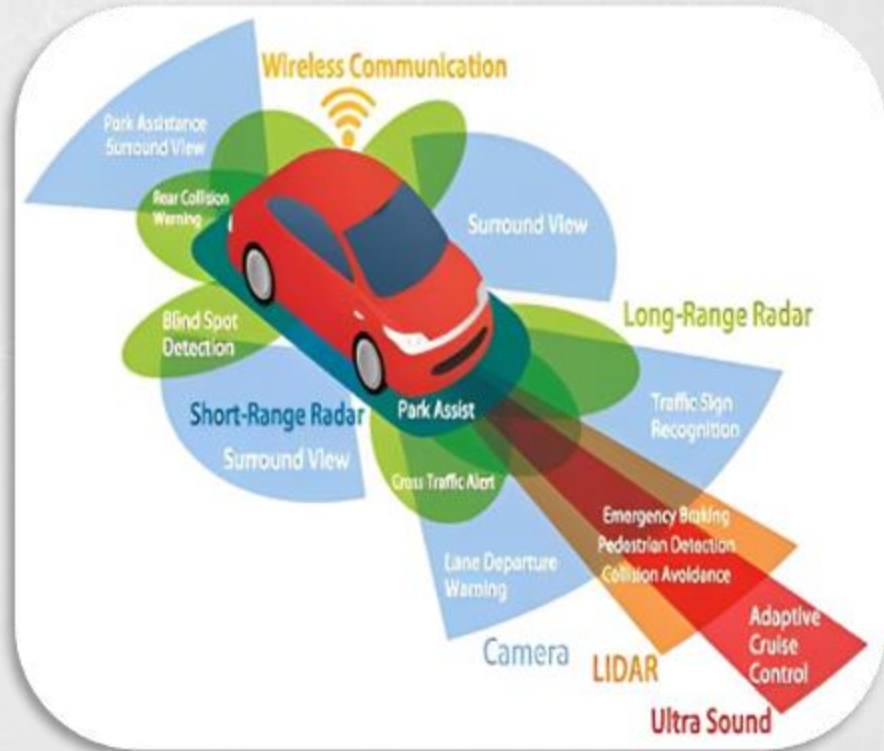
The field of transportation is rapidly evolving, driven by advancements in computing technologies. From autonomous vehicles to smart infrastructure, these innovations promise to transform how transportation systems operate and how we interact with them in the future.

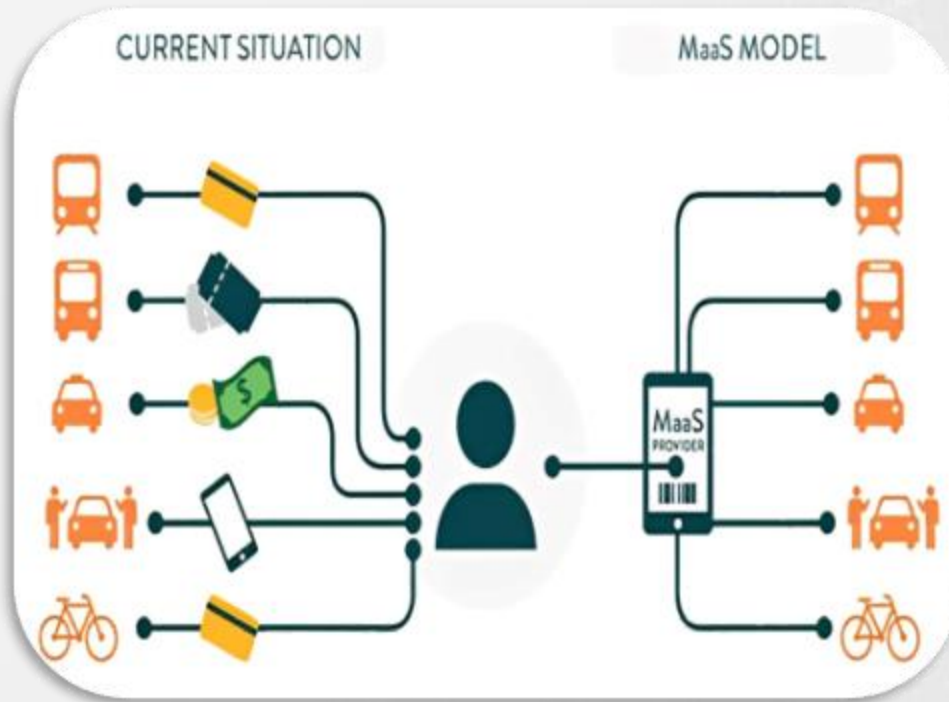
AUTONOMOUS VEHICLES

The development of autonomous vehicles has accelerated with advancements in AI, machine learning, and sensor technologies. These vehicles are expected to become more prevalent, improving road safety and changing the way people commute.

Companies like Waymo and Tesla are leading the development of self-driving technology, with ongoing advancements in vehicle autonomy and safety features.

Autonomous vehicles are set to revolutionize personal and commercial transportation, offering benefits such as reduced traffic accidents, improved efficiency, and enhanced mobility.





MOBILITY-AS-A-SERVICE (MaaS)

MaaS platforms integrate various transportation services into a single digital platform, allowing users to plan, book, and pay for different modes of transport through a single interface. This trend is facilitated by advancements in computing and data analytics.

Apps like Uber and public transit integration platforms are examples of MaaS solutions transforming urban mobility.

MaaS will offer greater flexibility and convenience for users, making it easier to navigate complex transportation networks and access multiple services.

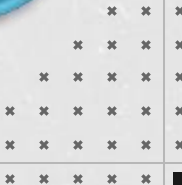
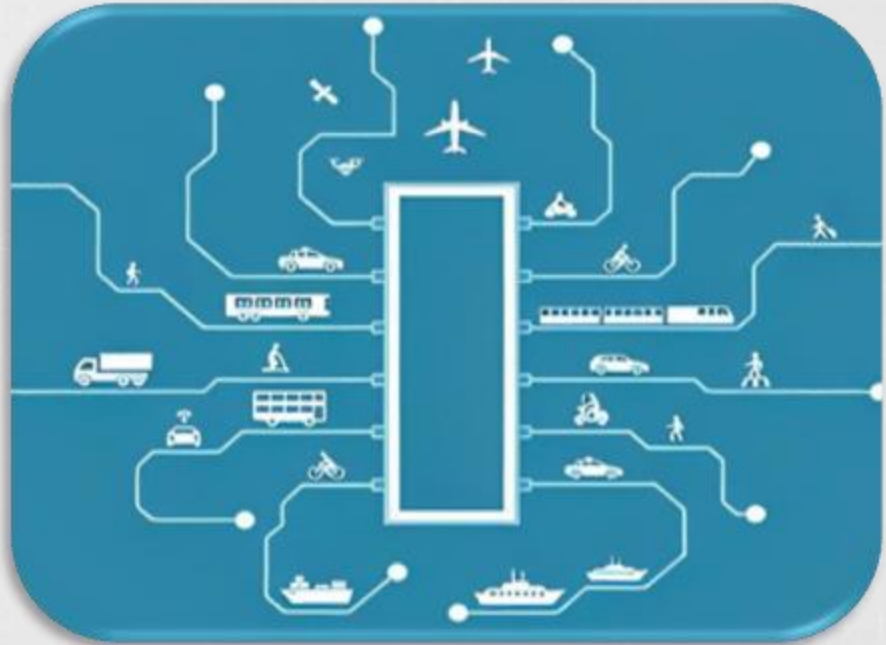


DATA-DRIVEN TRANSPORTATION SOLUTIONS

The use of big data and analytics in transportation is expected to grow, enabling more precise forecasting, planning, and management of transportation systems. Data-driven solutions will enhance decision-making and operational efficiency.

Predictive maintenance for vehicles, traffic pattern analysis, and smart routing algorithms are examples of data-driven applications in transportation.

These solutions will improve system reliability, reduce operational costs, and enhance the overall efficiency of transportation networks.





ELECTRIC & ALTERNATIVE FUELS

The shift towards electric and alternative fuel vehicles is expected to continue, driven by advancements in battery technology and computing systems for energy management. This trend aims to reduce dependence on fossil fuels and lower environmental impact.

The development of electric vehicles by companies like Tesla and innovations in hydrogen fuel cell technology are key trends in this area.

These vehicles will contribute to a more sustainable transportation ecosystem, reducing emissions and promoting cleaner energy sources.

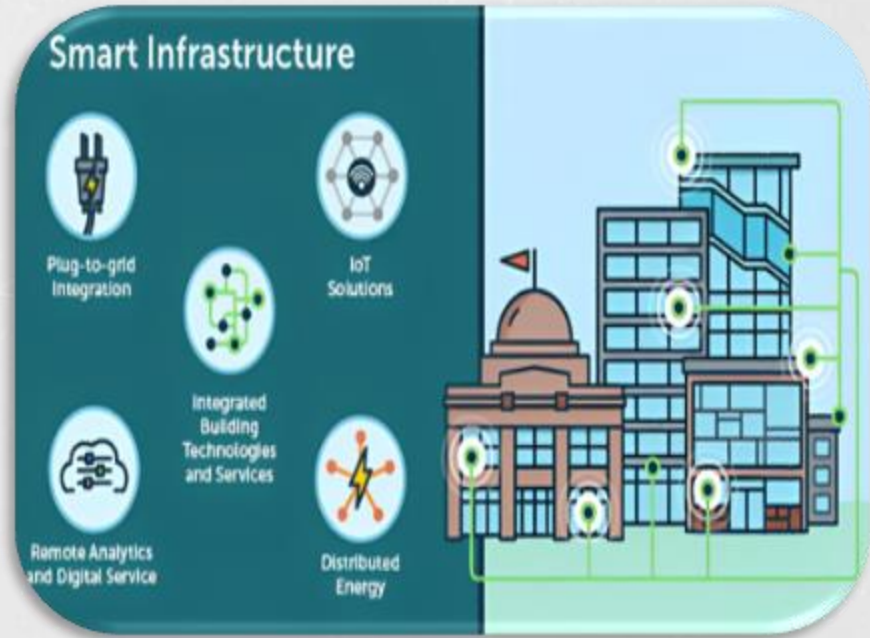


SMART INFRASTRUCTURE

Future trends include the integration of advanced computing technologies into infrastructure. Smart traffic lights, connected roadways, and IoT sensors will enable better traffic management and infrastructure maintenance.

Intelligent Transportation Systems (ITS) and smart city initiatives are examples of how infrastructure will become more adaptive and responsive to real-time conditions.

These advancements will improve traffic flow, reduce congestion, and enhance the efficiency of transportation networks.

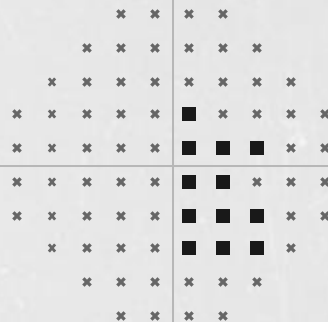


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THANK YOU!



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