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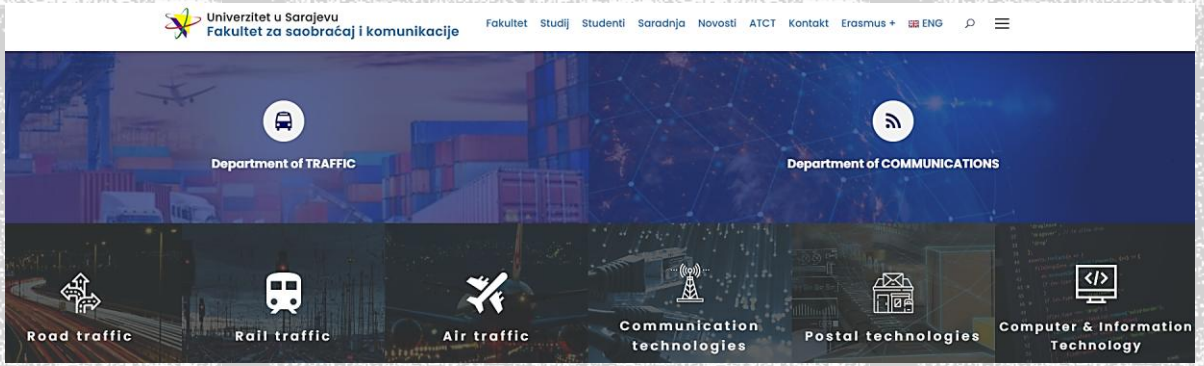


IoT RJEŠENJA ZA INDUSTRIJU ELEKTRIČNIH VOZILA

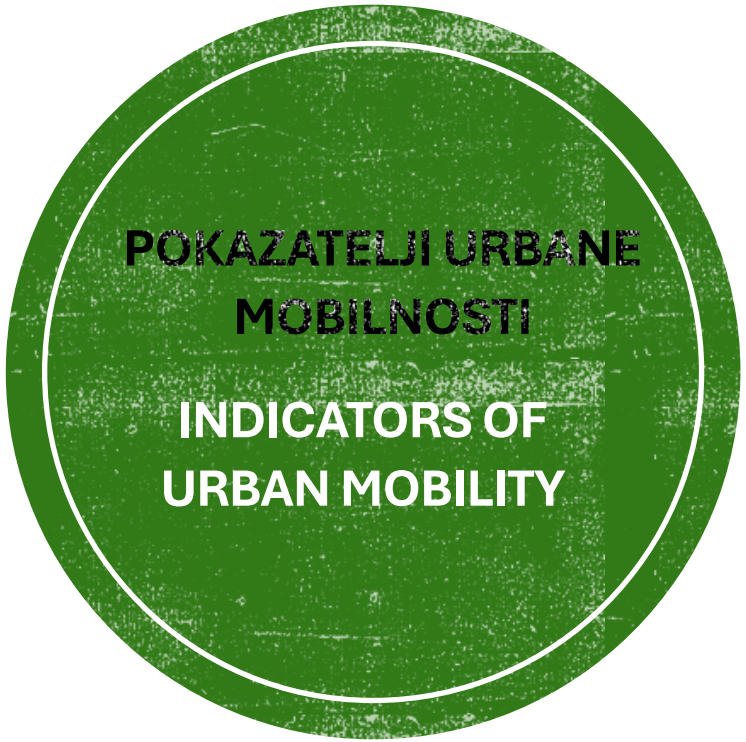
IOT SOLUTIONS FOR THE ELECTRIC VEHICLE INDUSTRY

IOT RJEŠENJA ZA SAOBRAĆAJ

Internet of Things (IoT) tehnologije predstavljaju revolucionarni pristup u unapređenju savremenog saobraćaja. Kroz povezivanje uređaja, senzora i sistema u realnom vremenu, omogućavaju se inteligentna rješenja za upravljanje saobraćajem u urbanim sredinama. IoT doprinosi efikasnijem kretanju, smanjenju saobraćajnih gužvi, poboljšanju sigurnosti i zaštiti okoliša. Ova prezentacija istražuje primjenu IoT rješenja u kontekstu urbane mobilnosti i njihov potencijal za stvaranje pametnih i održivih gradova budućnosti.

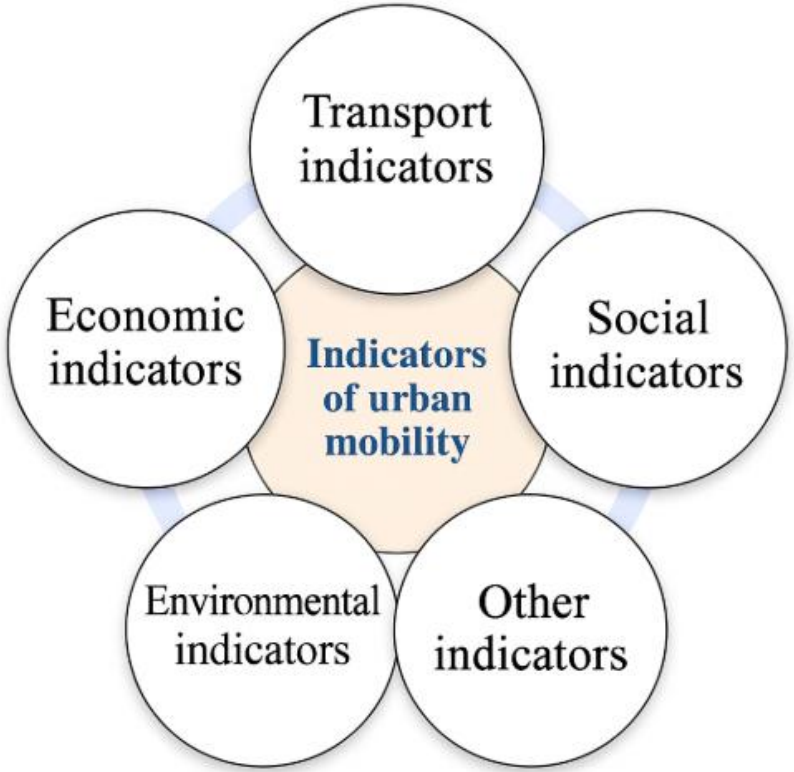
IOT SOLUTION FOR TRAFFIC

Internet of Things (IoT) technologies represent a revolutionary approach to improving modern transportation. By connecting devices, sensors, and systems in real time, they enable intelligent solutions for traffic management in urban areas. IoT contributes to more efficient movement, reduced traffic congestion, improved safety, and environmental protection. This presentation explores the application of IoT solutions in the context of urban mobility and their potential to create smart and sustainable cities of the future.



Pokazatelji urbane mobilnosti se formiraju na temelju odgovarajućih podataka iz različitih segmenata saobraćajnog sistema. Saobraćajni pokazatelj prikazuje urbanu mobilnost kroz kategorije koje su vezane za saobraćajni aspekt, npr. Vrijeme i brzina putovanja). Ekonomski pokazatelj pokazuje utjecaj pojedinih ekonomskih komponenti na urbanu mobilnost kao što su cijena goriva i cijena parkinga. Društveni pokazatelj prikazuje urbanu mobilnost kroz njenu društvenu prihvatljivost (npr. broj saobraćajnih nesreća, broj stradalih, broj povrijeđenih). Okolišni pokazatelj pokazuje urbanu mobilnost kroz kategorije koje su vezane za okoliš i meteorološke uslove, npr. emisija štetnih gasova, buka. Dodatni pokazatelji su oni koje nije moguće svrstati ni u jednu od navedenih kategorija, npr. postojanje regulatornih okvira, tijela za upravljanje i planiranje saobraćajem, itd.

Indicators of urban mobility are formed based on relevant data from various segments of the transport system. The transport indicator reflects urban mobility through categories related to the transport aspect (e.g., travel time and speed).The economic indicator shows the impact of specific economic components on urban mobility, such as fuel prices and parking fees. The social indicator presents urban mobility in terms of its social acceptability (e.g., number of traffic accidents, fatalities, and injuries).The environmental indicator represents urban mobility through categories related to environmental and meteorological conditions, such as harmful gas emissions and noise levels. Additional indicators are those that cannot be classified into any of the previously mentioned categories, such as the existence of regulatory frameworks, traffic management and planning bodies, etc.



POKAZATELJI URBANE MOBILNOSTI

INDICATORS OF URBAN MOBILITY

Održiva mobilnost ima za cilj osiguravanje efikasne mobilnosti koja podrazumijeva racionalno korištenje raspoloživog prostora i resursa uz smanjenje negativnog uticaja na okoliš. Za postizanje ovog cilja posebnu ulogu imaju različite ICT (Information and Communications Technology) tehnologije kao što su tehnologije koje omogućavaju razvoj IoT rješenja. U današnje vrijeme IoT ima veliku ulogu za razvoj urbane mobilnosti u pogledu unaprijeđenja postojećih sistema i razvoja pametnih rješenja koji doprinose održivoj mobilnosti. Brojni su primjeri IoT baziranih pametnih sistema urbane mobilnosti kao što su pametno upravljanje semaforima, pametni parking i iznajmljivanje bicikala. Korisnici ovih sistema su mnogobrojni, a uključuju stanovnike, turiste, donosioci odluka i drugi stakeholderi.

Sustainable mobility aims to ensure efficient mobility by promoting the rational use of available space and resources while reducing negative environmental impacts.To achieve this goal, various Information and Communications Technology (ICT) solutions play a key role—particularly technologies that support the development of IoT (Internet of Things) solutions.Today, IoT plays a significant role in advancing urban mobility by improving existing systems and enabling the development of smart solutions that contribute to sustainable mobility.There are numerous examples of IoT-based smart urban mobility systems, such as smart traffic light management, smart parking, and bike-sharing systems.These systems have a wide range of users, including residents, tourists, decision-makers, and other stakeholders.

ULOGA IOT U RAZVOJU URBANE MOBILNOSTI

THE ROLE OF IOT IN THE DEVELOPMENT OF URBAN MOBILITY

Za razvoj efikasnog sistema upravljanja saobraćajem koji će unaprijediti urbanu mobilnost, potrebno je omogućiti prikupljanje kvalitetnih podatka neophodnih za donošenje odluka. Zbog toga za razvoj urbane mobilnosti i stvaranje pametnog grada u posljednjih nekoliko godina posebnu ulogu ima IoT. IoT tehnologije omogućavaju prikupljanje podataka u realnom vremenu i pružaju povezanost između različitih fizičkih i virtualnih objekata. Ovi procesi omogućavaju brojne usluge koje doprinose unaprijeđenju urbane mobilnosti. Implementacija IoT sistema poboljšava mogućnosti tradicionalne infrastrukture kroz omogućavanje prikupljanja podatke iz fizičke infrastrukture, njihove razmjene između različitih komponenti i automatizirano donošenje odluka na bazi obrade podataka u realnom vremenu.

ZNAČAJ PRIKUPLJANJA I OBRADE PODATAKA

To develop an efficient traffic management system that will enhance urban mobility, it is essential to enable the collection of high-quality data necessary for decision-making. For this reason, IoT (Internet of Things) has played a particularly important role in the development of urban mobility and the creation of smart cities in recent years. IoT technologies enable real-time data collection and provide connectivity between various physical and virtual objects. These processes support numerous services that contribute to the improvement of urban mobility. The implementation of IoT systems enhances the capabilities of traditional infrastructure by enabling data to be collected from physical infrastructure, shared between different components, and used for automated decision-making based on real-time data processing.

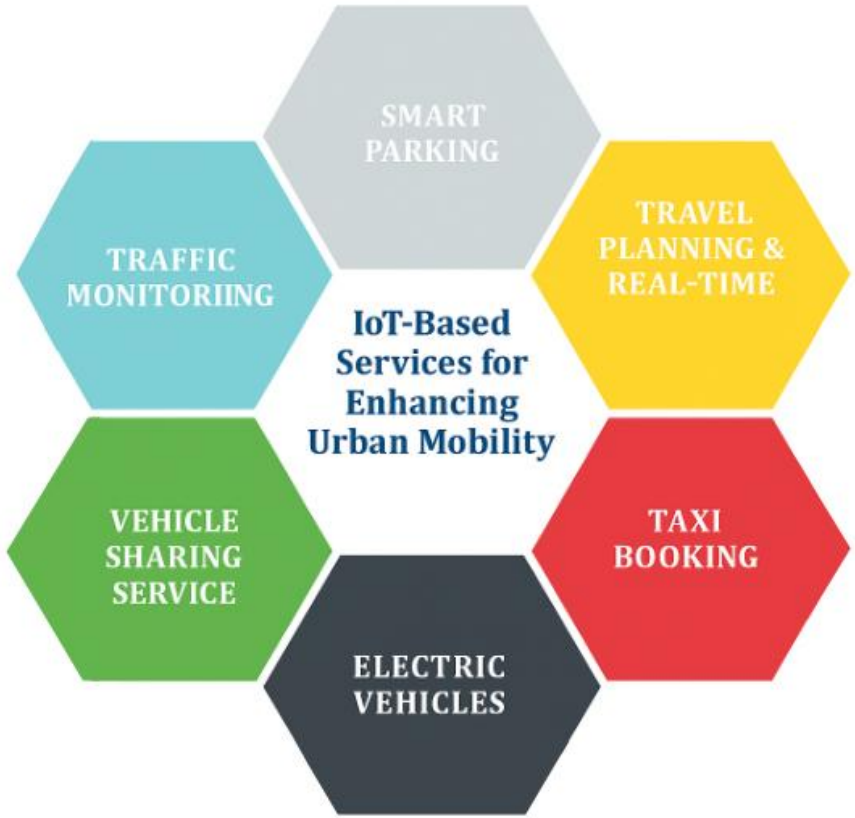
IMPORTANCE OF DATA COLLECTION AND PROCESSING:

Primjeri korištenja IoT tehnologija koji su u značajnoj mjeri unaprijedili određene aspekte urbane mobilnosti su u sistemima za adaptivno upravljanje saobraćajem, pametni parking, pametno izdavanje karata za javni prevoz, kontrolu pješačkih prelaza, planerima putovanja, uslugama dijeljenja vozila i bicikala, itd. U posljednjih nekoliko godina se posebno razvijaju sistemu za adaptivno upravljanje saobraćajem koji, kroz efikasno upravljanje saobraćajem putem automatizovanog nadzora, kontrole i upravljanja, doprinose smanjenju gužve, manjim uticajem na zagađenje zraka, itd.

Examples of IoT technologies that have significantly improved certain aspects of urban mobility include systems for adaptive traffic management, smart parking, smart ticketing for public transport, pedestrian crossing control, travel planners, vehicle and bike-sharing services, and more. In recent years, particular development has been seen in adaptive traffic management systems, which contribute to reducing congestion and lowering air pollution through efficient traffic control enabled by automated monitoring, regulation, and management.

PRIMJERI KORIŠTENJA IoT U SAOBRAĆAJU

EXAMPLES OF IoT USAGE IN TRANSPORT



IoT BAZIRANE USLUGE ZA UNAPRIJEĐENJE URBANE MOBILNOSTI

IoT-BASED SERVICES FOR ENHANCING URBAN MOBILITY

KLJUČNE POGODNOSTI ZA KORISNIKE

Ključne pogodnosti za korištenje navedenih IoT baziranih usluga za pametnu mobilnost imaju sljedeće potencijalne grupe korisnika:

• Putnici – poboljšanje iskustva putovanja u urbanim područjima, unaprijeđenje pouzdanosti putovanja, smanjenje troškova i vremena putovanja, itd.

• Transportni operateri – kreiranje uravnotežene ponude i potražnje, efikasnije korištenje resursa, reduciranje troškova, planiranje kvalitetnije ponude, itd.

• Gradske vlasti – planiranje razvoja infrastrukture i pružanja saobraćajnih usluga, osiguravanje ekološki održivijeg saobraćajnog sistema, kontrola saobraćaja u cilju unaprijeđenja sigurnosti, itd.

KEY BENEFITS FOR USERS

The key benefits of using the mentioned IoT-based smart mobility services apply to the following potential user groups:

- Passengers – improved travel experience in urban areas, enhanced travel reliability, reduced travel costs and time, etc.
- Transport operators – better balance between supply and demand, more efficient use of resources, cost reduction, improved service planning, etc.
- City authorities – infrastructure development and traffic service planning, ensuring a more environmentally sustainable transport system, traffic control for improved safety, etc.

Razvojem IoT tehnologija dolazi do njihove sve veće primjene u saobraćaju što u velikoj mjeri unapređuje urbanu mobilnost. Ove tehnologije doprinose efikasnijem upravljanju i kontroli saobraćaja, boljem iskorištenju raspoloživih resursa, integraciju različitih sistema, unaprijeđenju sigurnosti u saobraćaju, itd.

Ovo se postiže kroz efikasne mehanizme prikupljanja podataka u realnom vremenu koji su osnova za donošenje kvalitetnih odluka.

With the development of IoT technologies, their application in transportation is steadily increasing, significantly enhancing urban mobility. These technologies contribute to more efficient traffic management and control, better utilization of available resources, integration of various systems, improved traffic safety, and more.

This is achieved through effective real-time data collection mechanisms, which serve as the foundation for making informed decisions.

Neki od najčešće korištenih oblasti primjene IoT tehnologija koje doprinose unaprijeđenju urbane mobilnosti su kod unaprijeđenja električnih vozila, sistema za adaptivno upravljanje saobraćajem, pametnih praking rješenja i sistema za dijeljenje bicikala.

Some of the most commonly used areas of IoT application that contribute to the improvement of urban mobility include advancements in electric vehicles, adaptive traffic management systems, smart parking solutions, and bicycle-sharing systems.

Pametni parking povećava korisnicima sposobnost lociranja slobodnog parking mjesta što smanjuje vrijeme čekanja, gužve, troškove, negativni uticaj na okoliš, itd.

Smart parking increases users' ability to locate available parking spaces, which reduces waiting time, congestion, costs, environmental impact, and more.

Pametni parking

Smart parking

Pametno izdavanje karata omogućava lakše i brže plaćanje za usluge prijevoza uz integrciju različitih platnih sistema. IoT tehnologije omogućavaju efikasno planiranje rute putovanja u relanom vremenu.

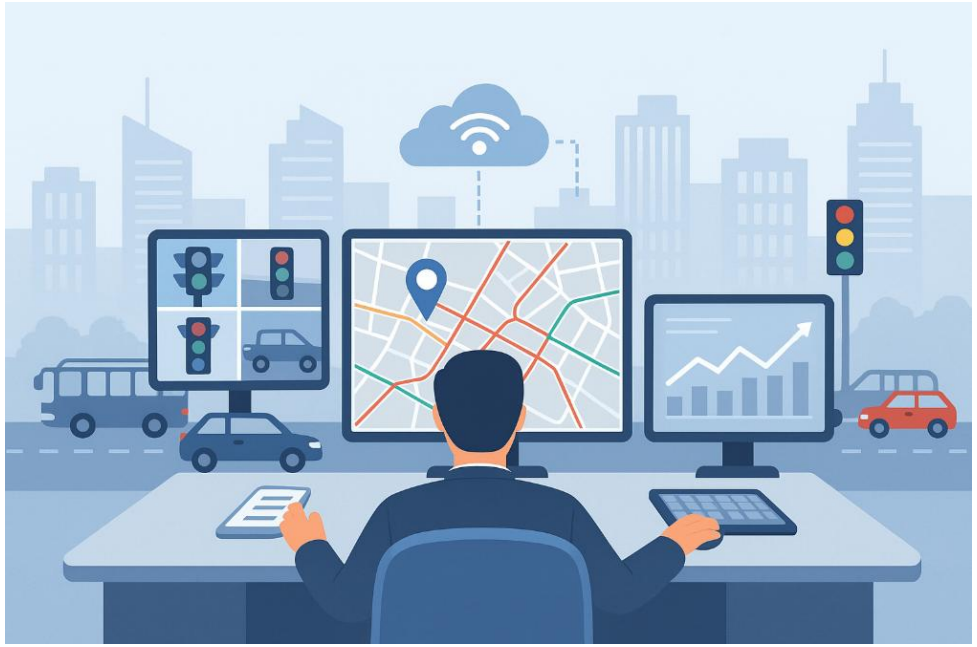
Smart ticketing enables easier and faster payment for transportation services through the integration of various payment systems. IoT technologies allow for efficient real-time travel route planning.

Pametno izdavanje karata

Smart ticketing enables

Pametni upravljački i kontrolni centri

Pametni upravljački i kontrolni centri omogućavaju prikupljanje podataka o saobraćajnom sistemu što omogućuje efikasnu kontrolu i upravljanje u cilju unaprijeđenja sigurnosti, smanjenja gužvi, itd.



Smart control and management centers

Smart control and management centers enable the collection of data about the traffic system, allowing for efficient control and management aimed at improving safety, reducing congestion, and more.

IoT omogućava i dodatne usluge za unaprijeđenje sistema dijeljenja vozila (npr. automobila i bicikala). Pametni sistem dijeljenja bicikala poboljšava interesovanje putnika za ovaj alternativni način putovanja i povezivanja. Ovo za posljedicu ima smanjenje broja vozila u saobraćaju što uzrokuje smanjenje gužvi i negativne efekte na okoliš.

IoT also enables additional services for improving vehicle-sharing systems (e.g., cars and bicycles). Smart bike-sharing systems increase passenger interest in this alternative mode of travel and connectivity. As a result, the number of vehicles on the road is reduced, which leads to decreased congestion and a lower environmental impact.

Pametni sistem dijeljenja bicikala

Smart bike-sharing systems

University of Sarajevo: https://www.unsa.ba
Faculty of Traffic and Communications: https://fsk.unsa.ba/

*PhD. **Osman Lindov**, Full Professor-Traff. Eng.*
Faculty of Traffic and Communications University of Sarajevo
Zmaja od Bosne 8, 71 000 Sarajevo, B&H
Phone: +387 (33) 565 200 / Mobile: + 387 (61) 161 482

Thank you for your attention

Osman Lindov: osman.lindov@fsk.unsa.ba

Amel Kosovac: amel.kosovac@fsk.unsa.ba

Drago Ezgeta: drago.ezgeta@fsk.unsa.ba

Adnan Omerhodžić: adnan.omerhodzic@fsk.unsa.ba

Belma Memić: belma.memic@fsk.unsa.ba

Elma Avdagic-Golub: elma.avdagic@fsk.unsa.ba

Aida Kalem: aida.kalem@fsk.unsa.ba

Edvin Šimić: edvin.simic@fsk.unsa.ba

Ajdin Džananović: ajdin.dzananovic@fsk.unsa.ba