

Innovative tools in occupational health and risk management

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A. PREZENTARE

OBIECTIVE

Dezvoltarea instrumentelor inovative pentru gestionarea eficientă a riscului în medii profesionale.

Evaluarea riscurilor profesionale în medii de muncă, evidențiind principiile fundamentale, metodele, și contribuțiile cercetătorilor români.

INOVAȚIE

Metodologii inovatoare propuse pentru evaluarea conformității cu reglementările în securitate și sănătate în muncă, folosind instrumente de auditare și abordări matematice precum METESPRRS.

Analiza relațiilor dintre securitatea profesională, nivelul de risc și probabilitatea manifestării riscului.

Direcții viitoare de cercetare în domeniul sistemelor medicale inovative și digitalizării evaluării riscului ocupațional.

Un instrument inovator precum MSSM.EXE 01 facilitează gestionarea documentelor de sistem.

B. PRESENTATION

OBJECTIVES

Development of innovative tools for effective risk management in professional environments.

Assessment of occupational risks in work environments, highlighting fundamental principles, methods, and contributions from Romanian researchers.

INNOVATION

Innovative methodologies proposed for assessing compliance with occupational safety and health regulations, using auditing tools and mathematical approaches such as METESPRRS.

Analysis of the relationships between occupational safety, risk level, and probability of risk occurrence.

Future directions for research in the field of innovative medical systems and the digitization of occupational risk assessment.

An innovative tool such as MSSM.EXE 01 facilitates the management of system documents.



Hybrid technology for obtaining composite structures in the ultrasonic field

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The proposed project aims at obtaining a new technology regarding the production of composite structures using the deposition of reinforcement materials in an ultrasonic field. Through this, the adhesion and mechanical properties are considerably improved to eliminate the defects of the composites such as delamination and premature wear by detaching the reinforcement particles. The project contains analytical calculations, MEF optimization, and the practical realization of the deposition stand in the ultrasonic field.

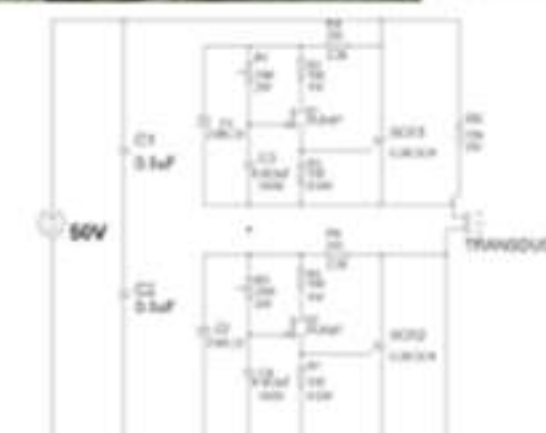
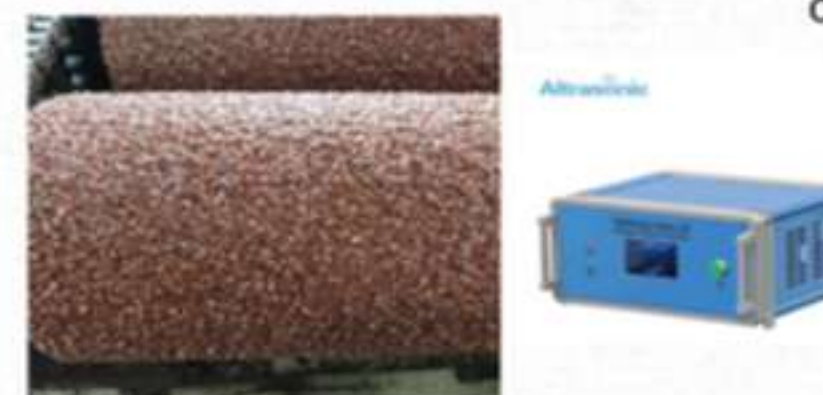
Installation design



The design of the ultrasonic system took into account the phenomenon of ultrasonic dispersion and its analytical calculation. Through mathematical modeling using the finite element method of the vibration modes, the optimal time for the realization of the composite structure was determined. The research carried out using the designed installation led to the determination of the way of optimal placement of the ultrasonic concentrator obtaining the composite structure.

ADVANTAGES

The result of the project will lead to the development of composite structures with high resistance to friction, wear, and delamination, made in low working times that are reflected in industrial, road, or transport applications.



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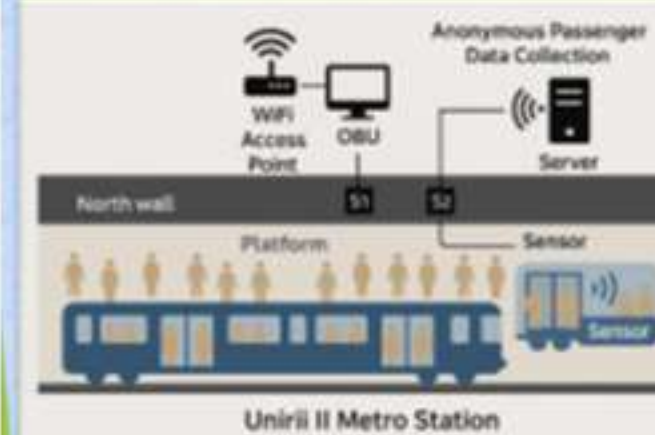
Proposed Architecture for an Anonymous Passenger Mobility Data Collection System

Chiva Ionuț Cosmin, Semenescu Augustin

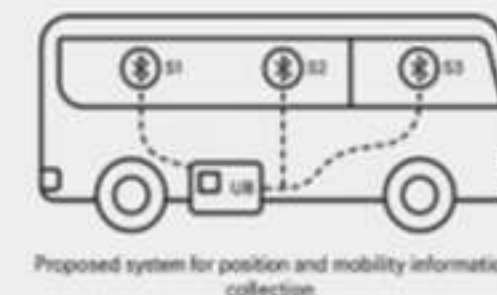
The proposed solution consists of an anonymous data collection system for monitoring passenger mobility in public transport, based on the detection of Wi-Fi and Bluetooth devices carried by passengers. The network is composed of strategically placed Access Points (APs), approximately 35 meters apart, which operate as passive sensors and collect information such as anonymized MAC addresses, Received Signal Strength Indicator (RSSI) levels, and detection timestamps. The collected data are transmitted to a local server for storage and preliminary processing, and then through a VPN connection to a central data center, where they are analyzed using artificial intelligence algorithms (Delaunay-Voronoi triangulation and k-means clustering) to estimate passenger positions and flow patterns. The system is energy-efficient, does not require cellular networks, and can provide valuable insights into congestion levels, passenger routes, and the optimization of public transport operations.



The diagram illustrates the data flow within the anonymous passenger data collection system. Wi-Fi/Bluetooth access points act as passive sensors, capturing anonymized MAC addresses and RSSI values. The information is sent to a local server for initial processing, then securely transmitted via VPN to a remote data center for AI-based analysis. A workstation allows local monitoring of system performance.



A system that anonymously collects passenger data at the "Unirii II" metro station. Sensors and WiFi access points detect the presence of people on the platform and inside the train, and the information is sent to a server for analysis. The collected data is anonymous, meaning it does not directly identify individuals but only records their number and movement. The purpose is to monitor passenger flow and improve transportation services.



A proposed system for collecting position and mobility information in a bus.

The system is installed in a bus and collects data about passengers' position and movement. Three Bluetooth sensors (S1, S2, S3) send data to a central unit (UB), which stores and analyzes the information. The purpose of the system is to monitor passenger mobility and distribution in order to improve public transportation.

Expected Outcomes

Real-time estimation of passenger flow and congestion levels.
Improved operational decisions for public transport authorities.
Scalable, energy-efficient, and privacy-preserving architecture.



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