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Research Bulletin

August 2025

A NEW PERSPECTIVE FOR AGE-FRIENDLY CITIES: HOW CAN WALKING ROUTES BE IMPROVED?

In this study examining the walking route preferences of older adults, it was revealed that instead of choosing the shortest path, they prefer safe and comfortable routes with features such as well-maintained sidewalks, green areas, benches, and good lighting. It was noted that these findings can be used to improve navigation applications and urban planning to better respond to the needs of older adults.

Street infrastructure and structural attributes.

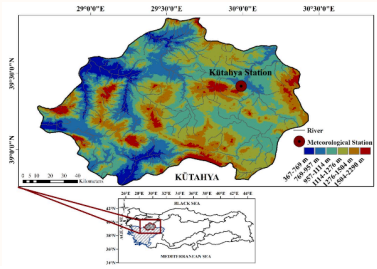
Study	Route length	Curb width/ presence	Curb quality	Stair/ ramp quality	Obstructions	User separation	Lighting	Connectivity	Pedestrian crossing	Other
Borst et al. (2009)	X	X		X						
Moran et al. (2017)	X+	X+	X + -	X-	X-	X+	X-			Road quality-
Brookfield and Tilley (2016)	X	X	X		X	X	X			
Van Cauwenberg et al. (2012)		X+	X + -	X-	X-	X+	X + -	X+	X + -	
Joseph and Zimring (2007)			X	X						Road segment length, Network centrality, outdoor vs. indoor
Mitra et al. (2015)		X+	X + -				X + -	X-		Signage-
Buman et al. (2013)	X		X	X			X	X	X	
Li and Zhang (2024)	X	X	X							Shade

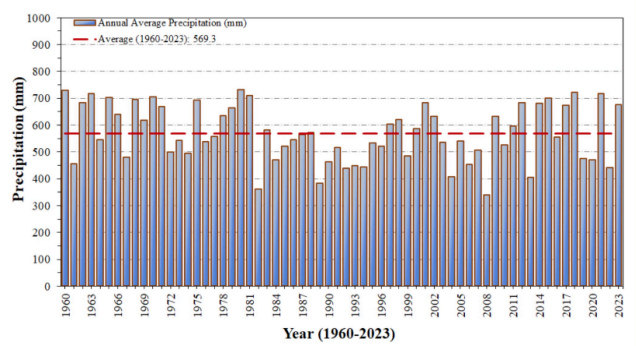
+, - indicate facilitaros and barriers, respectively, in studied that coded factors as such.

Fulman, N., Huber, J., Lloyd, A. T., Foshag, K., Grinblat, Y., Türk, U., Lautenbach, S., Amcoff, J., Toger, M., Jokinen, J., & Zipf, A. (2025). Route Choice To Inform Navigation System Design And Accessibility Analysis For Older Pedestrians: A Scoping Review. *Journal of Transport & Health*, 44, Article 102151. https://doi.org/10.1016/j.jth.2025.102151

NEW HOPE AGAINST CLIMATE CHANGE: RAINFALL TO BE PREDICTED WITH HIGH ACCURACY

In this study, advanced artificial intelligence methods were used to predict rainfall amounts in Kütahya. Through a hybrid approach developed by combining different models, tests conducted with data from 1960 to the present showed that rainfall could be predicted with very high accuracy (99.8%). It is emphasized that this achievement is significant for agriculture, water resource management, and the prevention of natural disasters such as floods.

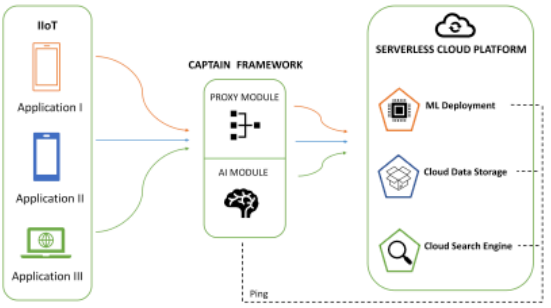




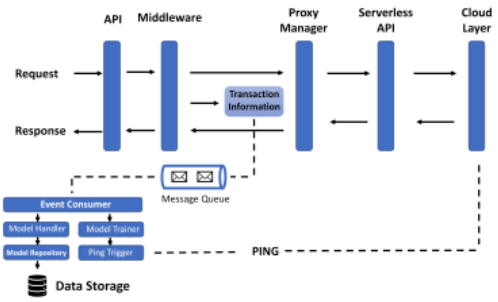
İlkentapar, M., Çitakoğlu, H., Talebi, H., Aktürk, G., Spor, P., Çağlar, Y., & Akşit, S. (2025). Advanced hybrid machine learning methods for predicting rainfall time series: The situation at the Kütahya station in Türkiye. *Modeling Earth Systems and Environment*, 11(5), Article 362. https://doi.org/10.1007/s40808-025-02539-0

ENVIRONMENTALLY FRIENDLY AND SMART SOLUTION IN INDUSTRY: CAPTAIN

A new technology testbed called "CAPTAIN" has been developed to reduce the energy consumption and carbon emissions caused by increasing data processing in industrial facilities. This system is designed to prevent inefficiencies in cloud computing systems and delays known as "cold starts" by using artificial intelligence models. Tests have shown that CAPTAIN significantly reduces processing time, energy consumption, and carbon dioxide emissions compared to existing systems.



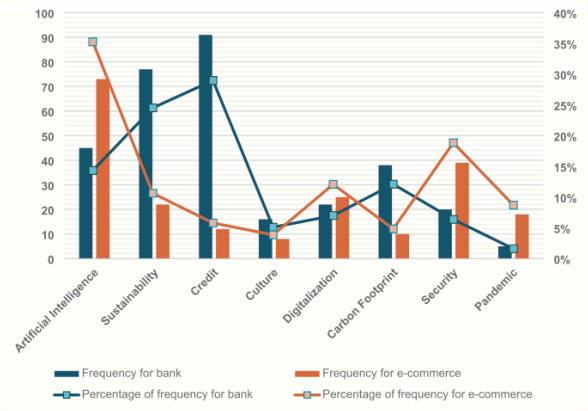
System model.



Architecture of the proxy module.

Golec, M., Wu, H., Özturaç, R., Parlikad, A.K., Cuadrado, F., Gill, S.S., & Uhlig, S. (2024). CAPTAIN: A testbed for co-simulation of scalable serverless computing environments for AIoT enabled predictive maintenance in Industry 4.0. *IEEE Internet of Things Journal*. https://doi.org/10.1109/JIOT.2024.3488283

BANKING SECTOR LEADS E-COMMERCE IN DIGITAL RESPONSIBILITY



A study was conducted on corporate digital responsibility practices in Turkey's banking and e-commerce sectors. The results revealed that the banking sector has a more mature and institutionalized approach, particularly in areas such as data security and regulatory compliance, while the e-commerce sector demonstrates slower and more fragmented progress in this regard. Thanks to strict regulations and their emphasis on reputation, banks show a higher awareness of digital responsibility, whereas the rapid growth objectives of the e-commerce sector appear to delay this process.

Aydoğdu, C.C., & Karsak, B.M.B. (2025). The rise of digital responsibility: Insights from Türkiye's banking and e-commerce sectors. *Business Strategy and Development*, 8(3), Article e70170. https://doi.org/10.1002/bsd2.70170

A NEW BACTERIUM SPECIES DISCOVERED: *PSEUDOMONAS LOGANENSIS*

A new bacterium species named *Pseudomonas loganensis* sp. nov. has been identified. In the study, the biochemical properties of the bacterium were examined and a genomic analysis was conducted. The analyses revealed that this species possesses distinct genetic characteristics compared to other Pseudomonas species. The research also evaluated the bacterium's ability to adapt to environmental conditions and its potential biotechnological applications. The findings contribute new knowledge to the field of microbiology and enrich scientific diversity. The study emphasized the importance of identifying new species for both fundamental sciences and applied research.

TABLE 3 | Antibiogram analysis of *P. loganensis* sp. nov. (R): resistant, (I): intermediate, (S): sensitive.

Antibiotics	Zone diameter (mm)
Oxacillin (OX-1)	0 (R)
Methicillin (ME-5)	0 (R)
Kanamycin (K-30)	19.5 ± 0.25 (I)
Azithromycin (AZM-15)	25.4 ± 0.08 (S)
Penicillin G (P-10)	0 (R)
Ampicillin (AMP-10)	0 (R)
Tetracycline (TE-30)	30.6 ± 0.16 (S)
Vancomycin (VA-30)	0 (R)
Amikacin (AK-30)	19.9 ± 0.34 (I)
Streptomycin (S-10)	17.9 ± 0.34 (I)

Karaman, M. Z., Yetiman, A. E., Zhan, J., & Fidan, Ö. (2025). Biochemical Characterization and Genome Analysis of *Pseudomonas loganensis* sp. nov., a Novel Endophytic Bacterium. *MicrobiologyOpen*, 14(4), e70051. https://doi.org/10.1002/mbo3.70051

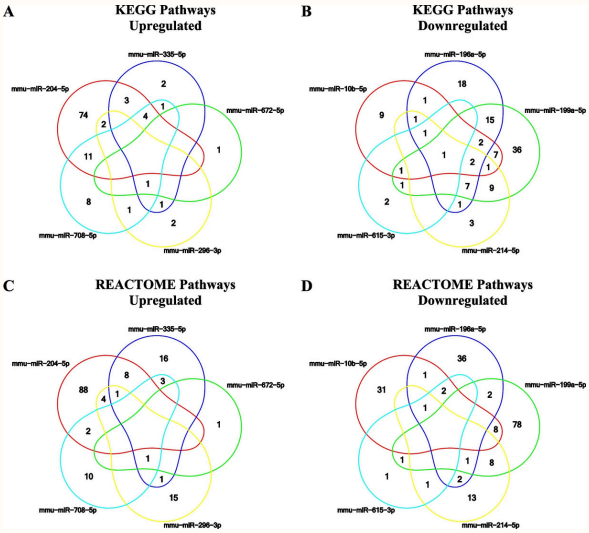
GEOPOLYMER CONCRETE EMERGES AS A SAFE ALTERNATIVE FOR BUILDINGS

According to a new study, geopolymer concrete (GPC), produced from industrial waste fly ash, can be a sustainable alternative to traditional cement-based concrete (OPC). Experiments and computer modeling examining the behavior of columns under load showed that GPC has a load-bearing capacity similar to OPC. However, GPC columns exhibited greater deformation capacity while forming finer and more localized cracks. These findings reveal that GPC can be safely used in structural designs.

Özbayrak, A., Küçüköncü, H., Aslanbay, Y. G., & Aslanbay, H. H. (2025). Experimental and numerical analysis of damage and crack behavior in geopolymer and ordinary portland cement reinforced concrete columns. *Journal of Building Engineering,* 111, Article 113623. https://doi.org/10.1016/j.jobe.2025.113623

NEW TREATMENT APPROACHES SOUGHT FOR TAY-SACHS DISEASE

A genetic analysis conducted on a new Tay-Sachs disease (TSD) mouse model has revealed new insights into the underlying mechanisms of the disease. Researchers discovered that features of TSD, such as neurodegeneration and neuroinflammation, are associated with changes in previously unidentified microRNA (miRNA) profiles. These findings provide a deeper understanding of the pathophysiology of TSD. It is suggested that in the future, new treatments targeting these miRNAs could be developed.



Kaya, B., Orhan, M. E., Yanbul, S., Demirci, M. D. S., Demir, S. A., & Seyrantepe, V. (2025). A comprehensive microRNA-seq transcriptomic analysis of Tay-Sachs disease mice revealed distinct miRNA profiles in neuroglial cells. *Journal of Molecular Neuroscience*, 75(3), Article 103. https://doi.org/10.1007/s12031-025-02395-8

A NEW SAFETY METHOD DEVELOPED FOR FIBER-REINFORCED CONCRETE BEAMS

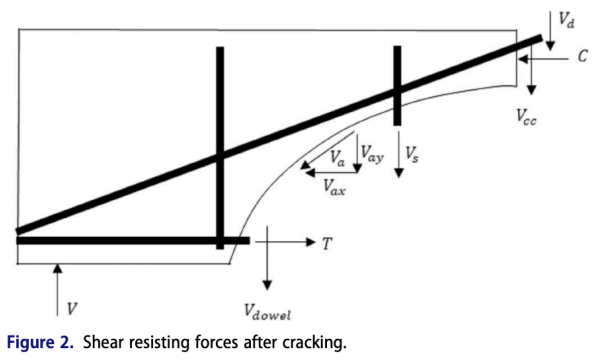


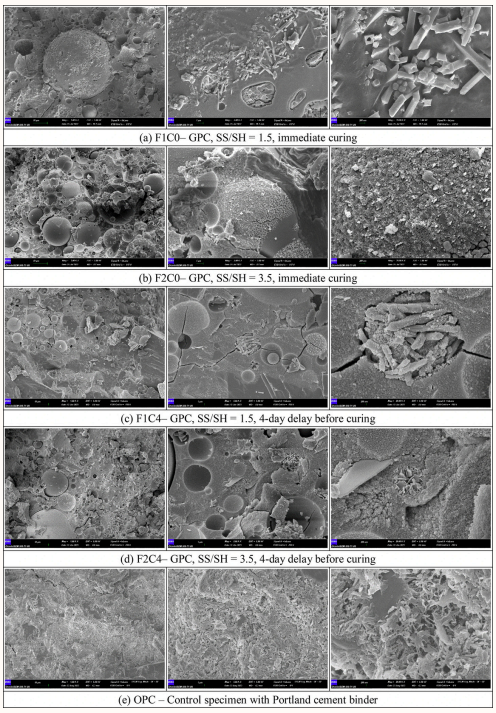
Figure 2. Shear resisting forces after cracking.

Engineers have developed a new method to more accurately calculate the effect of fibers that enhance the strength and flexibility of concrete. In this study, which examined 446 different fiber-reinforced concrete beams, an equation was formulated to predict the shear strength of beams in a safer and more practical way by considering the type, amount, and other details of the fibers. This method could be integrated into existing design codes to improve structural safety standards.

Bakir, B. B., & Yagmur, E. (2025). Shear strength prediction for fiber reinforced concrete beams. *Mechanics of Advanced Materials and Structures*. https://doi.org/10.1080/15376494.2025.2542545

AN ECO-FRIENDLY ALTERNATIVE TO TRADITIONAL CONCRETE: GEOPOLYMER CONCRETE

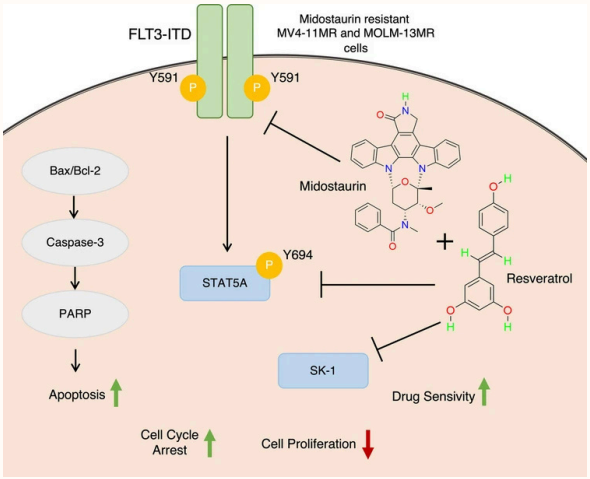
Research shows that geopolymer concrete (GPC), developed to reduce carbon dioxide emissions, is a structurally viable alternative to traditional concrete (OPC). The flexural performance of reinforced geopolymer concrete beams was examined, and it was determined that existing design standards (ACI 318 and TS 500) can be safely applied to this new material. Despite its lower modulus of elasticity, geopolymer concrete demonstrates load-bearing and crack resistance similar to, or even better than, that of traditional concrete.



Özbayrak, A., & Küçüköncü, H. (2025). Structural behavior of geopolymer reinforced concrete beams: Experimental, numerical, and code-based assessment. *Bulletin of Earthquake Engineering*. https://doi.org/10.1007/s10518-025-02257-z

13 CLIMATE ACTION 9 INDUSTRY, INNOVATION AND INFRASTRUCTURE

DRUG RESISTANCE IN LEUKEMIA TREATMENT OVERCOME WITH A NATURAL COMPOUND



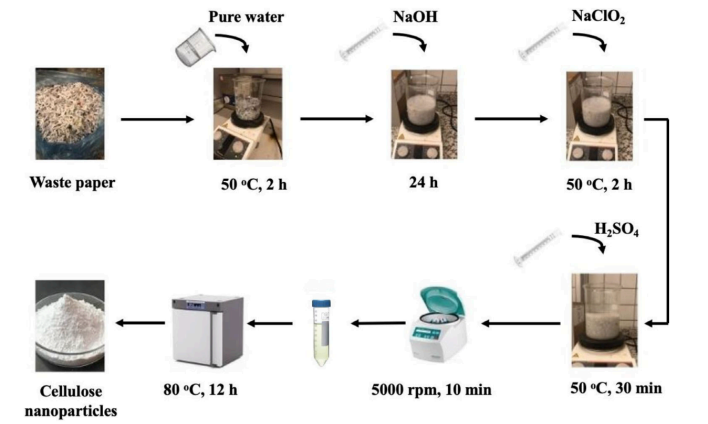
Here's the English translation of your text:
It has been reported that resistance to the drug midostaurin, a common problem in patients with FLT3-ITD acute myeloid leukemia (AML), was overcome by researchers through a combination therapy. Resveratrol, a natural compound found in grapes and peanuts, was found to halt the proliferation of resistant cancer cells and increase cell death when used together with midostaurin. These results indicate that natural compounds may serve as potential adjuvants in cancer treatment.

3 GOOD HEALTH AND WELL-BEING

Tecik, M., & Adan, A. (2025). Functional combination of resveratrol and midostaurin induces cytotoxicity to overcome acquired midostaurin resistance in FLT3-ITD expressing acute myeloid leukemia cells. *Naunyn-Schmiedeberg's Archives of Pharmacology*. https://doi.org/10.1007/s00210-025-04543-8

NEW MEMBRANES MADE FROM PAPER WASTE CLEAN MINING WASTEWATER

Researchers have produced a new type of membrane from cellulose derived from waste paper. This eco-friendly membrane is used to remove iron (II) ions from mining wastewater. The most effective type of membrane achieved about 58% removal of Fe(II). This invention not only provides a sustainable waste management solution but also highlights the potential for reusing waste materials in innovative applications.



Gül, A., & Şenol-Arslan, D. (2025). Eco-friendly fabrication of cellulose-derived polyvinylidene fluoride membranes from wastepaper for efficient Fe(II) removal from mine wastewater. *Polymer International*. https://doi.org/10.1002/pi.70030

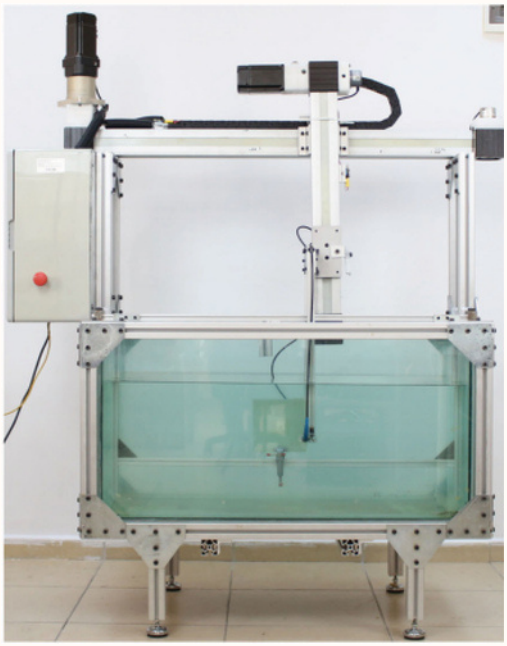
A NEW METHOD DEVELOPED FOR PRODUCING CEMENT WITH NATURAL MATERIALS

To reduce carbon dioxide emissions into the atmosphere, the use of natural pozzolans instead of clinker in cement production is being investigated. For this purpose, a multi-criteria compatibility index (MCCI) was developed to evaluate the compatibility of natural pozzolans and superplasticizers. The study found that polymelamine sulfonate (PMS)-based superplasticizers showed the highest overall compatibility. This new method may help provide more sustainable solutions for the cement industry in the future.

Argın, G., & Uzal, B. (2025). Compatibility of superplasticizers with natural pozzolan blended cement: Multi-criteria compatibility index through rheology and hydration kinetics. *European Journal of Environmental and Civil Engineering*. https://doi.org/10.1080/19648189.2025.2545452

NEW METHOD DETECTS COMPOSITE MATERIAL DEFECTS WITH HIGH ACCURACY

In large-scale applications such as airplanes and automobiles, detecting defects in composite materials carried a risk of error with traditional methods. In a new study, defect classification was performed on ultrasonic test images using transfer learning methods, a machine learning technique. Tests conducted with a newly developed dataset showed that DenseNet121 and VGG19 models achieved accuracy rates of 98.8% and 98.6%, respectively, demonstrating highly precise defect detection. This method aims to improve inspection processes by reducing human error.



Gulsen, A., Kolukisa, B., Özdemir, A. T., Bakir-Güngör, B., & Güngör, V. C. (2025). Defect classification of composite materials using transfer learning methods. *Nondestructive Testing and Evaluation*, 40(9), 4338–4354. https://doi.org/10.1080/10589759.2024.2422527