

Software helps planners design walkable cities

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Walkable cities reduce traffic congestion, which causes around 3.3 million deaths and \$121 billion in economic losses every year. But when architects are developing pedestrian-friendly neighborhoods, they often rely on trial and error, intuition or specialized simulations that are hard to use and to incorporate into their designs.

[Urbano](#), a free software package launched Oct. 26 by Cornell researchers, employs data, metrics and an easy-to-use interface to help planners and architects add and assess walkability features in their designs as effectively as possible.

"We wanted to create something that would allow architects and urban designers to simulate their designs and get some feedback early in the process," said Timur Dogan, assistant professor of architecture and lead developer of Urbano. "This lets them make decisions based on facts and data, so they can create the sustainable and livable urban environments of the future."

Since its launch, Urbano has been downloaded more than 400 times by universities and architecture firms around the world. The tool is the product of a collaboration between the College of Architecture, Art and Planning's Environmental Systems Lab, which Dogan directs, and the Department of Civil and Environmental Engineering in the College of Engineering.

The team most recently presented a paper on Urbano in June 2018, at the Symposium on the Simulation for Architecture and Urban Design, and new research is forthcoming in TAD, the journal of Technology, Architecture and Design.

The researchers sought to create a tool that works well with the design process, which can be fast, messy and circuitous. Simulations that are difficult to perform or take too long to produce aren't practical, Dogan said.

"We worked on new algorithms that are fast," he said. "We worked on user interfaces that are intuitive. And we made sure the software can be integrated smoothly into the design process, so from the very first ideas and sketches you can get some feedback and nudge the design in the

right direction."

Urbano relies on three metrics to assess walkability: Streetscore, which calculates how streets are used for certain routes; Walkscore, a customizable measurement that rates whether popular amenities are within walking distance of homes and workplaces; and AmenityScore, which considers demographics to estimate the usefulness of various services.

"This is really helpful information for designers doing site analysis," Dogan said, "because then they can see if there are certain services or amenities missing in neighborhoods, or others that are underutilized or overutilized."

Assessing walkability early makes it more likely that pedestrian-friendly features will be incorporated, since shifting gears once the process is underway can be costly and complex. And while experienced architects will automatically consider walkability in their designs, Urbano provides simulations backed up by facts and data.

"Oftentimes, if you cannot quantify the benefit of something, then it's difficult to convince someone to do it," Dogan said. "This tool lets professionals quantify everything so the stakeholders can have confidence in what they propose."

To develop Urbano, the researchers created automated ways to collect data. Information from geographic information system portals such as New York City's Open Data Initiative—plus information from other cities and websites and social networks, including Google and Yelp—comes in inconsistent formats. Because it can be difficult to access, many designers don't use this data, despite its wealth of information.

After determining which metrics would be most helpful to designers, the researchers developed algorithms to compute factors such as the shortest path to certain amenities and their utilization rates.

Currently, the research team is working on software that can assess [energy use](#) in models of cities, as well as a simulation tool, called Eddy3d, that considers data about urban microclimates. He hopes to eventually create a comprehensive toolkit for sustainable urban design.

"They're all really important questions that an urban designer needs to consider," Dogan said. "Our next step is to link them so you can compute the outdoor comfort of the street and at the same time compute the walkability of the street, and somehow use that information together to predict the likelihood of people walking."

More information: Urbano- A New Tool to Promote Mobility-Aware Urban Design, Active Transportation Modeling and Access Analysis for Amenities and Public Transport. Conference: SimAUD 2018, At Delft, Netherlands [DOI: 10.22360/simaud.2018.simaud.028](https://doi.org/10.22360/simaud.2018.simaud.028)

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