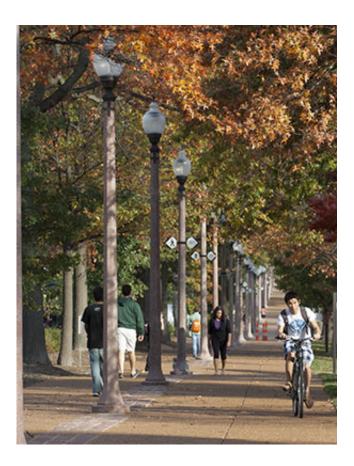# Medical Xpress

Study offers novel, inexpensive approach on improving public health

December 18 2012, by Leslie Gibson Mccarthy

New research gives communities a novel way to measure the effectiveness of built environments like trails, greenways and parks. Credit: Joe Angeles

(Medical Xpress)—A new study out of Washington University in St. Louis is one of the first to use technology to effectively measure the use of built environments—parks, greenways, trails and other man-made

public areas—as a means to improve public health.

The study, "Emerging Technologies: Webcams and Crowd-Sourcing to Identify Active Transportation," will be published Dec. 18 in the American Journal of Preventive Medicine. Lead author is J. Aaron Hipp, PhD, assistant professor of public health at the Brown School.

"Obesity is costing the U.S. healthcare system $147 billion annually," Hipp says. "We need to increase physical activity in this country and, by helping communities measure how effective cycling infrastructure, greenways, trails, parks and open space can be, we can both raise awareness and help communities build better environments," Hipp says.

The research was conducted in a novel way, using publicly available outdoor webcams and crowd-sourcing.

"The team used webcam imagery and a crowd-sourcing approach to count people, bikes and cars, in rainy, foggy or crowded conditions where automatic methods fail and research assistants struggle due to weather and numbers," says co-author Robert Pless, PhD, professor in the WUSTL School of Engineering & Applied Science.

The findings suggest that these two sources have great potential for capturing behavioral change associated with built environments.

"This research can inform multiple fields, including public health professionals fighting the obesity epidemic, urban planners designing our public spaces to facilitate movement, and computer vision professionals seeking to improve machine learning for public safety," Hipp says.
A web tool called the Archive of Many Outdoor Scenes (AMOS)—developed by Pless—gave researchers thousands of images from which to study. AMOS uses publicly available outdoor webcams and a custom web crawler to capture webcam images with a time

stamp—one image per camera every half hour.

From there, the Amazon Mechanical Turk (MTurk) website was used to crowd-source the image annotation and collect data. MTurk workers were paid one cent to mark each pedestrian, cyclist and vehicle in a picture. Each image was counted five unique times, a process completed in less than 8 hours.

"These pictures allowed us to go back in time and study a place that looked different from year to year," Hipp says.

The study centered on an intersection in Washington, D.C., at Pennsylvania Avenue NW and 9th Street NW in June of 2009 and June of 2010, between which time a bike lane had been installed. The research found cycling activity in the area went up four-fold once the lane was built.

"Using a webcam works to capture activity," Hipp says, "and adding the bike lane increased the amount of cyclists using it. Because Dr. Pless has an archive of these scenes, we were able to locate areas where the physical environment, design or even policy environment had changed.

"We can now crowd-source the images to understand if these design or policy changes are associated with human behavior changes in the same space."

Hipp says this is about more than saving money and reducing a waistline. "Cycling or walking to work will reduce your carbon footprint by 20 percent," he says. "Many potential wins are associated with increasing pedestrian and bicycle infrastructure. What is lacking is the evidence needed to convince communities and governments to spend the necessary money on improvements.

"There are literally tens of thousands of publicly available outdoor webcams throughout the world," Hipp says. "And they can be an effective tool for researchers."

Provided by Washington University in St. Louis