

# Boston Testing App for Auto-Detecting Potholes

| February 21, 2012

Ever hit a pothole, but were too lazy to notify your local transportation department about it? If so, innovators in Boston have come up with an easy way for your smartphone to automatically report those annoying gashes in the [road](#).

Called Street Bump, the mobile application uses sensors embedded in mobile devices to identify vibrations that could indicate potholes or other road hazards. But unlike other 311 apps that require user interaction to log a complaint, all a person needs to do is turn it on. Technology takes care of the rest.

Relying on [machine-to-machine communication](#), the app combines the vibrations it detects with GPS data and transmits the information back to the city. A software algorithm then deciphers whether a pothole is present. If so, a Boston Public Works Department employee is alerted so a repair crew can be dispatched.

The app was developed by Boston Mayor Thomas Menino's Office of New Urban Mechanics, in partnership with Fabio Carrera, a local professor at Worcester Polytechnic Institute. Although only in the pilot program stage, Street Bump is currently being tested by Boston's city inspectors, with plans to release a finalized version of the program to the public later this year.

Nigel Jacob, co-chair of the Mayor's Office of New Urban Mechanics, said in addition to speeding up road repairs in Boston, the goal is to develop a real-time map of street conditions that can be accessed by local users and for other cities around the world that are using the app.

The hope is that data from all app users will flow into a cloud-based database, Jacob explained, so someone could pull up the roadway information on any city if he or she needed it. A person living in Boston, for example, could access the road conditions of Baltimore that were determined by the app, or even a city abroad such as London.

"We're looking right now at the architectural issues as far as mechanically what the separation between the different kinds of data would be," Jacob said.

## Project History

Street Bump was initially developed by the Mayor's Office of New Urban Mechanics last year in part one of a three-pronged approach. For an initial \$10,000 investment, the app was created to gather data using a mobile device's accelerometers.

While apps existed for Android devices and iPhones to display data from accelerometers, questions remained about the usability of the information collected.

"It looked like to us that it was possible, but we had to really ascertain whether or not — if you custom-created an app — the data generated would be at the right level of fidelity," Jacob said.

Jacob and his fellow co-chair, Chris Osgood, ran the app through a series of trials, ultimately coming to a successful conclusion that the data collected by on-device accelerometers would be sufficient. But that was the easy step.

The hard part was coming up with the proper algorithm that could interpret the data accurately. Personnel in Boston's Public Works Department needed to be able to differentiate between a pothole and someone

driving over railroad tracks.

For that, New Urban Mechanics partnered with InnoCentive, an innovation and crowdsourcing company. Using a \$25,000 purse donated by insurance giant Liberty Mutual, a challenge was launched for developers to design an algorithmic solution. Three different algorithms were named winners, with their creators splitting the money.

According to Jacob, as part of the deal, the rights to the three solutions were released to Boston. New Urban Mechanics is using pieces of each to finalize what it needs for the back end of the app when it's officially released this summer.

## Challenges Remain

So what hurdles remain until Street Bump is formally deployed? For starters, the app is a resource hog. The program uses the accelerometers and GPS, so it's an energy-drainer. In order to save battery life, users will have to turn it on when they get in the car, instead of leaving the app running continuously.

Privacy concerns also might be a problem. While some phone data is anonymous, the GPS location is being noted by the app when it notates a bump in the road, which could cause some hesitation to use the program.

To offset those issues, New Urban Mechanics is discussing a variety of options to develop an interface that would incentivize residents to use the app. One idea is to include a leaderboard system where people would tally points the more they run the app and compete with others to be the top Street Bump user.

In addition, Jacob called Street Bump "a new kind of volunteerism" that empowers people to improve the quality of their city — without really doing anything.

"Instead of the traditional model of volunteering your personal time, now you're volunteering the time of your device to gather data," Jacob said.

Street Bump runs on Android devices, but Jacob said an iPhone version likely will be released in tandem when the finalized version makes its debut later this year.

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