ASSOCIATION OF CANADIAN MAP LIBRARIES AND ARCHIVES
BULLETIN

GIS Trends

Editor's Introduction

As anyone who has a smart phone knows, people's use of map-based information is being transformed. Increasingly, access to this information is not only through conventional maps and atlases in a library, but through apps accessed on the go. This presents new opportunities for map and GIS librarians: to provide novel ways of enabling access to maps, and also to collaborate with other campus stakeholders. Recently, our library took the plunge into the world of mobile maps, by exploring how an app could provide accurate and useful GIS-based information to our campus community. In response to an invitation from our parking office, we developed an app to help visitors, staff and students navigate the campus. It was an opportunity to redefine how we provide spatial information, one made possible by the range of technical skills and talents of Greg Young, our GIS developer.
Barbara Znamirowski, Editor, GIS Trends

Where's My Parking Lot?

Greg Young

What It Does

The Maps, Data, and Government Information Centre (MaDGIC) at Trent University, at the request of the University's Parking Services department, has created a unique web mapping application with a specific focus: connecting people with the right parking lots to suit their on-campus destination and budget. The student population at Trent has been swelling in recent years, with a commensurate increase in cars on campus. Popular parking lots fill up quickly, sometimes leading to frustration for students, staff, faculty, and guests. But what if they knew that there was another lot nearby that would get them to their destination within the same amount of time? Or perhaps one a few minutes further away that costs significantly less? The aim of this app is to assist people in making smart parking decisions. Users can select or search for any main building (or room within it) on campus and generate a list of estimated walk times to that building from every parking lot on campus. They can then pull up more details about each lot (i.e. pass type, hours) to help make their decision.

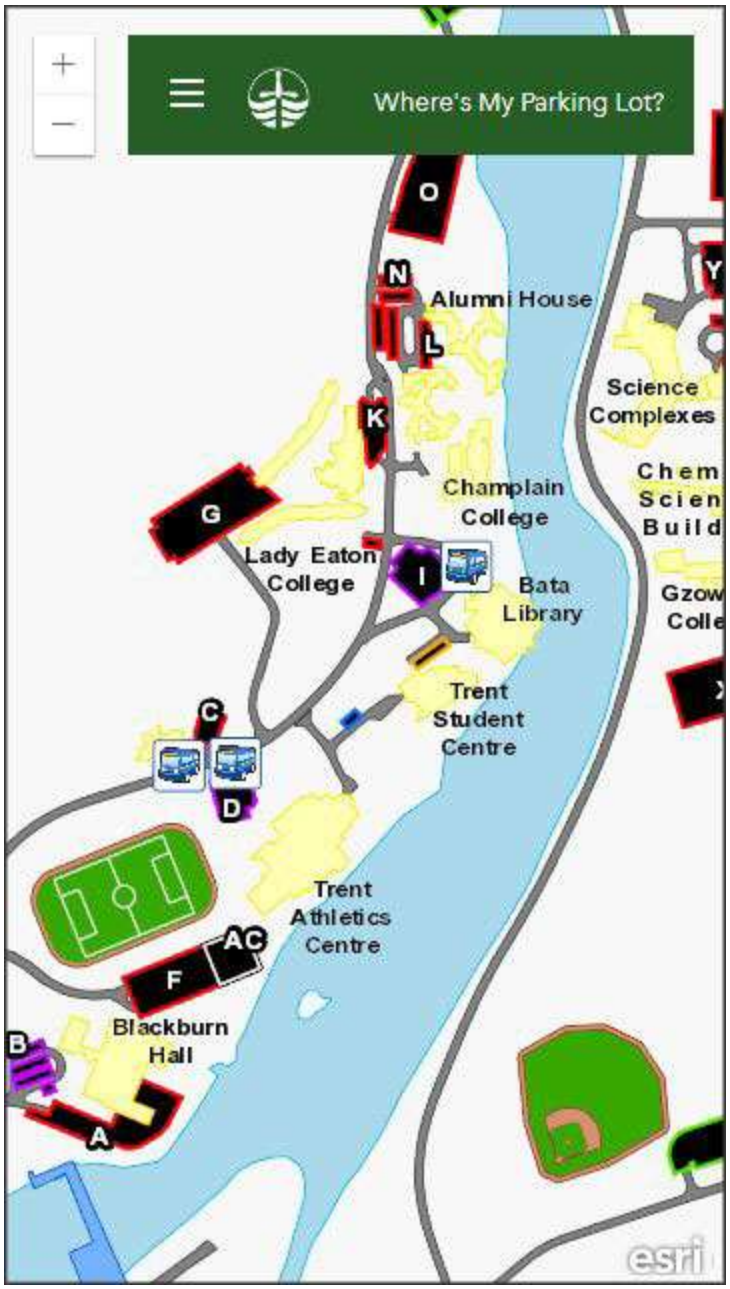

Figure 1. Default view of the app on a mobile browser

How It Works

The app was built using Esri's *Calcite Maps* as a base, a "theme for Bootstrap for designing, styling and creating modern maps apps" (https://esri.github.io/calcite-maps/samples/index.html). This library utilizes Bootstrap (a mobile-first JavaScript and CSS library designed by the folks at Twitter), the ArcGIS API for JavaScript, and Dojo (or JQuery) JavaScript libraries. The result is clean and responsive, working well on screens both large and small. Some customizations were made to the base functionality, enhancing keyboard navigability for accessibility purposes. Custom JavaScript was also written to handle the search, map identify, and walk time retrieval operations. All of this was done within *Visual Studio Code*, a free coding tool from Microsoft.

The app is hosted using Microsoft Internet Information Services (IIS) on a Windows Server host (v 2012 R2). The map was designed in Esri ArcMap (v 10.5.1) and published as cached map services to Esri ArcGIS Enterprise Server (v 10.5.1). Special attention was paid to fonts and colour contrast to conform as best as possible to Ontario's accessibility regulations.

The walking paths on Trent's Symons Campus were digitized and used to create a Network Dataset which could be used to generate routes. A Closest Facility analysis was run to calculate the walk time between all parking lots and all buildings on campus, using a walking speed of 4 km/h (according to Wikipedia, the average human walking speed is 5 km/h – we chose a slower pace to account for people with disabilities, toting baggage, leading small children, or simply enjoying a leisurely stroll). A custom Python script was written to retrieve a sorted list of parking lots from the resultant table based on a supplied building identifier which was then published to Enterprise Server as a geoprocessing service, to be called on demand by the web app.

The app was tested in several different browsers (e.g. IE, Google Chrome, Firefox, Microsoft Edge). Responsiveness testing was performed using Chrome's Developer Tools. The ChromeVox extension (screen reader tool) for Chrome was also used to perform keyboard navigation tests and validate spoken output from the app, improving usability for keyboard-only users and users with a visual disability.

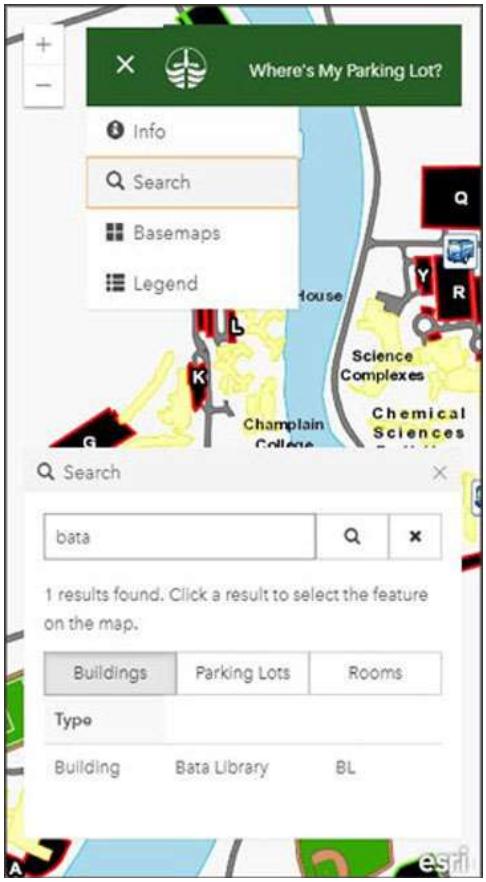

Figure 2. A depiction of the app's search functionality

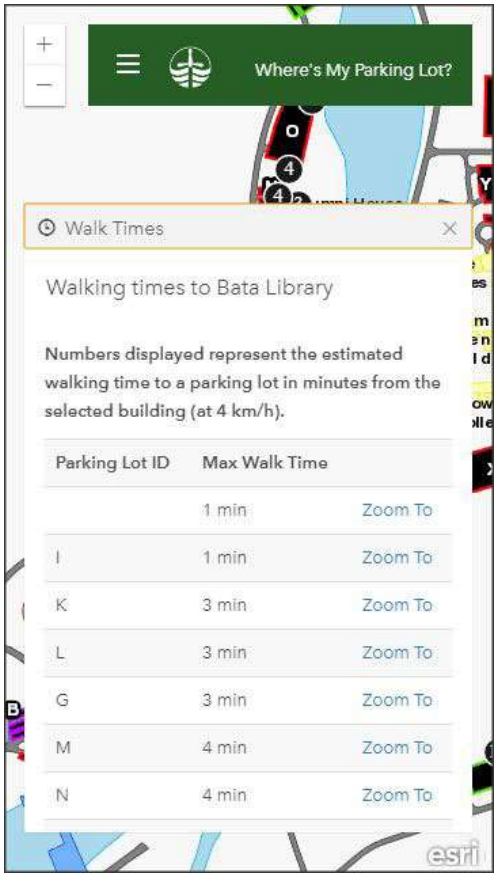

Figure 3. A view of the textual walk time search results generated by the app

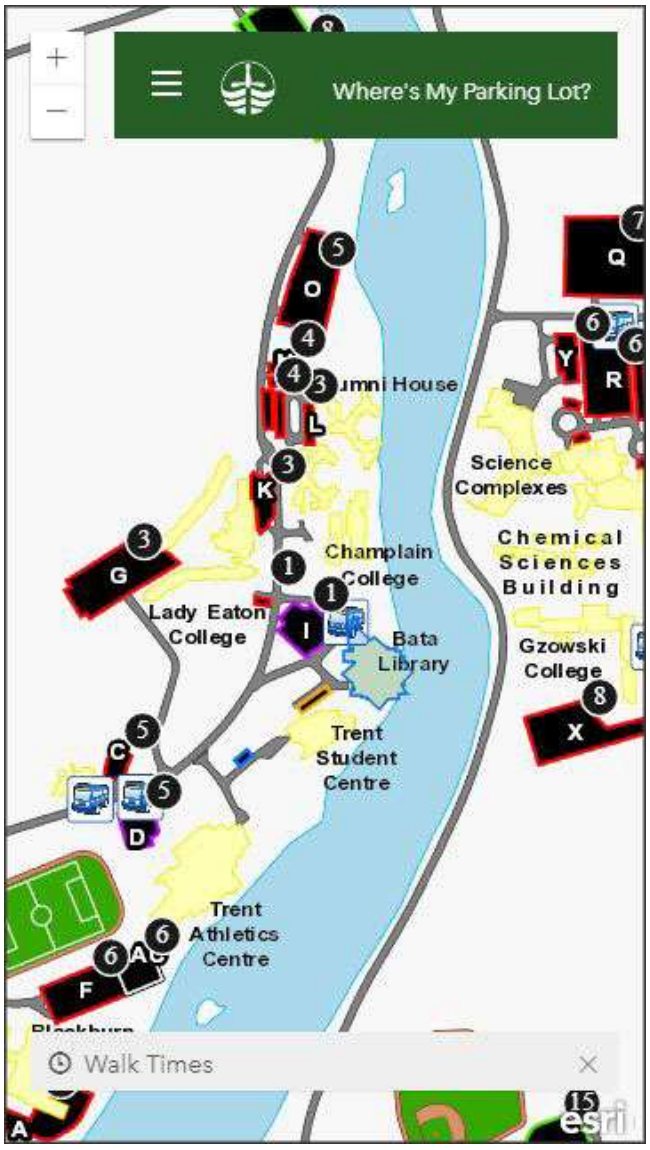

Figure 4. A graphic view of the walk time search results.
Walk times are represented by the white numbers inside the black circles.

What's Next?

Possible upgrades for the app in the future include:

- Add routing from bus stops to buildings, or between any two points on campus for that matter, using real-time network analysis (instead of a static table). This would also allow for users to select different walking speeds and choose other route options.
- Add 3D renderings of campus features, with interior floor plans of the buildings.
- Include within-building routing.
- Enable real-time location tracking and routing.

This app was designed by GIS professionals, however future maintenance of map features and attributes may well be done by someone with little or no GIS knowledge. To make it easier for them, it may be valuable to move the app's data into ArcGIS Online and create a simple editing app, which could be used from any device with a web browser to change features. Combined with the addition of real-time network analysis, this would allow feature changes to be represented immediately in the app and the routing would change accordingly.

The app is currently in the final testing stages and has generated a lot of positive feedback from those who have used it. We look forward to feedback from more users when it is released to the public. Look for it on the Trent University website in the coming months.

About the Author

Greg Young is a GIS Programmer and Developer with the Trent University Maps, Data and Government Information Centre (MaDGIC). He enjoys creating custom solutions that have practical applications.

GIS Trends: Note from the Editor
Submissions and Feedback

GIS Trends is a place to share ideas, observations and discoveries in the area of GIS and other spatial technologies. If you have something you would like to share please write to me. We also welcome feedback on GIS Trends articles. Proposals for articles and feedback should be sent to: bznamirowski@trentu.ca

Thanks for reading and contributing!
Barbara Znamirowski,
Editor, GIS Trends