# GalbraithMountainMap.*com*

By Mari Sagawa, Jordan Sjodin, Sean Palmer, and Chip Jackson
In cooperation with Virginia Cleaveland, WMBC, and Chris Behee
Advised by Dr. Chris Reedy

## Overview

GalbraithMountainMap.com is an online map of all the trails, roads, and other points of interest on Galbraith Mountain, a 3000-acre logging and recreational wilderness area just east of Bellingham. Mountain bikers, trail runners, and hikers come from all over the area to enjoy the extensive network of roads and trails on Galbraith Mountain, and our website serves to help showcase and promote the area for both recreation and tourism. This poster gives an overview of the website and its features as well as details on the technologies and services we used to build it.

## Collecting the Data

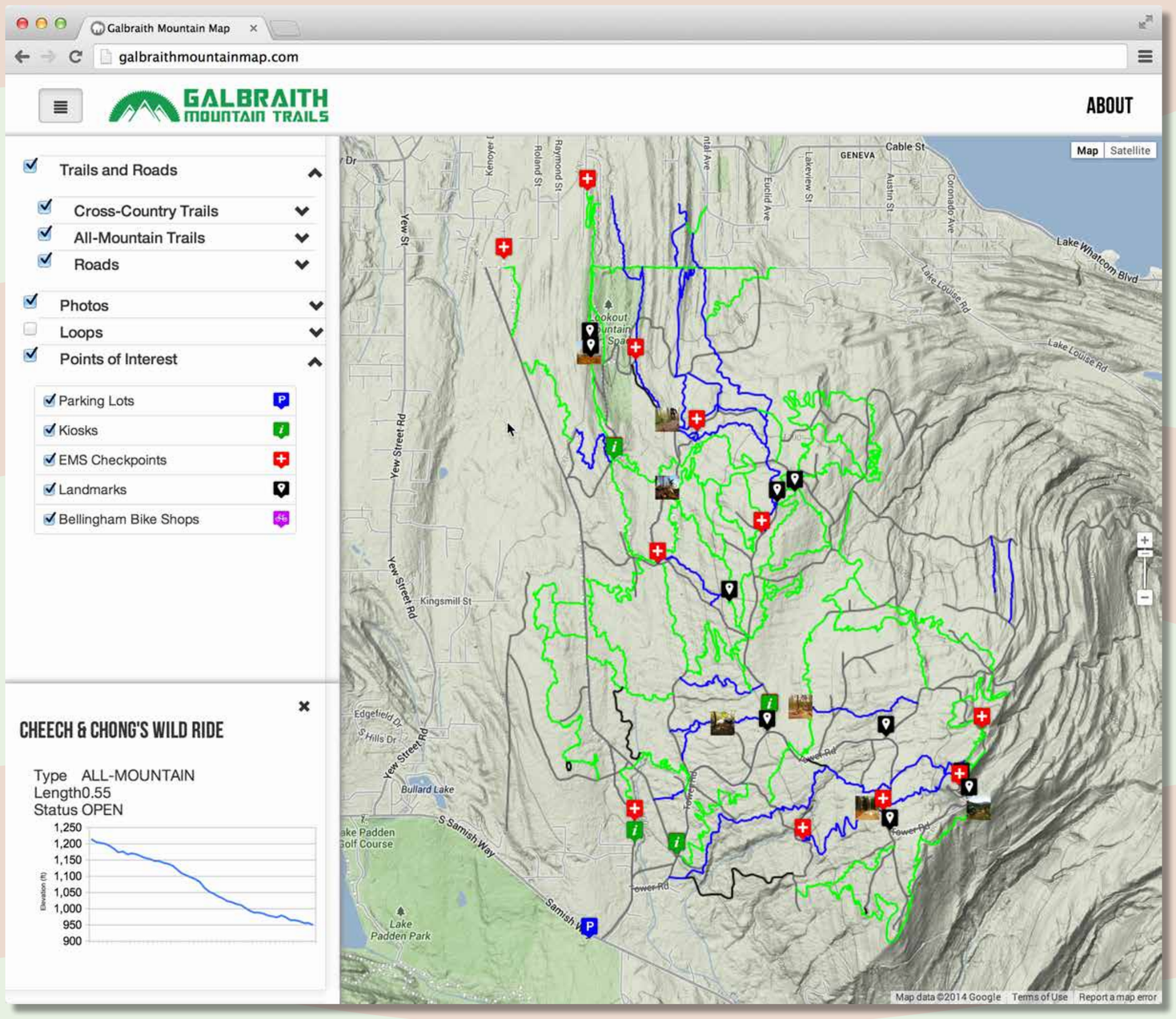
Chris Behee is a local mountain biker who has been working for years to accumulate comprehensive data on the hundreds of trails, roads, and other points of interest on Galbraith Mountain. In cooperation with the WMBC (Whatcom Mountain Bike Coalition), a local nonprofit organization, Chris' data has been compiled into a printed map that is available for purchase at many of the bike shops and outdoor stores around Bellingham. Chris and the WMBC have agreed to partner with us and let us use their data to build the website.

## Organizing the Project

Virginia Cleaveland is a Environmental Education graduate student who contacted the WMBC about creating an interactive map as the culminating project for her master's degree. Virginia's goals for the project were to showcase the extensive trail network on Galbraith Mountain and to promote the area for both its recreation and tourism potential. Virginia has been leading the project by giving us requirements and specifications, while also handling the communication with Chris and the WMBC. Working with Chris, Virginia has been using ArcGIS software to clean the data and get it into a form that we can parse and display on the Google Map.

## Parsing the Data

Virginia exports the data as a KML (Keyhole Markup Language) file and sends it to us. KML is a file format used to express geographic data that is just a simple text document with a tree-like structure of nested tags and their corresponding content. The file is formatted in a way that makes it easy for computer programs to parse. While the Google Maps API offers utilities to parse KML files, we have instead opted to use geoxml3, an open-sourced KML parser. This gives us more control over the parsing process and more access to the data after it has been parsed so we can customize the map and make it more detailed and interactive, and also prevent the public from accessing the data.




## Loading the Map

As the KML files are parsed, elements from them are placed on the Google Map one at a time. For each element that is placed on the map, we create a corresponding entry in the sidebar and save any additional detail fields from the KML file to be displayed later when the user clicks the element.

## Elevation Profiles

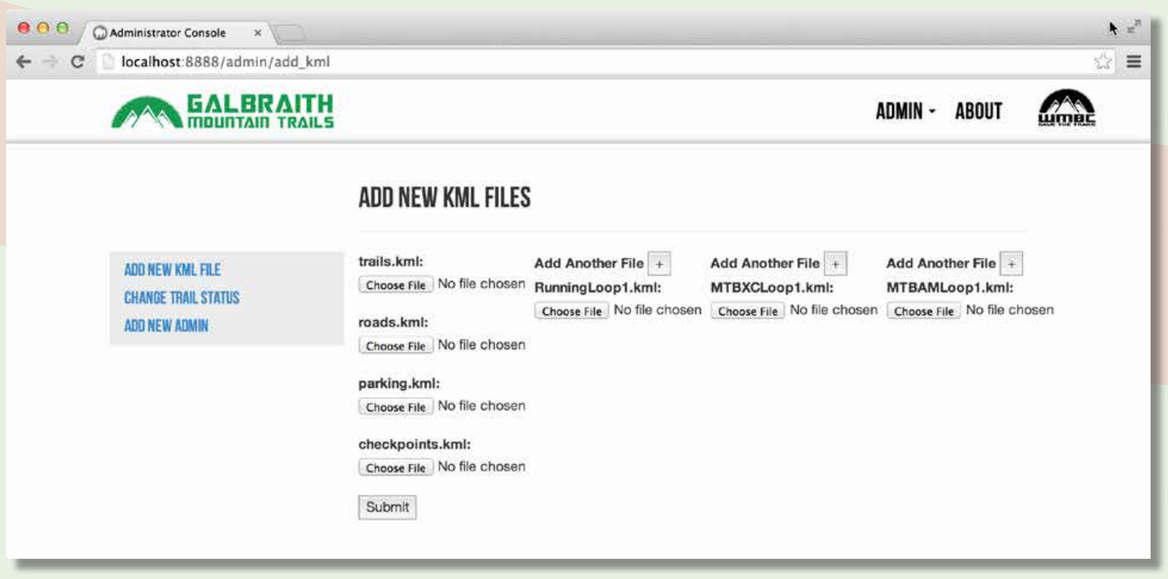
A line graph is created for every trail and road showing its elevation profile. Elevation data is gathered using the Google Maps Elevation Service API, and then plotted using the Google Visualization API.

## Panoramio Photos

When the page loads, a set of geolocated photos is downloaded using the Google Panoramio API and placed on the map and in the sidebar.

## Info Windows

Each element has all of its details compiled into one info window that is displayed when the user clicks on it in either the sidebar or on the map. These details include fields such as trail type, distance, open/closed status, elevation profiles, photos, directions to trailheads and local bike shops, and descriptions of trails, loops, and other features.




## Administrator Controls

To make it easier for Virginia and the folks from WMBC to continue updating the map in the future, we have created an administrator page where they can upload new KML files and update the status of trails to let users know about closed or unmaintained trails. This page is secured with an administrator login and is hidden from normal users.

WESTERN WASHINGTON UNIVERSITY