Undergraduate Honors Theses

Student Works

5-2014

Development of ETSU Student Life Android Application

Tyler L. Cox
ETSU

Follow this and additional works at: https://dc.etsu.edu/honors

Part of the Other Computer Sciences Commons, and the Software Engineering Commons

DEVELOPMENT OF ETSU STUDENT
LIFE ANDROID APPLICATION

Thesis submitted in partial fulfillment of Honors

By

Tyler Cox
The Honors College
University Honors Scholars
East Tennessee State University

May 10, 2014

_____
Tyler Cox, Author

                                            _____
                                            Don Bailes, Faculty Mentor

                                            _____
                                            Mike Lehrfeld, Faculty Reader

                                            _____
                                            Laughton Messmer, Faculty Reader

Contents

Introduction

In the ever-changing field of computing technology, staying up to date with the cutting edge is the key to success. Most companies, businesses, and even academic institutions attempt to take part in this technological arms race to stay modern with current technology. East Tennessee State University was no exception this rule. With around 56% of Americans currently owning a smartphone (that being a phone that has access to the internet) (Smith 2013), mobile development is obviously one of these edges that places are scrambling to get a presence.

Background

In the fall of 2011, ETSU currently had no mobile presence for itself aside from a few mobile versions of frequently used websites (Such as their main homepage). At this point, ETSU began approaching the Department of Computing (at that time, the Department of Computer Science) about possibly working with them to create a mobile application that represents the school that would allow students to import pages and information quickly and easily. It was at this time that I was speaking with professors about possible thesis research. I came to Dr. Don Bailes with this question and he mentioned to me that ETSU was looking for someone to develop an Android application for the school. Prior to this, I had no experience whatsoever with development on a mobile platform, but as this was a cutting edge field, I was naturally attracted to the idea. Dr. Bailes spoke with me about what exactly the project entailed and what ETSU wanted from this application. I immediately jumped on-board with the idea began teaching myself the ins and outs of Android Programming. I was in Dr. Bailes's Honors Intro to Computer

Science II class at this point and spoke with him about allowing me to make the initial work on this project count as a final project, to which he was happy to accept.

Learning & Initial Development

I began by searching Google for Android Programming tutorials. This led me to Google's incredibly helpful and detailed guide for Android development in Eclipse (The IDE, or development environment, that I had the most experience with at the time). Armed with this information, I started development of a first program. That first program took quite a bit of time, but it helped improve my understanding on how Android worked. I was already familiar with the Java programming language (What Android is written in) as a result of the Introduction to Computer Science courses that I had completed. The experience was not very helpful for Android development, as these courses focus on PC development, while most of the use of Java in Android development is the generation of web pages and items on these pages. Also, the pages generated with Android have an XML foundation. At this point, the only webpage generating code that I knew was HTML. XML was another completely new concept to me that I was very intimidated by at first. I assumed it would be similar to HTML, but when I opened up the XML for my first page, the syntax was much different. Fortunately, with the Android System Development Kit in Eclipse, it produces a what-you-see-is-what-you-get (WYSIWYG) editor that allows the programmer to drag-and-drop various text fields, buttons, and other components onto a screen that will become your webpage. This allowed me to generate basic pages without having to know all of the nuances of Java and XML. Figure 1 shows the basic editing screen in Eclipse for an Android Application.
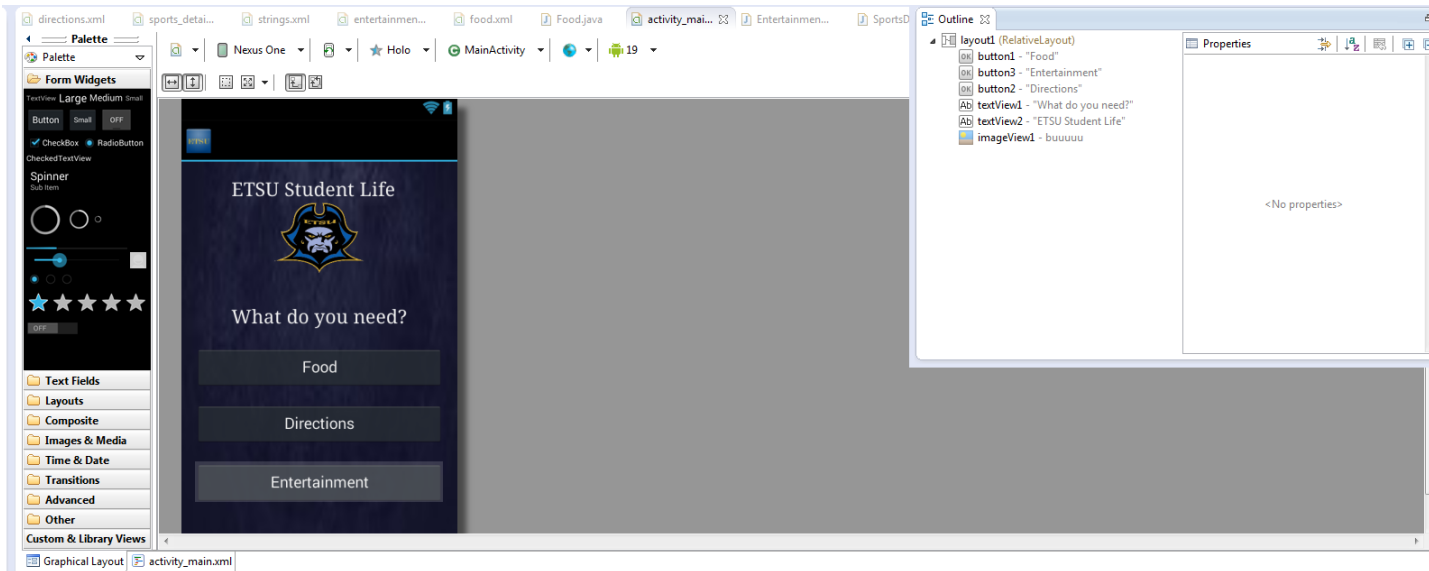
Figure 1. Eclipse's interface for editing a particular Android page

For this first experience with Android, I went through a few of the basic tutorials that Google provided for novice developers and came up with an interactive framework that would hold my future application. At this point, the design of my mobile application was incomplete. This led to the first iteration of the application simply being a collection of screens and links. The main bulk of the work for my "Final Project" that this ended up being was the process of learning a completely new platform of development and applying that into a basic application.

Roadblocks and Moving Forward

After this initial effort, the project seemed to be headed in an excellent direction. Unfortunately, around this time the development started to falter and issues began to arise. Due to a series of intense class schedules and a steady stream of out-of-class work, development of the application slowed to a crawl and eventually had to stop. These more pressing projects, assignments, and deliverables took precedence over development and it somewhat fell to the wayside. During this downtime in development, ETSU still wanted to have their application

created. I had never actually been in direct contact with any administrative unit from ETSU about my thesis becoming the "official" student application for the college, and this proved to be a major thorn in my side. During this downtime ETSU contracted an outside developer to continue the creation of the ETSU Student Application.

This came as a bit of a shock to me, but in retrospect I should have anticipated it. A crucial error I made during this development process was the lack of direct communication with those at ETSU that wanted an application regarding my project. They had a need for a mobile presence and wanted it more quickly than I could deliver it. I should have contacted ETSU administration as soon as I agreed with Dr. Bailes to work on the project. Because of this lack of discussion, ETSU went and hired another developer/group of developers to create what they needed sooner. This third-party developer followed the specifications that ETSU wanted in its application and produced a quality product.

Analysis of Official ETSU Application

The official ETSU mobile application has a series of functions: It allows student access to D2L, Athletics, Social Media, News, Course Information, Maps, and ETSU-made videos. Figure 2 provides a screen capture of what the ETSU-made application looks like.

Figure 2. The home screen of ETSU's official mobile application

Due to this app already being made, I was forced to make a decision: should I continue with my

goal of creating a student life application, or scrap the idea and start with something new. This

was a difficult decision, as I was initially drawn to the student life application project by a desire

to create something that would be beneficial to the student population as a whole and could even

be picked up as an official product of ETSU. In the end, the desire to create an application for

ETSU students to assist with their daily lives led me to the decision to continue the course that I

was on and develop an unofficial mobile application to complement the existing ETSU

application. I focused on finding different core functionalities for my student life application and

the official ETSU mobile application. While I wanted my project to be complementary, I concluded that some overlap between the two would still be acceptable. Implementing overlapping features would allow me to learn how to develop those features.

Differences and Overlap

This led to a period of brainstorming of what unique features my application would have, as well as what features would overlap with the current application. I asked many of the newer students to ETSU that I knew as well as those that had been at ETSU longer as to what kind of features they would find useful in such an application. The easiest sections to come up with were those that I felt like were important enough to overlap between the two. When I think of what the average college student would be wondering about when it came to their school, there are a few things that spring to mind. Some of these are aspects such as dining, directions, sports, and events. From Figure 2 above, the official ETSU application provides the user with access to sports as well as campus events. I elected to have these key elements in my application due to the fact that even if a student only downloaded my application and not ETSU's official one, they would still be up to date with a good amount of the activities happening on campus. The actual implementation of my versions of these features will be addressed later by going into detail into just how they work and what exactly they provide the user. For differing aspects of the applications, I chose to include two key different features: directions and dining. ETSU's official application has maps functionality, but it is not to the point that I feel like a student could effectively use it. While simply seeing a map of campus may be useful for finding one's way around, I felt that a few user experience changes could make that even better. For starters, if students new to campus were lost trying to find their way around to a particular class, a map isn't

too terribly helpful. For example, if a student has no clue where exactly they are on campus without signs around to determine the building names. What would just having a map do? I felt like this could be remedied by implementing a series of walking/driving directions that they user could be given to direct them exactly where they need to go from any location to arrive at their destination. This would provide students with a simple, yet effective method to get to wherever they need. Also, a much forgotten choice that students have access to is ETSU ID Bucs. While most students stick to a meal plan for their food options, some (me included) have ID Bucs loaded on to their ETSU ID and use it in various locations. An unfortunate downside to this, though, is that very few people know where exactly these ID Bucs can be used at. Obviously the first thing that most people think of is on-campus food places, but unbeknownst to most of the student body, there are a plethora of off-campus restaurants and establishments that will accept ID Bucs. I felt like having a place in the application that provides this information for the user as well as simply showing what all dining options are available close to the college would be an excellent boon for the user.

Starting Again from Scratch

Another roadblock came in the way at this point in development, unfortunately. During my extended hiatus from working on the project, one way or another, all of my files from my first prototype of the project had become corrupted and rendered unusable. This was more of a moral setback than anything, as I had to start from scratch with development. A heavy workload the past semesters had come in between me first getting familiar with Android and this point in time, so I was hoping to have this previous code as a starting point to re-familiarize myself with. As this was not the case anymore, I essentially started learning Android all over again from

scratch. The plus-side of this was that having much more web development experience from classes such as Server-Side Programming and Advanced Web Development, I was able to grasp the concepts behind what was creating the pages and the interactions between them as opposed to relying so heavily on the WYSIWYG editor. This lead to me being much more comfortable with the Android development and allowed me to start from an area that would be more stable going forward.

All of this led to the "round 2" of development beginning around the start of my senior year. I began the development similarly to what I did when I initially started to learn Android: I followed some tutorials that Google helpfully provided until I grasped the basics. I picked up much faster this time and was able to quickly get a framework set up of what the project would be in. I wanted the application to be split into three different categories: Food, Directions, and Entertainment.

"Home" Screen

The application would initially boot up into a home screen that allowed the user to navigate to a particular page depending on which of these three categories they were interested in. Figure 3 shows what this home screen looks like at the current iteration of the application.
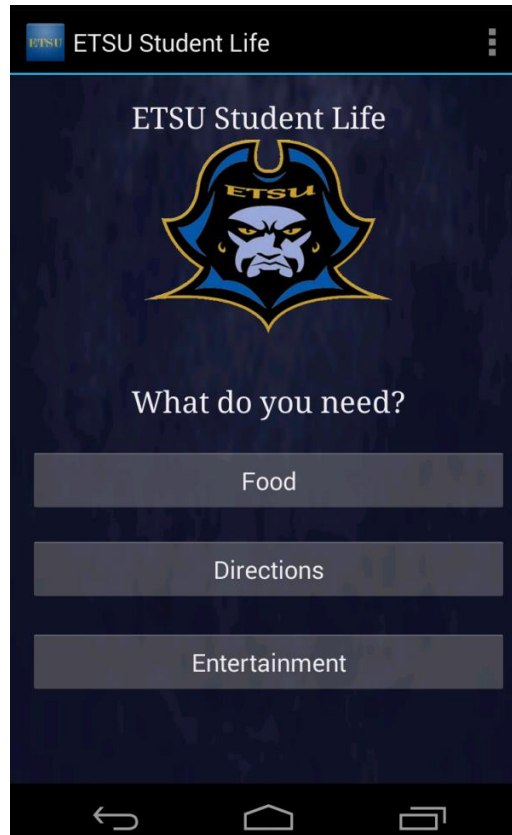
Figure 3. The home screen of ETSU Student Life. Provides the user with access to Food, Directions, and Entertainment.

This gives the user an easy-on-the-eyes starting position with easily recognizable paths to choose from to decide what they want to do. The user will see these three options and immediately be able to know to navigate to one of them to continue on to their desired destination.

"Entertainment" Screen

After creating this initial home screen, I decided that the first functionality to tackle would be the "Entertainment" section. Under this section, the user would be able to find "stuff to do" around campus. ETSU unfortunately has a poor reputation for on-campus events, but this is not true at all. There are plenty of events going on at ETSU, but the students are just rarely aware of them. This section will allow students to find out these campus events, schedules for ETSU's

9

various sports teams, as well as have access to ETSU's student-run newspaper, The East

Tennessean. Figure 4 shows the current version of the "Entertainment" page.
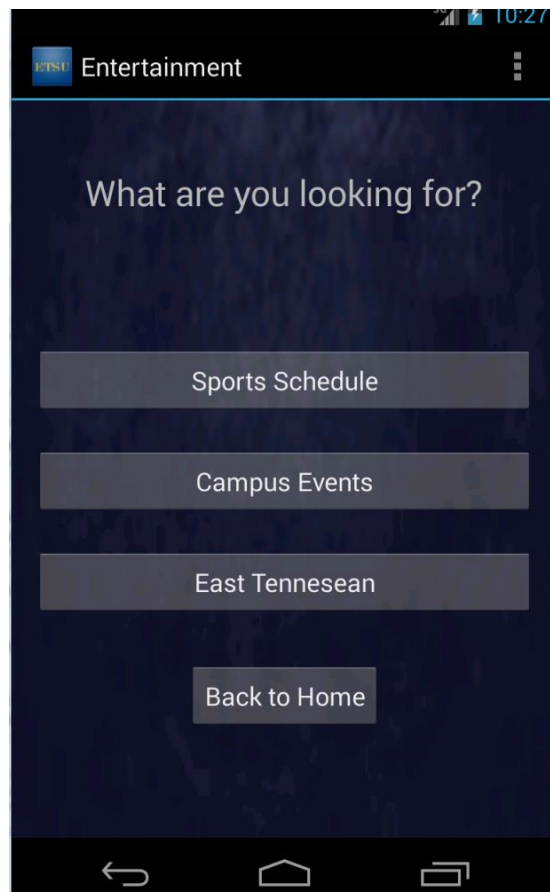
Figure 4. This shows the "Entertainment" screen in my application.

From this screen, the user can navigate to the three aforementioned places. The "Campus

Events" button will take the user to ETSU's calendar of events happening on campus from the

current date of access up to the next two weeks. This way any student who uses this application

can easily be up-to-date on whatever is happening around campus. The "East Tennessean" button

will link the user to the homepage of the East Tennessean's website. This website is updated

every time a new issue is put out, so this will allow for a student to keep up-to-date on both local

and world news. Finally, the "Sports Schedule" button will take the user to another page to allow

them to select from a list of sports teams and find which they wish to see the schedule of. Figure 5 shows this screen.
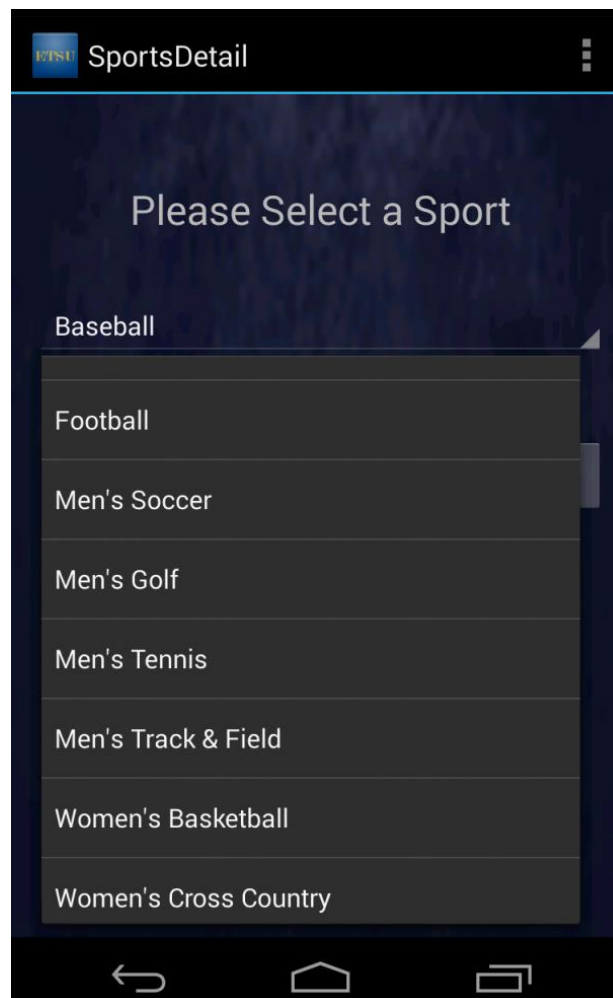
Figure 5. This screen allows the user to select a Sport and then hit accept to navigate to the schedule of that team.

In addition to selecting and submitting, this screen (like other screens in the application) has a button that allows quick return to the home screen. Development of this section was fairly straightforward. The majority all of the content in this section is composed of simply linking the user on button presses to various external websites. I looked around on the internet for tutorials on how to fire an "Intent" (Android's version of executing an action) to take the user to a

particular webpage. After learning this, I put the code in place so that the "East Tennessean" and "Current Events" buttons would take the user to the intended place. The sports scheduling linking was a bit more of a challenge with needing to take the user to a particular place based on what they had selected from the drop-down menu. This was able to be done by looking at which value was currently selected in the drop-down menu when the user hit the submit button, and take them to the appropriate place based on that value.
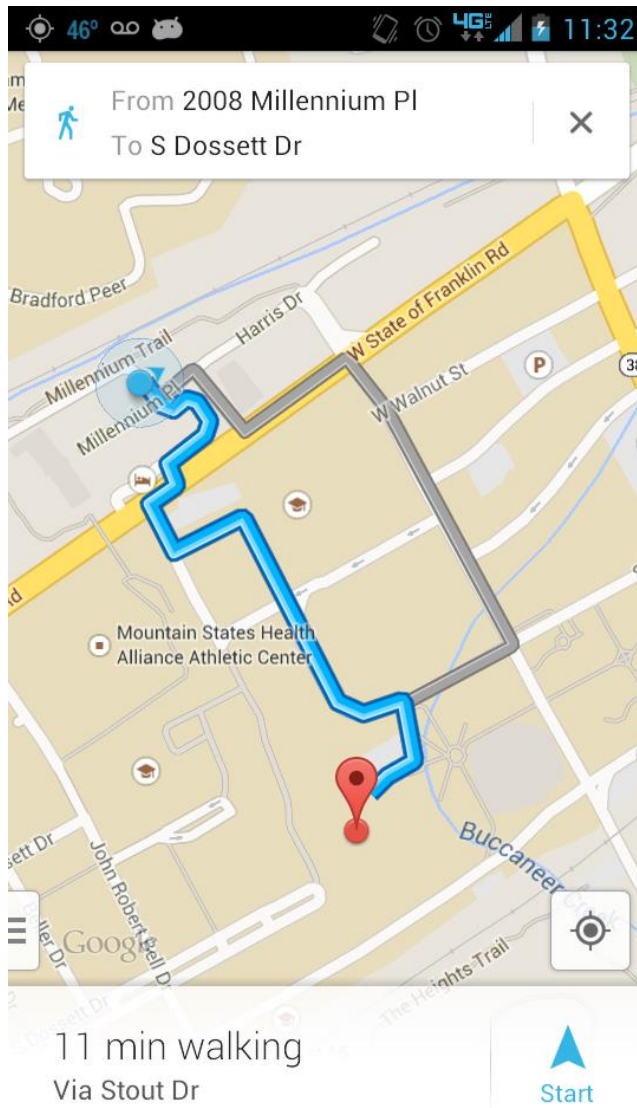
"Directions" Section

Following completion of the "Entertainment" section, I elected to tackle what I thought would be one of the most challenging aspects of the project: the Directions section. I had planned on having integration with Google Maps for this part, but I had no idea how to integrate it or what the process would be to do so. Nevertheless, I dove headfirst into Google's helpful tutorial on how to set up your own Google Maps application. This involves an in-depth process of registering your application with Google so that they can provide you with a key as well as a package of code to utilize in your application. This key is needed so that Google can track the tasks for which you are using your application's GPS functions for. This way Google can know if someone's application is using GPS functionality for malicious purposes. I fumbled around with this for a few days trying to understand how exactly implementing a map in my application should work. Fortunately, after browsing around online, I found many developers saying that implementation of the current version of Google Maps was not functional on the Android Emulators in Eclipse, but would actually work on a physical device. I decided to hook my own phone up and run my application on it to test this. Shockingly, it worked beautifully on my phone and it just seemed to be a problem with Google Maps and the emulators. After getting the

basics down, I decided to present the user with a similar drop-down type list as the sports

schedule section to select from an alphabetical list of key campus locations. This was not simply

limited to buildings, but also included local hotspots, such as the Amphitheater. After selecting a

location and hitting submit, the application will work with Google Maps to bring up walking

directions from your current GPS-tracked location to whichever destination you chose. Figures 6

and 7 show this.
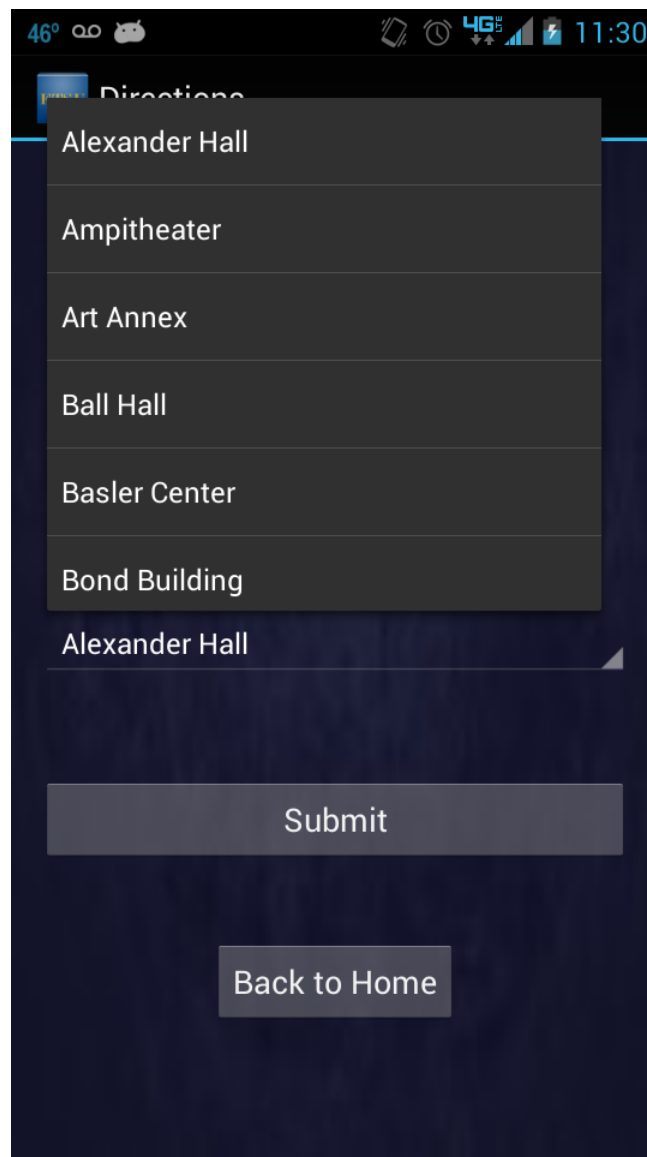
Figure 6. The selection screen for navigation to a particular location.

Figure 7. The Google Maps navigation with walking directions from my current location to the

ETSU Amphitheater

In order to get these particular locations, I needed a way to tell Google Maps exactly where they

are. Fortunately, there is a simple way to do this: GPS coordinates. By going on the online

version of Google Maps, I was able to pinpoint all of these key locations on campus and attain

the GPS coordinates of that place. I input this in the application and made it so that the

application will navigate you from where you currently are to the GPS position of the selected

place. This section ended up working fantastically well, much better than I anticipated. Currently, this section is the one I felt turned out the best.

"Food" Section

The last major section of the application is the "Food" section. At this point in time, this section is still under construction, but there are design documents/engineering specifications/etc. so this section can be completed in a future build. This section will produce a list of locations to the user of various restaurants, grocery stores, etc. that are relatively close by to ETSU's campus. From this list, the user will be able to filter the places by "Type" (such as restaurants, stores, etc.), whether or not ID Bucs are accepted there, and place them in alphabetical order. In addition, the places will be able to be selected by the user to open up Google Maps to provide driving directions to these places in the same manner it is done for the campus locations. This will be done by having a database with all of the relevant information hosted on campus. The application will not connect directly to this database due to security concerns, but will instead go through a Web Service. Android can create what are essentially pseudo-web pages to allow a user to do various tasks. In this particular instance, a web service will be invoked that requests a connection to the database hosted on ETSU's server. It will provide credentials to prove that it is from a trusted source and then pull whatever information is needed from the database. It will then finally pass this information back to the application which will display it as needed.

Reflection

Overall, this was an incredibly beneficial project to work on, and I learned an immense amount from developing this application. Specifically, looking back on my development process,

there are a few things that I would certainly change. One major hiccup was the development of an official application by ETSU before I got a chance to get steadily into my own development. In the future if I intend to create anything official for a business of company, I will definitely be in more contact with them to avoid a situation such as this. Secondly, my application is only currently accessible on Android platforms. If I were to start this project all over again, I would definitely utilize certain tools that allow a developer to create an application that easily spans Android, iOS, and Windows Phones.

All of these different functions come together in this application to create a product that is functional as well as useful for the average ETSU college student. My intentions for this application are for it to coincide with ETSU's current official application and maybe even have the official one take some ideas from mine for it to improve. I plan to turn over ownership of the application to ETSU following graduation and give them permission to implement any of my ideas or functionality if they so desire.

Works Cited

Smith, A. (2013, June 15). *Smartphone Ownership 2013*. Retrieved April 8, 2014, from pewinternet.org: http://www.pewinternet.org/2013/06/05/smartphone-ownership-2013/