

Swan Lake through electronic glasses

Furman's Lake and Augmented Reality

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Abstract

The goal of this project was to create an educational/informational tool on the Lake Restoration Project at Furman University using Augmented Reality (AR) as a demonstration of the capabilities of an AR approach to information distribution. A multiplatform application for mobile devices, such as iPhone and Android, called Layar was the specific software used. It allows users to create a layer of geographically tied information that will be superimposed over the real world when viewed through the camera of a mobile device. This specific implementation focused on Furman's Swan Lake and its restoration. The content focused on several key points of the restoration efforts, such as the rain gardens and bank regeneration, and includes vintage photos of the lake in its original state.

I. Introduction

The purpose is not to just create a product, but to experience the process of creating an AR system to determine whether or not AR merits further use and to what purposes it can be applied. By starting without a priori knowledge of this system the test was to see with what amount of difficulty a presentable final product could be made.

II. Literature Review



Fig.5 An exhibit in the Virtual Public Art Project

As technology changes, the ways for which it can be used change as well. With Augmented Reality just now coming into its own and gaining widespread use (for example the Dutch company Layar was created in 2009) the uses vary widely from the purely recreational to the purely informational. From games, like "real life" Pacman to a botanical database for field use (Agarwal et al.). A comfortable midpoint is the creation of interactive games meant to educate the users, such as in Squire and Jan's study. (Which is closer to what this project intends to accomplish.) Or even something like the Virtual Public Art Project, which promotes AR art in public spaces. However, the real limits are simply what limitations hardware and software have.

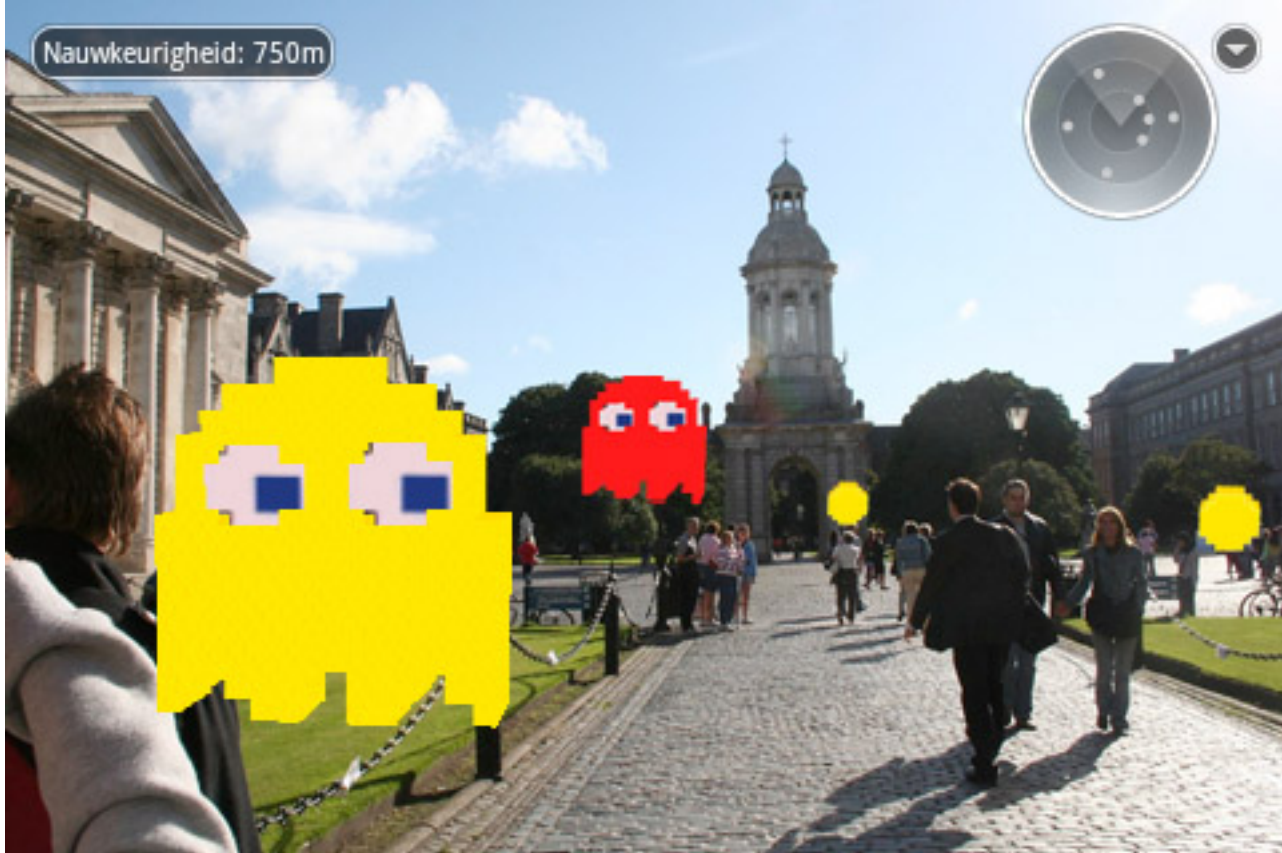


Fig.1 This is an example of a more whimsical use for Augmented Reality.

III. Concept

General:

Using a mobile device with GPS, a compass, a camera, internet access, and the Layar application the user is able to view a layer of virtual information superimposed over the actual world.

Detailed:

- The mobile device uses GPS and its compass to determine where and in which direction the camera is facing.
- The geographical information is sent to the Layar server, which based on the layer being used, accesses an outside database.
- The database holds information on POIs (Point of interest) which it passes to the Layar server.
- The Layar server arranges them on the mobile devices screen based on the geographic information in the POI.
- A POI is at least a geographic point (in latitude and longitude), and can be linked to outside media.
- When the POIs are passed from the database to the user the links are passed as well. At this point the user is able to access these links directly.

Database: The database is created by the layer developer (not Layar) and consist of at least one MySQL table. The database is accessed via webservises, using PHP and JSON.

Media Storage: Media can consist of audio, video, text, or URLs. The audio, video, and text file need to be on a server that is accessible by internet.

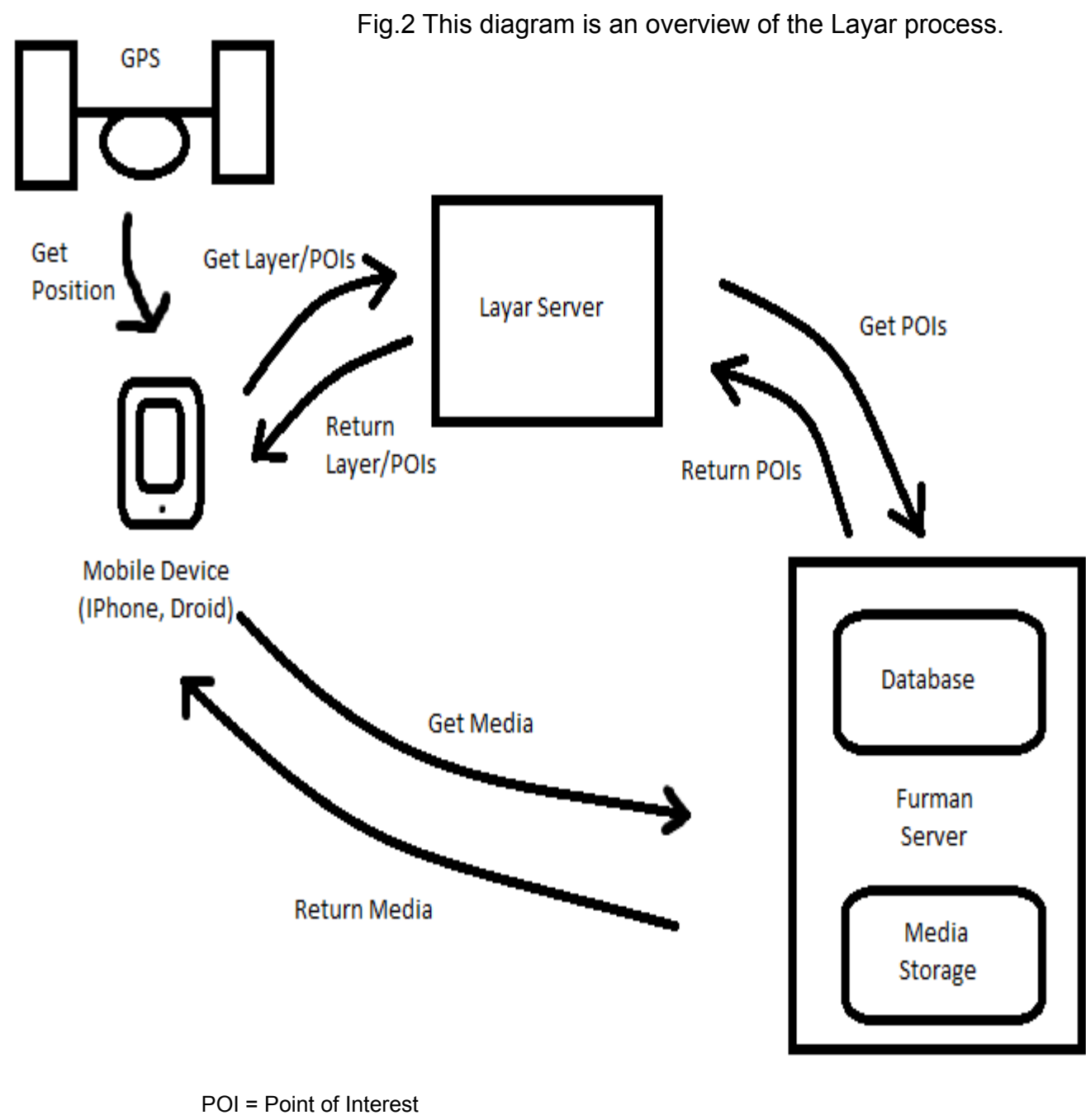


Fig.2 This diagram is an overview of the Layar process.

IV. Content

Points of Interest around Swan Lake



Legend
• Photo POIs
• Information POIs

The content within the layer created was all focused on the restoration of Swan Lake. The informational content was derived from the literature online concerning the Restoration Project. The points included were:

- Rain-gardens and the Asia Garden
- The Bell Tower: as a reference to songbirds
- The Old Beach
- Eastern Wall: reference to heating and algal growth
- Lake-shore re-vegetation
- The cypress Island
- Storm water discharge pipes
- Thoreau's Cabin
- Shi Center
- The Berm and stream

Each POI was linked to either the Lake restoration website or to some information derived from the web-site.

In addition to the restoration points a group of old photos from the Furman's Special Collections and Archives that show the lake before the decline in water quality were included as points in the final layer.

Fig.3 To the left is a map detailing the Geographic locations of all of the points included in the finished layer.



Fig.4 To the right is one of the older pictures included in the finished layer.

V. Demonstration

At 1:30pm there will be a demonstration on the shore of Swan Lake. (Otherwise this picture will have to do.)



V.I. Results and Future Uses

Only the surface of AR have been scratched in this project. To someone willing to put in the effort and time the results are almost limitless. Even getting a small amount of functionality requires little effort and time once the concept and process are understood. Some future uses could include a layer depicting the energy use or CO₂ emissions related to buildings on campus or a layer geo-referencing all of the photos from Special Collections. Other options could revolve around tours of Furman for potential students. The possibilities are only as limited as one's creativity.

VIII. Acknowledgements

The person who was most influential in helping this project get accomplished is Mike Winiski. Without his technical expertise this would not have been possible.

Also deserving thanks is Furman's own Special Collections and Archives staff who made available all of the amazing photos.

The Furman Lake Restoration website, which can be found at:

<http://www2.furman.edu/sites/LakeRestoration/Pages/default.aspx>

VII. References

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