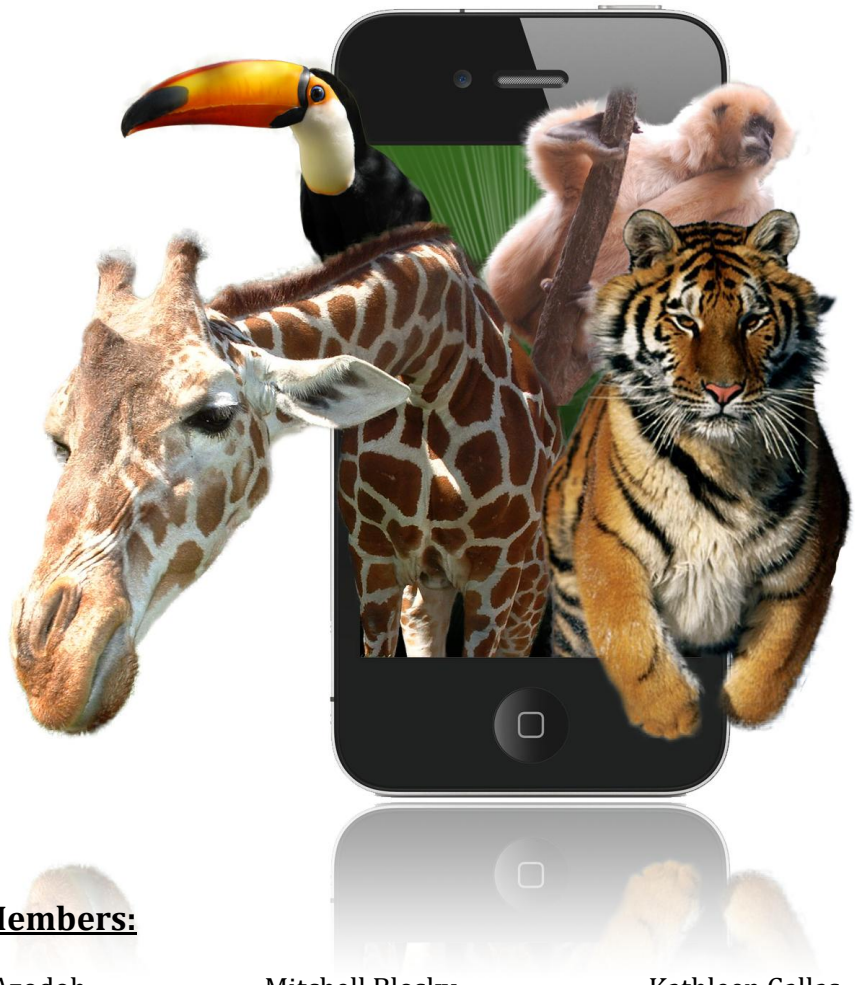
# IPRO 318: Zoo Tech

ILLINOIS INSTITUTE OF TECHNOLOGY

## *Fall 2010 Final Report*

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BROOKFIELD ZOO

Chicago Zoological Society

*Inspiring Conservation Leadership*

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BROOKFIELD ZOO
Chicago Zoological Society
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# I. Executive Summary

Our IPRO team was motivated by surveys conducted during previous summers by Brookfield Zoo. In this survey, visitors reported that learning from a staff member or volunteer greatly enhanced their experience. Unfortunately, only about 70% of visitors reported having this opportunity. In order to further enhance the experience of visitors at the zoo and make interesting information more accessible to guests, IPRO 318 is working with the Brookfield Zoo education staff and animal researchers, along with the Chicago Zoological Society (CZS), to develop an iPhone application that will serve as an additional resource. This application will utilize a virtual tour guide that will assist users in locating and learning about the animals at the zoo. Our hope is that this application will educate users about conservation efforts and allow users to become more deeply connected to the animals at Brookfield Zoo.

This semester, IPRO 318 developed the structure and flow of the application to make it fun and easy to use. It was found that Brookfield Zoo did not have a central location with information about all the animals at the zoo. To solve this problem, an easily updatable database was created and populated with information about popular animals at Brookfield Zoo. This database was integrated into a prototype of the application, along with additional features, such as an audio portion of the virtual tour guide. In the future, IPRO 318 hopes to make the application more available to guests by expanding to other platforms, such as Android™, Windows® Phone 7, and iPad.

# II. Purpose and Objectives

## A. Team Purpose

The Brookfield Zoo was in need of a device that would enhance their visitors' overall experience; this would be accomplished by aiding in trip planning, as well as by educating visitors about the animals, ecosystems, and conservation efforts. This IPRO strived to assist zoo visitors through the development of an iPhone application that would utilize a virtual tour guide. Ultimately, the purpose of this IPRO was to create an application that would allow users to become more involved with the services that the zoo has to offer, as well as develop a connection with the animals.

## B. Objectives

The primary objective of this team was to build upon the previous semester's prototype of an iPhone application to be used at the Brookfield Zoo. The main focus of this semester was the creation of a virtual tour guide to help users learn about and establish a connection with the animals, as well as educate users about conservation efforts. The application would include an interactive map which would allow the user to locate their current position, as well as specific animal exhibits throughout the zoo. Additionally, the guided inquiry portion of the application will aid in the identification of each animal and will serve as an

educational tool for users. To reach these goals, a new database architecture was implemented with the following goals:

1. **Usability:** To design a more aesthetically pleasing, efficient application interface.
2. **Identification of Animals:** Fine-tune by adding three paths for animal identification (A-Z, Q's, # Code).
3. **Beyond Identification:** Include a new interactive map, present a MyZoo and camera feature to keep track of exhibits visited, add an audio option, and to expand on these functions in the future to enhance the experience of guests.
4. **Coding:** To implement a map feature capable of tracking the user (GPS) and transfer to a new database driven system.

## C. Partner Information

IPRO 318 is working with Brookfield Zoo of the Chicago Zoological Society (CZS) to provide an iPhone application suited to fulfill both organizations' objectives. The project was started in 2009 as a result of Brookfield Zoo's interest in reaching out to visitors through technology, specifically the iPhone; the CZS's mission statement is to educate people about conservation by creating connections between visitors and the animals.

Brookfield Zoo, situated in Brookfield, IL, was established in the suburbs of Chicago in 1934. It retains its reputation of leading the fields of animal care and conservation by bringing in animals from all around the world who are endangered or have been injured and giving them a home and medical care. Just recently, the Zoo brought pelicans that were caught in the BP oil spill in the Gulf of Mexico, cleaned them up, and released them in Formal Pool at the zoo. More information can be found about the IPRO's mission and inspiration at http://brookfieldzoo.org/czs/about-czs.aspx.

## D. Existing Technology

This is the third semester of IPRO 318 since the original project was started in the summer of 2009 as a collaborative effort between Professor Hood and Brookfield Zoo. As the summer course ended, two main ideas were proposed for the project: a GPS-enabled database and a guided game. Since then, the game aspect has been dropped and a guided tour has been added instead.

Outside of the current project, there have been other applications created for the same purpose. One such program, called the "Pocket Zoo", has made much of the ideas that we have proposed readily accessible, although not tied to any particular zoo. Pocket Zoo was created by Tiny Hearts Ltd. and has a few main aspects to their program:

1. **Live Streams** - Show animals in their exhibits from zoos all over the world
2. **Digital Map** - Ties together all the animals with illustrations and their places of origin

3. **Digital Sounds -** Give the ability to listen to the animals and hear what sounds they make
4. **Information -** Allows users to find out a variety of information about the animals
5. **Picture-taking** - Allows the users to take pictures of the animals and save them, or share them using twitter or email

Many of these tools can be incorporated into our project and custom-tailored to best serve Brookfield Zoo's aims and to improve user interaction with the zoo.

## III. Organization and Approach

Due to the different aspects of this IPRO, our team has divided into three main groups. The groups are comprised of the following teams: Virtual Tour, Information Architecture, and Coding. With four students returning to the IPRO from previous semesters, the organization of teams was very clear. The Virtual Tour team will work on the structure of the application to make sure the application is easy to understand in terms of user experience and graphics/design. The Virtual Tour team will act as the backbone by taking information from the Information Architecture team, visualizing the ideas, and finally passing them along to the programming team, which will then implement the ideas. Taylor Dreher will act as our team's project manager and spokesperson by making sure the team is on track and preparing weekly discussions. The faculty members Cindy and Dennis Hood will oversee our team's process and assist in guiding us when we stumble upon an issue. The Information Architecture team will work closely with the Brookfield Zoo employees and conduct many visits to the zoo.

At the beginning of the semester, each group determined its own main objectives and goals for the semester:

### A. Information Architecture:

1. Main Objective: To identify, organize, and gather relevant information about zoo animals.
2. Task 1: Define database information
    a. Identify relevant information about zoo animals
3. Task 2: Create spreadsheet template of database
4. Task 3: Populate database with previously gathered info
5. Task 4: Complete Fragile Kingdom info
6. Task 5: Collect info about major animals not in Fragile Kingdom

### B. Virtual Tour

1. Main Objective: To design a more aesthetically pleasing, easy to use application interface for the virtual tour feature.
2. Task 1: "Connect with the animals" ideas
    a. Come up with new ways for visitors to connect with the zoo animals

3. Task 2: Create application flow
    a. Decide how user will move from one feature to another
    b. Create hierarchy of application levels
4. Task 3: Mockup screenshots
    a. Create mock screenshots of what the application will look like
    b. Decide on the types of transitions between screens
5. Task 4: Create application graphics
    a. Create graphics (icons, symbols, pictures) that will be used for application

### C. Coding:

1. Main Objective: To implement a virtual tour feature using GPS.
2. Task 1: Understanding of the former code
    a. Look over Spring and Summer code
    b. Identify and fix code inefficiencies
3. Task 2: Integration of database
    a. Improve database structure
    b. Populate database with animal information
4. Task 3: Addition of GPS
    a. Use GPS to identify user location at the zoo

## IV. Analysis and Findings

As previously stated, IPRO 318 approached the problem by dividing into three groups. The whole IPRO's analysis and findings are a result of the accomplishments of these individual groups. As a team, IPRO 318 discussed and identified the problem we aimed to solve, which included defining a possible solution and the scope of that solution. Each group worked individually on their piece of the problem, and in the end, the work of all three groups came together. Below are the sub-teams' analyses and findings that ultimately define the analyses and findings of the team as a whole.

### A. Information Architecture

1. Research findings: Information Architecture in its research found that classifying animals by color is difficult for the guided inquiry portion of the application, since some animals have several different colors. Also, copyright of pictures can be an issue when they do not come from the zoo.
2. Resources: Information Architecture utilized the Internet (Brookfield Zoo website, Wikipedia, answers.com), and also zoo contacts and previous semester information (zoo's fact sheets) to build off of previous work. Google Earth was used in order to obtain the coordinates of Brookfield Zoo.
3. Major discoveries: Information Architecture's major discovery was that discrepancies in human observation make efficient guided inquiry a complicated task. Also, they concluded that the application could detract people from viewing and enjoying the zoo

experience.

4. Innovative approaches and solutions: Information Architecture utilized the innovative approach of considering possible choices each person may have when describing the colors of an animal. This group was able to implement an option for users to choose more than one color in order to limit the variance in human discrepancy and minimize error in animal identification. The group also decided to add an audio portion of the tour guide with information about animals so users do not have to stare at their phones and may have a better zoo experience.
5. Accomplishments: This group created a template for the database to be easily used for the application and populated the database. They also collected data for 80+ animals to populate the database and gathered coordinates for the GPS system. The group also started to develop an audio tour and made a recording for the prototype.

**B. Virtual Tour**

1. Research findings: Team Virtual Tour's research found it is better not to make custom buttons or features which are unnatural to users of iPhones and iPads, for example leaving such items as the back button on the top left of the screen. Usability tests were completed by creating a flow chart which was continuously refined in order to create an application that is user friendly for all age groups, and has great transitions and design.
2. Resources: Virtual Tour team purchased zoo applications, which were all created by the same developer: AVAI Ventures Inc. The group also researched the Cincinnati Zoo, Dallas Zoo, Woodland Park Zoo, Houston Zoo, and Pocket Zoo. In researching other Zoo applications, the Virtual Tour team focused on flow of the application, clarity, ease of use, design, and features used to keep users engaged. The group also looked at IOS documentation, photo sizing of images, and standard sizes for iPhone/iPad use. The team also referenced the Human Interface Guidelines for standard buttons, tabs, and backgrounds, which made it easier for the programmers to use. Finally, Virtual Tour team used the research from previous IPROs.
3. Major discoveries: The major discoveries for team Virtual Tour were that it is better to not make custom buttons or features which are unnatural to users of iPhones and iPads.
4. Innovative approaches solutions: An innovative approach used by the group the creation of a feature called My Zoo. The group tried to tie it into the rest of the application nicely while keeping it simple.
5. Accomplishments: Team Virtual Tour was focused on using the foundation set forth by the previous IPROs, along with other studies of applications in order to create a engaging application which helps users connect with animals. It was important to keep the user from staring at their phone by creating a personal tour guide. This semester, the group was able to develop a great application structure. New features were added, such as camera, map, and different ways to identify the animal. Additionally, a better animal info page was created, which has a world map view, personal information, and characteristics. The greatest accomplishment is allowing the user to listen to the information presented on the animal page versus having an individual stare at their phone. The group also created a My Zoo feature which allows the user to store the

animals they have seen so when they return to the zoo they will remember where they left off. My Zoo also allows for individuals to print off graphics of the animals they have seen or send the animal tile via email. The group also created an Events tab, which allows users to access times of shows as well as upcoming events through a calendar.

### C. Coding Team

1. Research findings: Coding Team's research consisted of finding solutions to some of the major obstacles that faced in the development of the app. In regards to the GPS, Coding found that combining the zoo's provided cartoon map with real world coordinates and the iPhone's GPS system would be very difficult, if it was even possible to translate the coordinates from one map to the other in the first place. Another thing this team discovered was that the iPhone does not provide standard libraries for displaying photo albums within applications, and this feature would have to be made entirely custom.
2. Resources: The Coding Team Used Apple's API to see what they had to work with and also used forums and other internet resources. The Apple developer community was the most helpful resource.
3. Major discoveries: The only real major discovery was the problems that arose when trying to use the map that was provided by the zoo in the GPS system; this was one of the biggest setbacks in the development of the app.
4. Innovative approaches and solutions: Coding has since managed to integrate the GPS system into the application and has created custom album views, which show an album of pictures taken with the application without exiting the application.
5. Accomplishments: The Coding Team's accomplishments include a successfully integrated database, a GPS implementation on the map, and finalization of the application's design.

## V. Conclusions and Recommendations

The final prototype developed by our team is fully functional, and includes a revised guided inquiry function, built-in database, photobook, map with GPS, and a rebuilt design layout from previous semesters. The layout consists of five main windows (Home, Map, Animals, Camera, and More), with games and an events calendar added to the home page.

Under the "Animals" tab, the user will find a number of different ways to search for the animal that they are viewing in front of them. One option would be to use the guided inquiry function to identify the animal. The user may also choose to use a number system which is being implemented by the Brookfield Zoo; a number unique to each animal will be on a billboard near the animal's habitat and can be used for identification. One final option a use may consider is to look up the animal by name.

The "Map" tab is a marked difference from previous semesters. What exists now is a real-world view of the zoo using Google Maps with the user's physical location marked by a pin on the map; in addition, significant landmarks will be displayed for the user. Once clicked, the pin marking the location will expand with the name of the location and an option to see a description of the location.

The Information Architecture group has been instrumental in filling out the application's database and has introduced a sample audio tour guide for a number of the animals in the database. The application now has a dynamic database that can be easily updated when new animals are introduced into the zoo or moved; this is in contrast to the hard coded animals that were placed last semester.

For future semesters, we recommend improving the project in a number of ways. Due to time constraints of this semester, not all the animals were completed for the application. Also, pictures were found from fair use sites, not from Brookfield Zoo directly; these pictures should be replaced with pictures that are custom-tailored to the zoo. The audio tour was not fully implemented and should be finished before release.

For the coding aspect of the project, we recommend that the database be fleshed out further with the rest of the animals on the server. Additionally, the project should be polished off fully, but it is highly recommended that the application not be built from the ground up again; this would take a large investment of time that should be used to finish the application instead. Implementations for the iPad, Android™, and Windows® Phone 7 platforms should be investigated for further saturation of the mobile market and increased exposure to visitors to the zoo. Other items that need to be fleshed out would be expanded games, a refined MyZoo tab, and an overlay for the map feature to increase detail.

# VI. Appendices

## A. Appendix A: Team Information

| Name | Contact Info | Year/Major | Skills/Attributes | Expectations |
|---|---|---|---|---|
| **Antonio Gabriel Perez de Tejada Martinez** | aperezd@iit.edu [redacted] | 3rd Year Computer Science | Programming, working well with others, Bilingual English/Spanish with some French | To make significant progress on the iPhone application |
| **Ashlie Mis** | amis@iit.edu [redacted] | 4th Year Computer Science | Delegating tasks, responding in a timely manner, making presentations, time management, organized, hard worker, quick learner. | Get a prototype of the application working well enough that we really need to do at the end of the semester is field test it and debug. Learn from the mistakes of the past two teams. |
| **Brooke Jeffcoat** | bjeffcoa@iit.edu [redacted] | 5th Year Architecture | Design, teamwork, communication, brainstorming | To perform well at IPRO day by further developing a successful iPhone application |
| **Catalina Rojas** | drojas@iit.edu [redacted] | 4th Year Mechanical Engineering | I have worked in product development for a pharmaceutical company writing protocols and analyzing data. Good time management, unique combination of technical and business related skills, detailed oriented, bilingual English/Spanish, organized | To get further in the application and do very well on IPRO day |
| **Chinedu Azodoh** | cazodoh@iit.edu [redacted] | 4th Year Electrical and Computer Engineering | Programming, teamwork, communication, brainstorming | To perform well at IPRO day by further developing a successful iPhone application |
| **Erick Schneider** | eschnei2@iit.edu [redacted] | 4th Year Computer Science | Problem solver, hard working, graphical and analytical thinker | Get a working prototype created and debugged for IPRO day, able to be expanded upon with little work on the part of the programming team |
| **Jennifer Puzewski** | jpuzewsk@iit.edu [redacted] | 5th Year Architecture | Design, hard worker, respectful, reliable, very organized, team player, communication | To get the application much closer to a working |
| **Jonathan Kobayashi** | jkobaya2@iit.edu [redacted] | 4th Year Electrical Engineering | Building circuits, website design and development, graphics design, basic photo editing, basic | Learn more about how personal devices like the iPhone can be used not only as a device to own, |

| | | | | |
|---|---|---|---|---|
| | | | programming, organized, hard working | but as an extension of ourselves. See this IPRO demonstrate a new way of using personal mobile devices |
| **Kat Callas** | kcallas@iit.edu [redacted] | 4th Year Humanities | Familiar with Brookfield Zoo, worked/volunteered there for 3 years in the education department | Get a fully working prototype of the application |
| **Mitsuru Chiba** | mchiba@iit.edu [redacted] | 4th Year Biology | Researching, developing innovative or new ideas that may prove pertinent, design | Develop fun features that draw in visitors to learn more about animals |
| **Mitchell Blosky** | mblosky@iit.edu [redacted] | Architecture | | |
| **Erica Pauley** | epauley@iit.edu [redacted] | 4th Year Mechanical Engineering | Good at organizing, writing, and time management. Ability to multi-task and follow through on all assignments | Learn to work more efficiently with people from different technical backgrounds while completing a iPhone application |
| **Taylor Dreher** | tdreher@iit.edu [redacted] | 3rd Year Psychology | Time management, punctual, responds fast to emails or other forms of communication | Get GPS up and running and test a prototype at the zoo |
| | | | | |

B. **Appendix B: Budget**

1. **Anticipated Expenses:**

| **Public Transportation** | **Round Trip/Person** | **Total (14 people)** |
|---|---|---|
| **Metra** | $7.00 | $98.00 |
| **Overall Total (* 3 trips per person)** | **$21.00** | **$294.00** |

| **Vehicle Transportation** | **One Way** | **Round Trip** |
|---|---|---|
| **Distance Miles** | 15mi | 30mi |
| **Mileage Reimbursement ($0.50/Mile)** | $7.50 | $15.00 |
| **Total Per Person** | | $15.00 |
| **Overall Total (*5)** | | **$105.00** |

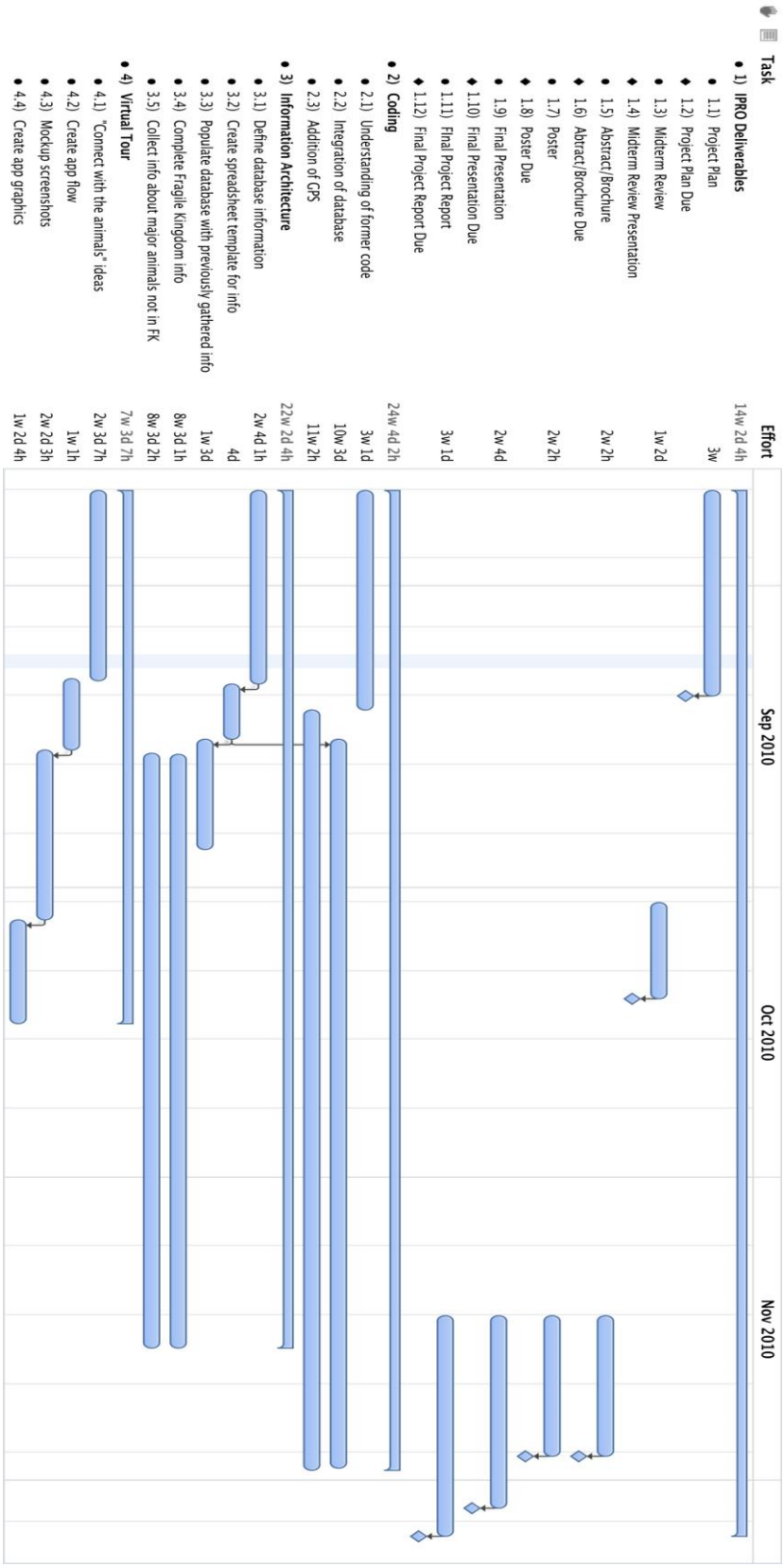
**Summary:**

| | |
|---|---|
| **Transportation** | **$497.00** |
| **Miscellaneous** | $50.00 |
| **TOTAL EXPENSES** | **$547.00** |

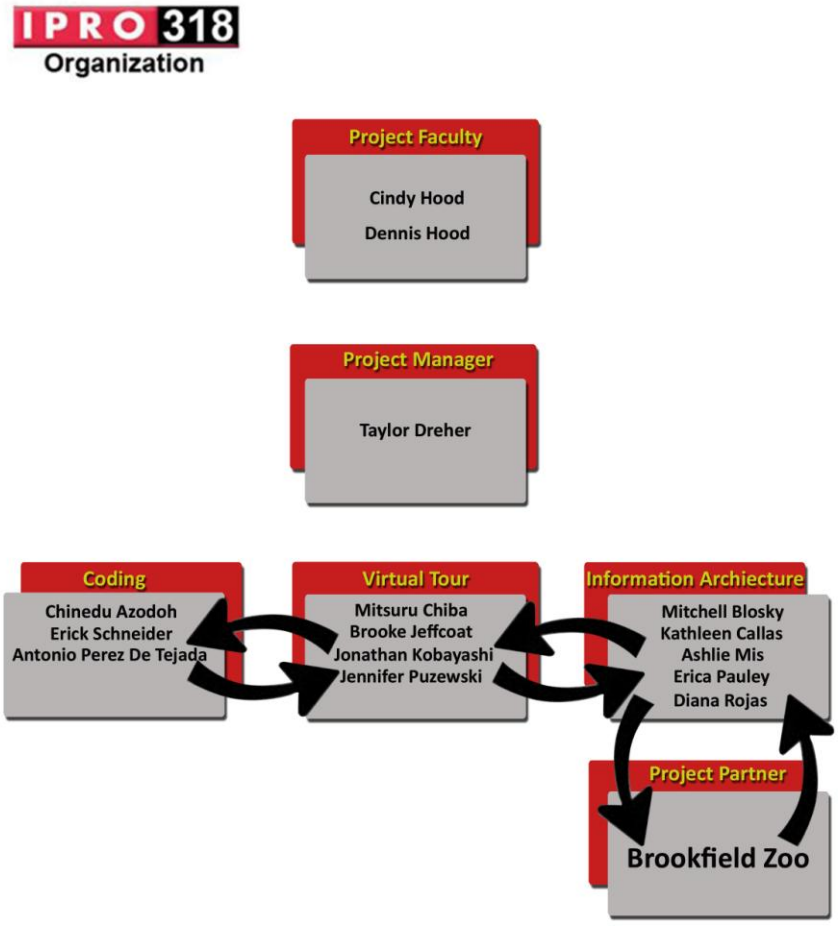
2. **Actual Expenses:**

| | |
|---|---|
| **Transportation** | **$53.13** |
| **Miscellaneous** | $0.00 |
| **TOTAL EXPENSES** | **$53.13** |

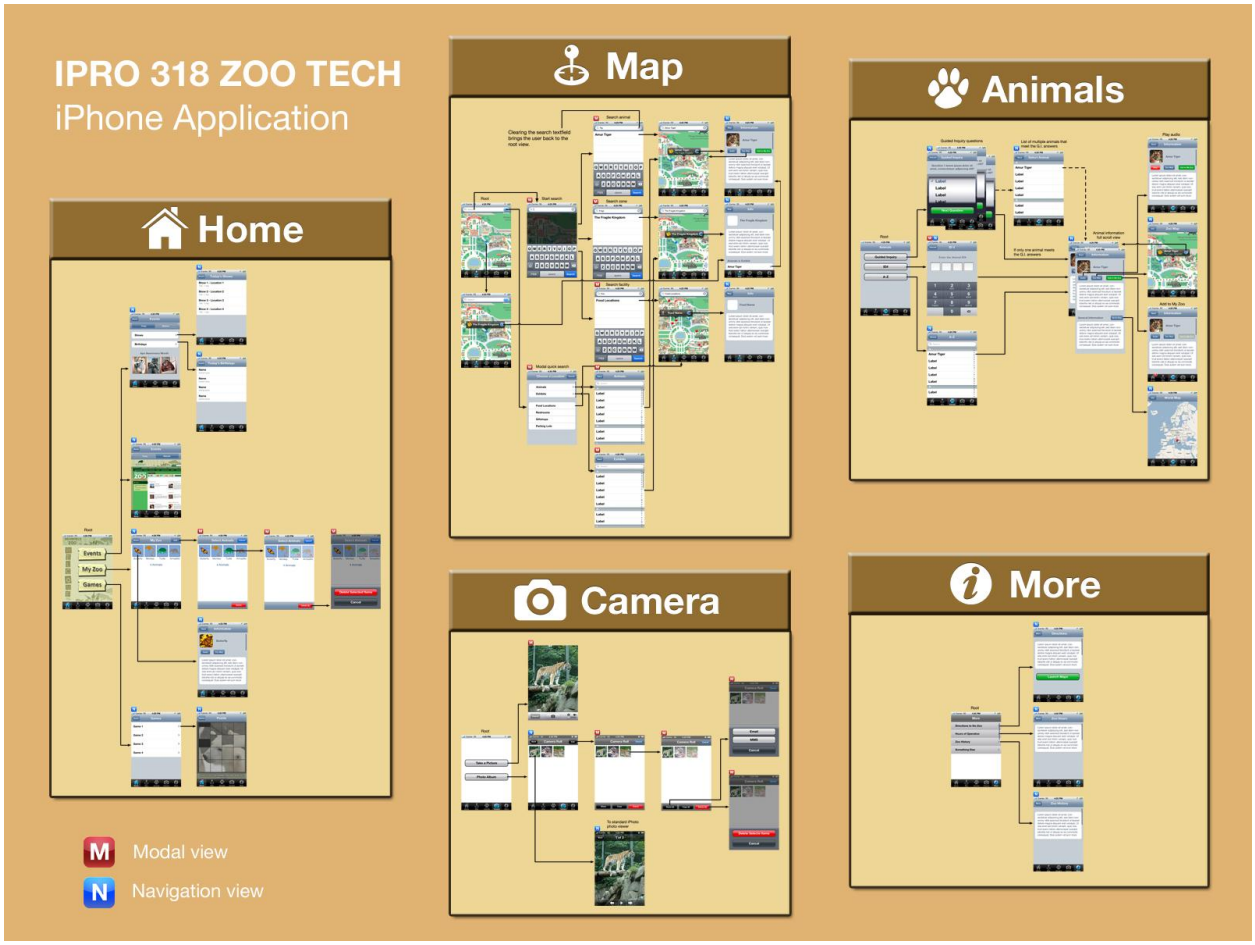
## C. Appendix C: Gannt Chart



## D. Appendix D: Team Organization



## E. Appendix E: App Flow



## F. Appendix F: Contacts

### Zoo Contacts

| Last Name | First Name | | Email | Phone # |
|---|---|---|---|---|
| Halverstadt | Brittany | | Brittany.Halverstadt@CZS.org | 708-688-8834 |
| Watters | Jason | Behavioral Researcher | Jason.Watters@CZS.org | |

## G. Appendix G: References


1. Brookfield Zoo (© 2010 Chicago Zoological Society)
    a. http://www.czs.org/czs/Brookfield/Zoo-Home.aspx
2. Internet Information Databases
    a. http://www.wikipedia.org/
    b. http://www.answers.com/
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    a. http://www.earth.google.com
4. Previous iPhone Applications
    a. AVAI Ventures Inc (© 2010 AVAI Ventures, Inc.)
        i. http://avaimobile.com/
    b. Cincinnati Zoo
        i. http://avaimobile.com/amp-apps/cincinnati-zoo-ideas/
    c. Dallas Zoo
        i. http://avaimobile.com/amp-apps/dallas-zoo/
    d. Woodland Park Zoo
        i. http://avaimobile.com/portfolio/woodland-park-zoo/
    e. Houston Zoo
        i. http://avaimobile.com/portfolio/houston-zoo-copy-0/
    f. Pocket Zoo™ (© 2010 Tiny Hearts Limited)
        i. http://tinyhearts.com/pocketzoo/
5. Apple® (© 2010 Apple Inc.)
    a. Human Interface Guidelines
        i. http://developer.apple.com/library/ios/#documentation/UserExperience/Conceptual/MobileHIG/Introduction/Introduction.html
    b. Apple developer community
        i. http://developer.apple.com/
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    a. http://stackoverflow.com/