

InfraDrone Android Application

PROJECT PLAN

Team Number 07

InfraDrone

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Contents

1 Introduction	2
1.1 Project statement	2
1.2 purpose	2
1.3 Goals	2
2 Deliverables	2
3 Project Requirements/Specifications	3
3.1 functional	3
3.2 Non-functional	4
3.3 Standards	4
4 Design	4
4.1 Previous work/literature	4
4.2 Proposed System Block diagram	5
4.3 Proposed Event diagram	5
4.4 Assessment of Proposed methods	6
4.5 Validation	6
5 Challenges	7
6 Timeline	7
6.1 First Semester	8
6.2 Gantt Chart	10
7 Conclusions	10
8 References	11

1 Introduction

1.1 PROJECT STATEMENT

For this project, we are to design an Android/IOS application to display data that has been collected by a drone. The types of data to be displayed are images, reports, and 3D models. The application should also have the capability to function on mobile VR devices. The VR component of this project will be used to view the 3D models as well as to navigate through the application itself.

1.2 PURPOSE

As drones become more advanced and capable, their uses can become more engineering focused. With high-end drones having the ability to carry advanced imaging equipment we can use their mobility to get data and images from otherwise hard to reach viewpoints. Once the data is collected it would be useful to be able to analyze the data anywhere, especially on site. We hope to create an application that can be used to quickly and easily access the data collected from these drones from a mobile source.



Figure 1: InfraDrone's Drone carrying a camera [1].

1.3 GOALS

Since this project is based on creating a mobile application, by the end of the project we hope to become familiar in visual studio as well as app development in general. We also want to be able to deliver a fully functioning application that meets all of the requirements given to us, and we want to meet those requirements on a timely basis. By working as a team we hope to gain experience in teamwork, communication, and knowledge sharing, not only within the team but with our clients as well.

2 Deliverables

Our final deliverable should be a fully functional application that displays the data collected by a drone. The application should meet the following requirements:

- Similar display features as current InfraDrone web portal.
- Standard InfraDrone style GUI and design.
- Data should be extracted from AWS folder structure.
- User friendly 3D model viewing on application.
- Ability to view images, reports, and locations on application.

- VR visualization using Google Cardboard or Daydream system.

3 Project Requirements/Specifications

3.1 FUNCTIONAL

Functional Requirements for project:

- Create an application equivalent to display features of Web-Portal
- Apply the company's GUI and design styles
- Navigate a user friendly application
- View images, reports, and locations
- Interact with user friendly 3D models
 - Display three types of 3D models
 - Ability to rotate and zoom 3D models
 - User can click on points on 3D model to view notes/annotations
- Application will extract the necessary data from Amazon Web Services folder structure
- Ability to use Google Cardboard or Daydream System for VR visualization

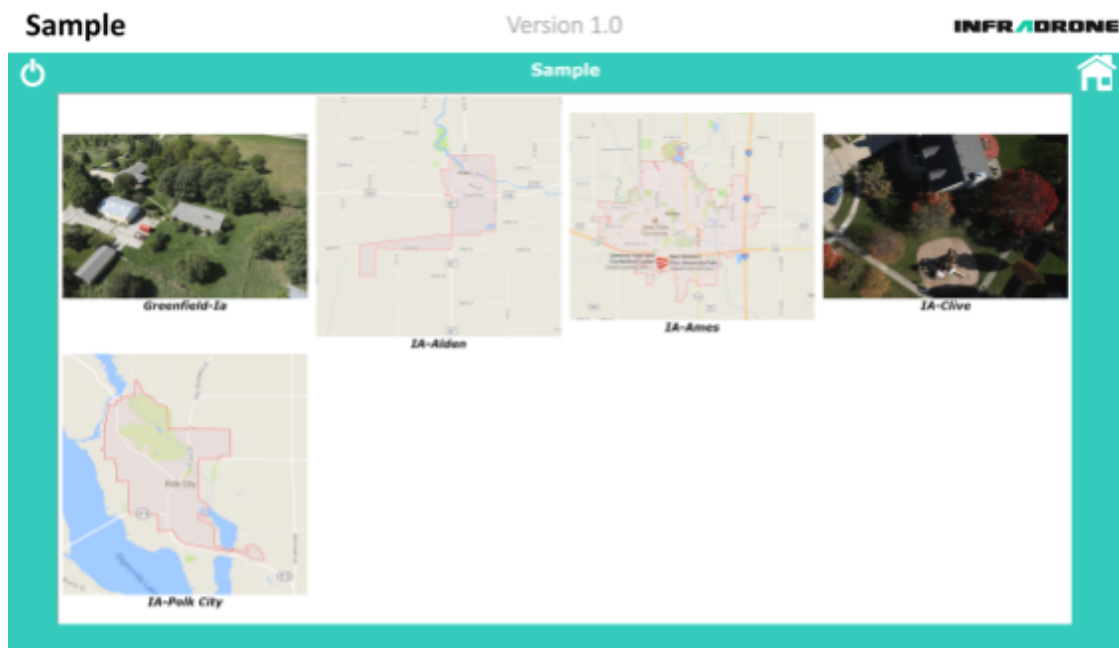


Figure 2: Current Web Portal Layout [2].

3.2 NON-FUNCTIONAL

- secure login and logout of user's account
- application works for iOS, Android, and Windows appliances
- Friendly user interface
- optimized loading times for application

3.3 STANDARDS

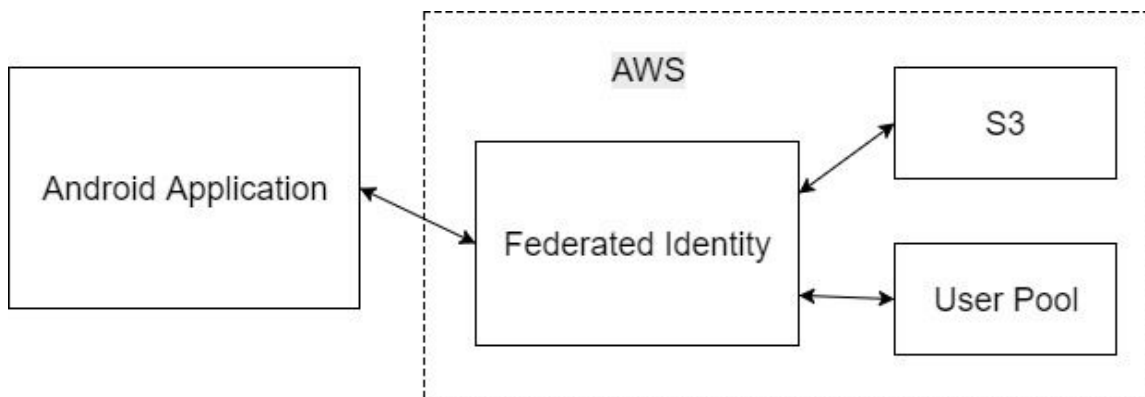
Our team plans to follow standard industry practices to reduce defects in code as well as improve overall quality. If we find any changes that need to be made to the production process, the team will meet and review the changes. We plan to use regression testing to ensure that new components do not mess with the previously working ones. We will also try our best to do code reviews of each other's work to further reduce the chance for errors. Our team will also work to adhere to the standards created by organizational standards like IEEE and ABET. So far, none of the practices we plan to use would be unethical to these organizations.

4 Design

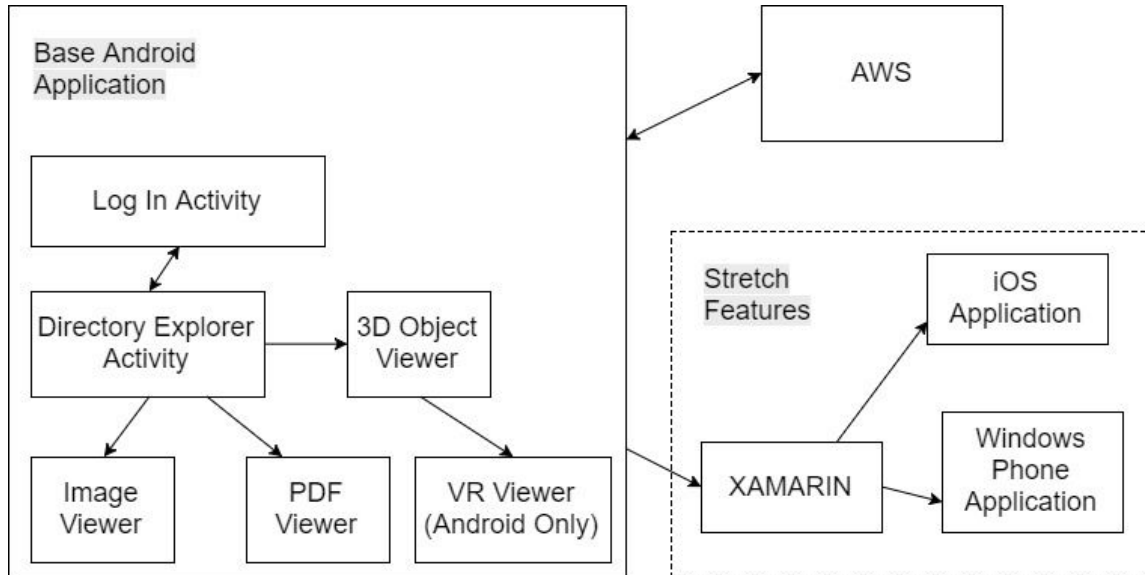
4.1 PREVIOUS WORK/LITERATURE

As a part of SE 329 (software project management) and SE 339 (software architecture), Evan Snitkey and Blake Agey worked together in groups on two android applications. One of them was a caloric nutrient calculator application and the other was an online shopping application. Both of these were developed in Java using the Android Studio IDE. David Schmadeke and Yangxiao Wang are currently enrolled in CPRE 338 (Android development) which will help in developing our base Android application.

4.2 PROPOSED SYSTEM BLOCK DIAGRAM



4.3 PROPOSED EVENT DIAGRAM



Our proposed system block diagram is comprised of two key components - our Android application and AWS. AWS contains a federated identity component which is used to authorize user pools. The user pool is a group of users that are associated with our application. They will be using these services to log in and once logged in, they will have access to their data stored in AWS S3. All of the client data will be viewable for the client within the application.

The proposed event diagram is similar to the block diagram, however it includes more in depth information regarding the Android application and stretch features. The Android application design structure is very similar to the current web portal. The user will start by logging into the application when it starts up. After this, they will be redirected to their directory explorer which will display all of the user's data in AWS S3. After navigating to an image or PDF, they will have the option to view them in a larger window using the viewer feature. They can also view 3D objects via the 3D object viewer. The 3D object viewer will include a VR button which will display the 3D object in VR. Our stretch feature is cross-platform development; this will be explored more during semester two when we have the Android application completed.

4.4 ASSESSMENT OF PROPOSED METHODS

Technologies that can be done in different ways in this project include 3D object viewing, displaying data from AWS S3, working with the federated identity user pool, and cross-platform development. We started developing in the Xamarin framework using C#, but we quickly realized that it would take much longer to develop in C# since we did not have nearly as much experience in C# as Java and the VR API's were only available for Java and C/C++. We decided to develop in Java via Android Studio and push cross-platform development off as a stretch goal for next semester. For 3D object viewing, we tried out a

library called ModelViewer-o8o, however we found that we would have to rewrite most of the code to get .mtl textures to work within the 3D object files. We switched to a different library called Rajawali which is much easier to use.

4.5 VALIDATION

As a group, we have selected David Schmadeke to be our quality assurance expert. With this title, he will be expected to extensively test all developed code to ensure that everything we create works as it is intended. We plan on creating and attending many technical information sharing meetings during the later half of the semester to address testing and project validation as well. To further the success in our validation process, we will be meeting with our clients weekly to demo our week's progress and note any improvements that we can make going further.

5 Challenges

From the discussion with our client, we found that we can potentially face three challenges/risks that may slow or hinder your plan.

- Extract data from AWS (Amazon Web Service)
- Show 3D model textures on mobile device
- Application with VR (Virtual Reality)

Since we are all unfamiliar with Amazon Web Service and have no experience with Virtual Reality, those may become challenges and slow our project development process.

6 Timeline

Milestones listed described in more detail in section 6.1 & 6.2

Milestones	Description	Milestone Criteria	Planned Date
Mo	Start Project	Meet with client	09/11/2017
	Project goals and scope defined	Project plan created	09/24/2017
	Team web site	Team website created	09/24/2017
M1	Start Planning		09/24/2017
	Development plan created	Initial UI created	09/26/2017
M2	Start Execution		10/01/2017
	Begin development of project	Project design document created	10/06/2017
M3	Data extraction		10/9/2017
	Begin development of data link from AWS and back end scripting	Extract data from AWS and start back end script	10/13/2017
M4	Improve project development		10/23/2017

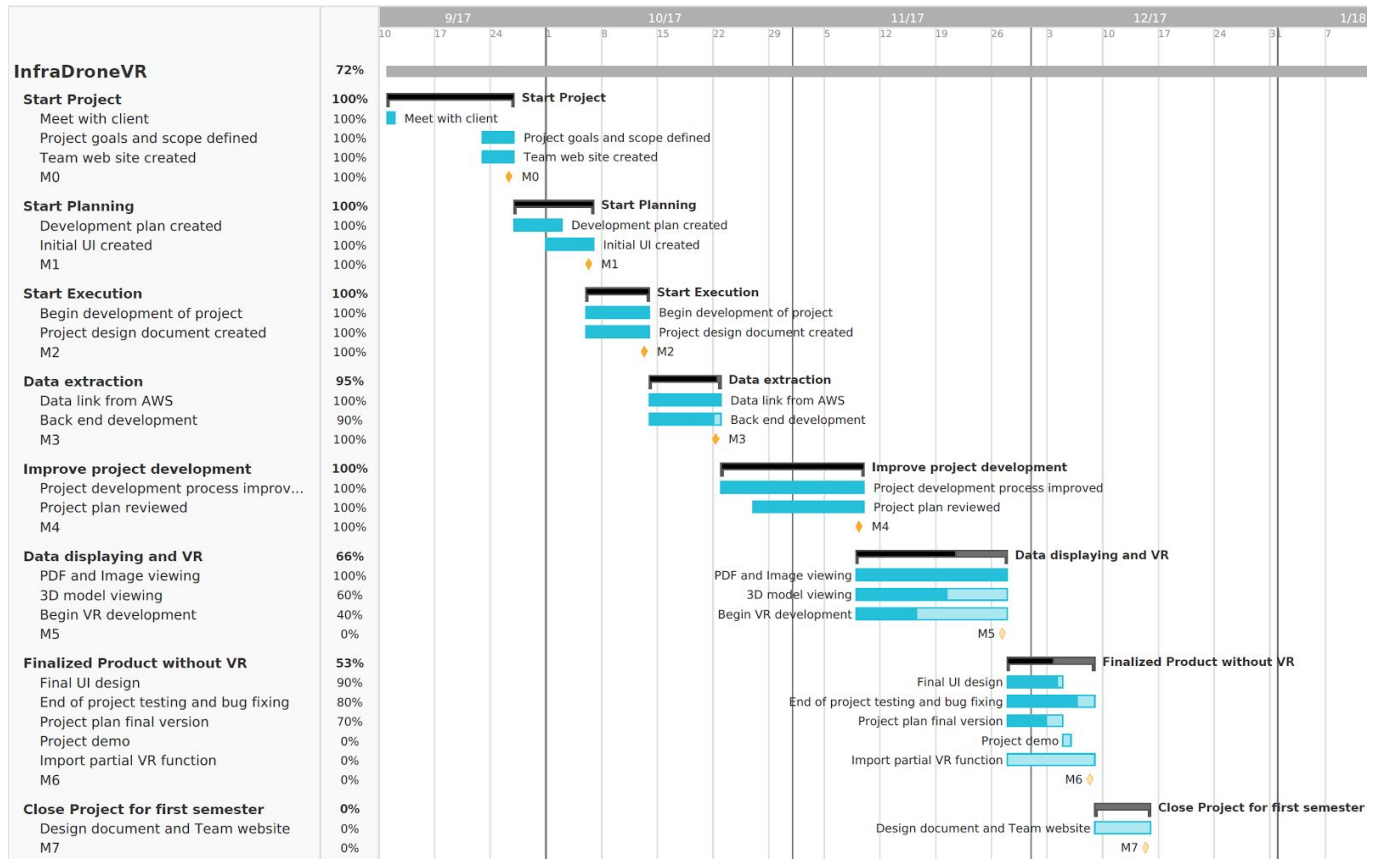
	Project development process improved and continue working on AWS	Project plan reviewed	10/27/2017
M5	Data displaying and VR		11/9/2017
	Implement the data viewing function (PDF and Image)	Show PDF and Image data extracted from AWS	11/9/2017
	Implement the data viewing function (3D model)	Show 3D object in the mobile app	11/9/2017
	Begin VR development	Start VR development, simple app display data using VR	11/9/2017
M6	Finalized Product without VR		11/27/2017
	Final UI design	Generalize UI design	11/27/2017
	End of project testing and bug fixing	Final product created and released	11/27/2017
	Project plan final version	Project plan final version created	11/27/2017
	Project demo	Wrap up development of Iteration-1 & Demo to InfraDrone	11/27/2017
	Import partial VR function	Attempt to integrate the simple VR app with our finished app	11/27/2017
M7	Close Project for first semester		12/04/2017
	Design document and Team website	Design document and Team website updated	12/08/2017

6.1 FIRST SEMESTER

Milestone	Work	Members
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Mo	Create and review project plan	Entire team
Mo	Contact client and meet with them	Entire team
Mo	Team website updated	Yangxiao Wang
M1	Initial UI design	Entire team
M2	Development of application	Entire team
M2	Project design document	Evan Snitkey
M3	Data extraction from Amazon Web Service	Entire team
M4	Discussion and improve project plan	Entire team
M5	Data displaying for PDF and Image	David Schmadeke
M5	Data displaying for 3D model	Blake Agey
M5	Prototype VR app	Yangxiao Wang Evan Snitkey
M6	Discussion and finalize project plan	Entire team
M6	Test product and bug fixing	David Schmadeke
M6	Demo product to InfraDrone	Entire team
M6	Continue VR development	Yangxiao Wang Evan Snitkey
M7	Update team website	Yangxiao Wang
M7	Update Design document	Evan Snitkey

6.2 GANTT CHART



7 Conclusions

The main goal of this project is to be able to deliver a functioning application that can easily display images and 3D models, collected from a drone and stored on AWS. The application will follow the current InfraDrone website design. We also want the final design of the application to have the ability to view images and models in a VR environment. We will be using Android Studio as our integrated development environment for the Android application.

We will meet with our client on a regular basis to ensure we are on the right track as well as to express any concerns or difficulties with the project. We plan to have the data displaying part of the application done by the end of the first semester as well as a basic function of VR. The second semester will be for VR as well as refining the first semester

goals. To complete our project we need to effectively work together as a team to meet our goals and requirements set by the team as well as the client.

8 References

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3. "Rajawali." *GitHub*, github.com/Rajawa
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5. "Amazon Web Services (AWS) - Cloud Computing Services." *Amazon Web Services, Inc.*, aws.amazon.com/.

