

Software Project Plan

Software Development

Final Project - Baggage Recovery App

Wei Liu
Ziwei Dai
Lixin Chen

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1 Introduction

1.1 Project Overview

In the highly competitive landscape of the airline industry, airlines must find unique ways to differentiate themselves from their competitors. An excellent way was to do so by providing a superior customer experience in the baggage recovery process. This was done by developing a Baggage Recovery Application that facilitates the process of locating lost bags and returning them to their owners in a timely fashion. This application has two main interfaces, one for customers and one for warehouse employees. For the customers, the goal of the application was to allow them to upload images of their bags and file a report if the bag gets lost. For the employees, the goal was to leverage image matching technology with these images to help the employees match bags to reports much faster. In time, this application will be a part of the United Airlines mobile application for customers. For the employees, this application will be used to assist with warehouse operations. Overall, the hope is that this application will be able to improve the satisfaction of customers and employees alike when it comes to the baggage recovery process.

1.2 Project goal and scope

The current baggage recovery process at the airport is tedious. When a bag is lost at an airport, multiple things can happen. In most cases, the bag will have tracking information that will lead to it being found and returned within a few days. However, there are instances where the tracking information is unavailable which prevents employees from determining its owner. In these cases, the bags will be shipped to the Airport Resolution Service Center. Here, warehouse employees will manually catalog the bags that come in and search through their contents for identifiable information. If the employee can determine the owner of the bag, then the bag will be sent back to the owner. The problem with the baggage recovery process occurs when there is no identifiable information available to match the bag with its owner. Whenever a missing bag report comes in, the employees must then manually look through all of these unidentifiable bags and try to match the information in the report with the bags. This process is incredibly cumbersome and timely, and so the goal of this project was to find a way to use technology to enhance this process so that employees are happier and customers receive their lost bags faster.

To solve the problem faced by airports, the team developed an application prototype that uses image matching technology to facilitate the baggage recovery process. With this application, customers can upload images of their bags that can be matched with images

taken by employees of the bags that arrive at the warehouse. The system then compares these images to help employees narrow down the bags they must manually search through. The application also provides customers with a mechanism to report their missing bags and check the status of the recovery process. This application prototype used a mobile-first approach.

1.3 Stakeholders

1.3.1 Customers/users

As is said above, this application is designed for all the potential passengers who may lose their packages during the flights. Therefore, the users for our application are all those people who want to have a better experience when they lost their baggages and tried to find them back.

1.3.2 Employee

Although the application is to give convenience to those users. However, the application will not be able to work if there are not enough experienced employee who will need to use this application in the warehouse to handle those missing baggage report.

1.4 Project Team Organization

The project team was composed of three graduate students with varying skill sets and professional experience. Together, the team was able to realize the vision of the client and develop a successful product that met their needs. The team members are as follows:

Lixin Chen - Technical Manager

Mr. Chen is a dual master's student in Information Technology and Web Science (ITWS) and Financial Engineering at Rensselaer Polytechnic Institute (RPI). He completed his bachelor's degree in Mathematics from Shanghai University, China. Mr. Chen served as one of two technical managers for the project, working primarily on the image matching capabilities. His background in computational vision was integral to the successful development of this functionality.

Ziwei Dai - Technical Manager

Ms. Dai is a dual master's student in ITWS and Computer System Engineering (CSE) at RPI. She earned her bachelor's degree in Electrical Engineering from Huazhong University of Science and Technology, China. Ms. Dai served as the other technical manager due to her development experience in Python and other programming languages. As a technical

manager, she worked primarily on back-end functions and their interaction with the front-end.

Wei Liu - Project Manager

Mr. Liu is a master student in Information Technology and Web Science(ITWS) at RPI. Mr. Liu served as the Project Manager for this project, but his major contributions came from his work on the design of the application. In addition to creating the designs, Mr. Liu implemented the front-end for the project.

2 Project deliverables

2.1 Software deliverables

The team has already finished an amazing online mobile-first website application which can be used smoothly on the mobile phone or on the computer. Both client and employee can use different side(client/server) of the application to make the whole thing work. All codes will be submitted within the zipped packages of this final project and will have a specific Readme instruction to help those people who want to use it.

2.2 Document deliverables

A number of documents will be delivered by the team, including Software Project Plan, Software Functional Specification Document, Software Design Documentation, System Configuration Document, Quality Assurance Plan.

3 Project Management

3.1 Project Management Methodology

After the whole team agreed to work on the original idea of this project, the team started to design the overall structural and detail of the application. Once the designs were completed, the team presented them to other students for feedback which was integrated into secondary designs. This feedback allowed the team to refine the workflow for the application before development began which was crucial to successful implementation of the project.

Because of the nature of the project, the team decided to divide the workload of the project into development and non-development components. Before development began, all team members worked together to establish requirements for the project and solidify the workflow and designs. Once development began, everyone in the team takes care of their own part of the implementation of the application. After everybody finished their own part and the team will work together to combine them.

The team used several different online tools to facilitate communication and collaboration for the project. Slack was used for communication within the team. For group meetings, WebEx was used as a conferencing and screen-sharing tool. These meetings were critical for the development of the project as it allowed the team to discuss any process and design changes as development was happening. Google Drive was used as the central location for all project documents and was further utilized as a way to collaborate on these documents. Finally, Github was used for source control and code collaboration for the actual development of the project.

For this project, the team followed a slightly modified agile development methodology with sprints. The methodology is not perfectly agile because, in true agile methodologies, each sprint contains planning and design phases and development is fully completed at the end of each sprint. However, for this project, the team completed the planning and design phases separately but followed the iterative process for development itself. This was done because the short time period for the project required the team to have all of the planning and design done early and approved by the client. The schedule for the sprints was as follows:

Sprint 1:11/01-11/09

- Come up the idea of the project

- Design the process and flow of the project

Design the data model and database

Sprint 2:11/10-12/01

Implement the front end -- website

Implement image matching algorithm

Implement client-side application

Implement server-side application

Sprint 3:12/01-12/07

Testing

Bug Fixing and Code Refactoring

3.2 Project Schedule

The project itself was divided into four phases: planning, design, development, and testing. The planning phase was to develop the requirements for the project and assess if it was strategically and financially viable. In the design phase, the team drafted initial designs for the application interfaces and database. Once the designs were approved by the team, the team move on to the development phase. It was in the development phase that the team implemented the actual product to be delivered. Finally, the test phase will try numerous different use cases and corner cases to test the robustness of the project. After finding the bug or problem of the application, the team will fix those bugs and retest the application.

Below is the Gantt chart and burn down chart of this project. As we can see, everything for this project has already been finished now.

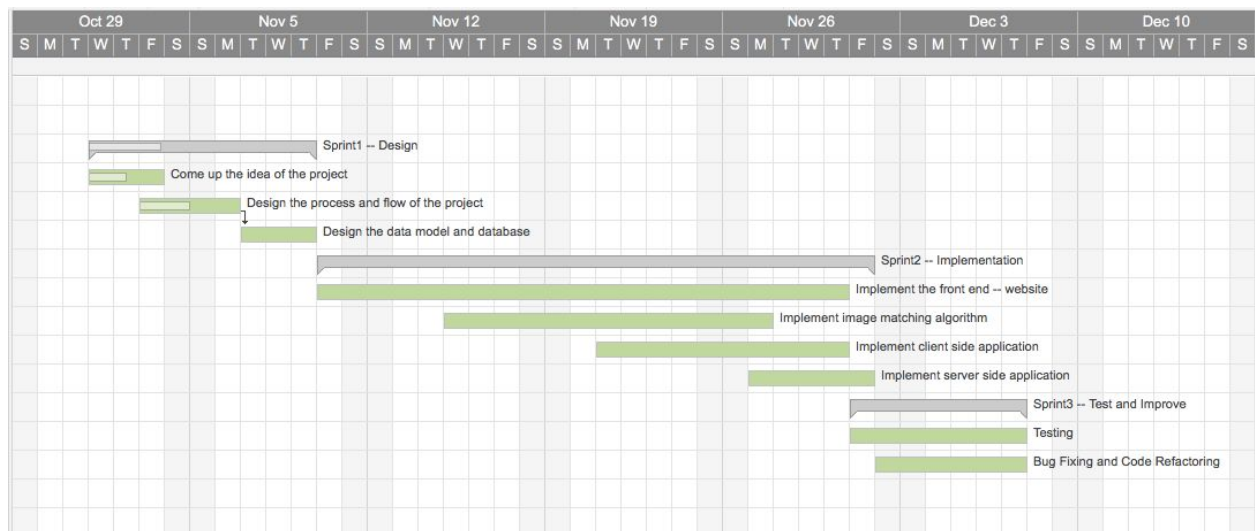


Figure 1: Gantt Chart

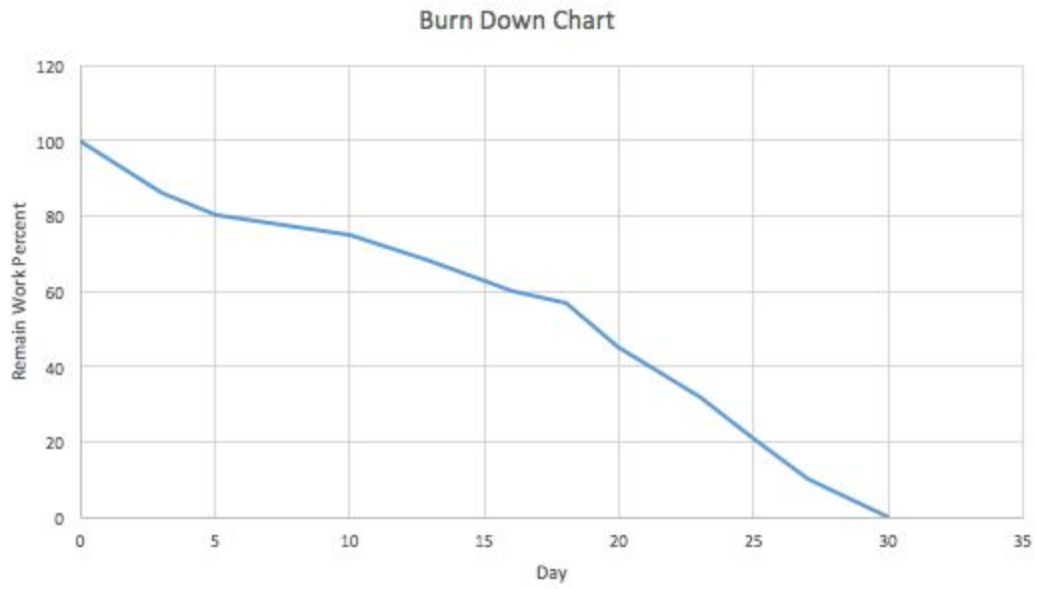


Figure 1: Burn Down Chart

4 Milestones

Milestones	Deadline	Comments
Project Plan	Oct 24, 2018	Submit the draft of the project plan and functional specification to the LMS before 11:59 PM.
Functional Requirement	Oct 24, 2018	Submit the draft of the project plan and functional specification to the LMS before 11:59 PM.
Design complete	Nov 9, 2018	Complete the draft design.
Design documentation	Nov 24, 2018	Submit the draft of design documentation of your project to the LMS before 11:59 PM
Implementation Complete	Dec 1, 2018	Complete the implementation.
Final project presentation	Dec 7, 2018	Final project due for class presentation
Final project submission	Dec 8, 2018	Submit all documentation and code package before 11:59 PM.

5 Software Change Management

We use Git as the methods to do the software change management and version control. Every time we add a new feature, we will create a new branch to manage all the code of this new feature.

6 Results

The team was able to successfully complete the application as scheduled. The application deliverables consisted of a customer interface, a warehouse interface, and a server that facilitates the exchange of information between the two.

The success of the project hinged in large part due to the communication between the team. Some changes were made to the schedule of deliverables throughout the project, but none of which impacted the overall completion of the project. It was first planned that the team work on the front-end and back-end separately and eventually connect the two components. However, the team quickly realized that it would help with testing if they were done together. As a result, the deliverable schedule was changed so that entire functional components would be worked on in a single sprint.

The team's hope is that the airport will be able to use this prototype as a launching point for a more sophisticated mobile application that can be widely used by both customers and employees. With this application in place, the airport will see several things happen. First, the process improvements in the warehouse will increase employee satisfaction. Employees will no longer need to search manually through so many bags before finding the correct match. This process improvement will result in faster turnover time for bag returns which in turn results in improved customer satisfaction as customers are reunited with their bags sooner. Customer loyalty will also increase alongside the increases in customer satisfaction as customers will feel more cared for it. This gives the airport the competitive advantage they are looking for when it comes to the baggage recovery process.

In the competitive landscape of the airline industry, airline companies must differentiate in order to succeed. However, not much differentiation can be created in the travel process itself--most aircrafts are created by the same manufacturers and a flight is still a flight regardless of which airline a customer chooses. What can be differentiated are things like price and customer services, which is what creates competitive advantages for airlines.

When the team came on to the project, the only major requirement was that this technology leverage image recognition to help match lost bags in the Baggage Resolution Center to their owners. By working with the client and understanding the current processes, the team was able to design and develop a web application that incorporates this technology in a successful way to improve the efficiency of the warehouse. This

application serves as a prototype for airport and airline companies that they can use to develop true mobile platform that can be incorporated into their existing mobile application.

The success of the project was in large part due to the team's dynamic. Each team member had unique skills that they could bring to the project making each member vital to its success. Furthermore, while the project manager Mr. Liu led the team and oversaw all components, each member contributed to discussions and all decisions were made by the group collectively. This type of collaborative environment allowed for the team to flourish and develop a successful end product.

One area where the team could have been better was in the use of progress-tracking tools. The team had set up a progress board on a Trello-like website, waffle.io, and started using it to assign certain tasks to certain team members. However, the team did not keep this board as updated as it should have, and so not much benefit was gained from its use. Fortunately, this did not prove to hamper the development of the project as the deliverables schedule was followed closely and the project was completed on time.

Overall, the team is incredibly satisfied with the results of this project. The application provided is user-friendly, matches with the warehouse workflow, and helps customers and employees alike in a new and intuitive way. With this prototype as a guide, the team has no doubt that airport and airline company using this application will be able to implement this application for their own systems and gain the process improvements and competitive advantage they desire.