Department of Computer Science & Engineering
The University of Texas at Arlington

Project Charter
CSE 4316: Senior Design I
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Team Corps Catch
Corps Catch

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Revision History

Revision	Date	Author(s)	Description
0.1	09.14.2022	KL	Document creation
0.2	09.14.2022	KL, OK	First draft
0.3	09.26.2022	KL, OK, KB	Completed initial draft
0.4	12.13.2022	KL	Completed V2

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1 Problem Statement

In recent times, families are often inside which can lead to a sedentary lifestyle. Corps Catch would like to change that and encourage and incentivize families to be active outdoors. It is an application with the intention of getting families active, allowing them to work collaboratively and spending quality time outdoors.

2 Methodology

We, Team Corps Catch will develop an interactive and educational app that gets families excited about the outdoors, and educates families will doing so. This application will promote friendly competition between friends and families by implementing a trivia like component to the application. In each trail there is questions scattered throughout the trail. At the end of the trail if you have answered all the questions correct you receive the corp coin that is unique to the trail. This is important to the application because it gives an incentive for guests to pay attention to the guide while enjoying the outdoors.

3 Value Proposition

We, Team Corps Catch have a sponsor, Nikisha Cook who will be setting requirements throughout the various sprints. The Corps Catch application would benefit the US Army Corps of Engineers as it will hopefully build more visitor engagement at the various parks and trails. Visitors would also benefit as they would be entertained during their outdoor hikes, be rewarded with Corps Coins, and ultimately, spend quality time together. Not only do visitors benefit from the entertainment of the hikes, but they also get a good workout from the trails they go on. Adding on to the fact that they get a good workout they also gain an abundance of knowledge from the trail guide, and have something to show from it that being the corp coin.

4 Development Milestones

All important documentation, demonstrations of major project features, and associated dates are included in the list of core project milestones below.

- Project Charter first draft - September 26th 2022
- System Requirements Specification - October 17th 2022
- Architectural Design Specification - November 2022
- Project Charter v2 - December 14th 2022
- System Requirements Specification v2 - December 14th 2022
- Architectural Design Specification v2 - December 14th 2022
- Detailed Design Specification - February 2022
- Demonstration of User Interface and Login - March 2022
- Demonstration of Augmented Reality use - April 2022
- CoE Innovation Day poster presentation - April 2023
- Final Project Demonstration - May 2023

5 BACKGROUND

Some people enjoy going outdoors and look forward to going for runs, cycles, hiking and so on. Others are not so keen on outdoor activities, Corps Catch's goal is to make outdoor activities more fun! This application would not just be an aide for the novice outdoor explorer but would be useful for even seasoned enthusiasts. This is because another goal of the app is also to educate its users. This is done by asking trivia questions about a variety of topics such as safety, water, and nature.

The reason for the development of this app is to encourage people to go outdoors more often and also to educate and entertain potential users about the outdoors by giving them an incentive that being the Corps Coins that can be obtained through answering various questions correctly. In reality, a military Corps Coin is given as a reward for hard work and dedication, this is translated in the app and receiving a *virtual* Corp Coin allows the user to feel a similar sense of pride. Receiving a coin is no easy feat as it requires every question to be answered correctly and also increases with difficulty.

Throughout each trail, the tour guide will give various facts that may or may not be asked on the app. It is the user's responsibility to remember the facts to answer the questions correctly to obtain Corp Coins at the end of the trial. Also, as the user goes along the trail the questions get progressively harder and the time limit gets quicker. This will be implemented to ensure that older users do not get bored, and can motivate the younger users to be more attentive to the tour guide.

The relationship between our team and the sponsor Nikisha Cook is closely knit, as we are developing an app for her to use at her place of work. We have to ensure that everything we do is up to her standards, and we have to all be on the same page to ensure everything runs smoothly. If we aren't all on the same page there will be major setbacks that could ruin a sprint cycle or make our work useless. This app would be a great way of informing the public about important facts and things to know while outdoors.

6 RELATED WORK

The idea of a fun outdoor game to play using GPS-enabled smartphones is not a novel concept. The following is a list of five applications that are already available to mobile users for free or for a fee:

- Pokemon Go needs no introduction: As you move around in real life, your avatar moves around in the game area. You may encounter Pokemon in the wild, which you may catch by throwing Poke Balls at them. The main goal is to collect every Pokemon species. (Free) [2]
- Geocaching is a form of scavenger hunt in which individuals conceal item-filled "caches" anywhere they wish, then publish the GPS coordinates to the internet for others to locate. (Free) [2]
- Resources is a location-based game like Pokemon GO. Instead of catching Pokemon or claiming territory, your objective is to search your surroundings for virtual mineral reserves. You then turn those minerals into goods, generate money, and improve your business. (Free) [2]
- Star Walk 2 is a stargazing app that uses the sensors and GPS on your iPhone to identify stars, planets, and constellations in the night sky. (2.99) [3]
- PictureThis can identify the local or worldwide species of plants, flowers, and trees that you're guaranteed to see outside, whether you're on a beach, hiking a mountain, or simply taking a stroll around the neighborhood. (Subscription required, free trial available) [3]
- Oh, Ranger is one of the greatest adventure applications for finding open places and outdoor things to do within these open spaces. The user only has to download and install the program and then enter their location. The Oh, Ranger app then informs the user about the parks in the area and the activities available inside them. The application serves as your virtual guide to the great outdoors. (Free) [4]

- AllTrails has a free version that may be used everywhere there is cell phone connection. Hikers with mobile phone reception may use the app to follow the GPS map, which is shown by the blue dot. A membership is required to download offline maps for use. The subscription necessitates app purchases. When there is no mobile coverage, the subscription version enables the usage of maps and GPS capabilities. Users may search for mountain bike routes and get mountain riding maps in addition to being a popular hiking app with decent trail maps. [1]

- Cairn: you can identify places with mobile coverage, share your location with friends and family, and download offline maps using Cairn. The application allows you to share your location with your friends in case you get separated while hiking. They'll be able to locate you using your GPS position. You can also set up a "due back time" if your group decides to split up. If someone hasn't returned by that time, you can search for them on the map. (Free and available with a subscription) [5]

We intend to develop a game comparable to Geocaching, but more likely similar to Pokemon Go, as the latter combines certain novel and technologically sophisticated features, mainly augmented reality and geolocation. Using geolocation to tell the app where the user is at the Corps lake, followed and then augmented reality to allow the user to interact with virtual elements in the actual environment. You can identify places with mobile coverage, share your position with friends and family, and download offline maps using Cairn.

7 System Overview

The application will consist of a game designed to encourage families to spend time together outside at a Corps trail and to work together to achieve the aim of collecting Corps coins. The following components of the mobile device will aid in determining the location of the trivia facts as the player gets within 10-15 feet of the location.

- Global Positioning System (GPS): The application will display a map of a Nature Trail with GPS-based locations where players get tested on their knowledge of the park through random questions based on aformentioned facts.

- Phone camera: This will be utilized in the augmented reality aspect of the app allowing users to still focus on nature and the outdoor scenery while also learning about what they see.

- Application Programming Interfaces (API): To avoid repetitive and monotonous questions, an API will be implemented in this to load and retrieve the questions and answers of the game from the database question bank to the application. These questions will be created by our sponsor, Nikisha Cook. For this purpose, we will use either of the following databases:

  - Firebase, MongoDB.

- Other miscellaneous components culminating the app such as:

  - Sign up and Login Components: For new users to create an account and existing users to access their account.
  - Inventory: of all collected and missing Corps Coins.
  - Home Screen: consisting of trail options as well as information about trails; length, estimated duration, etc.

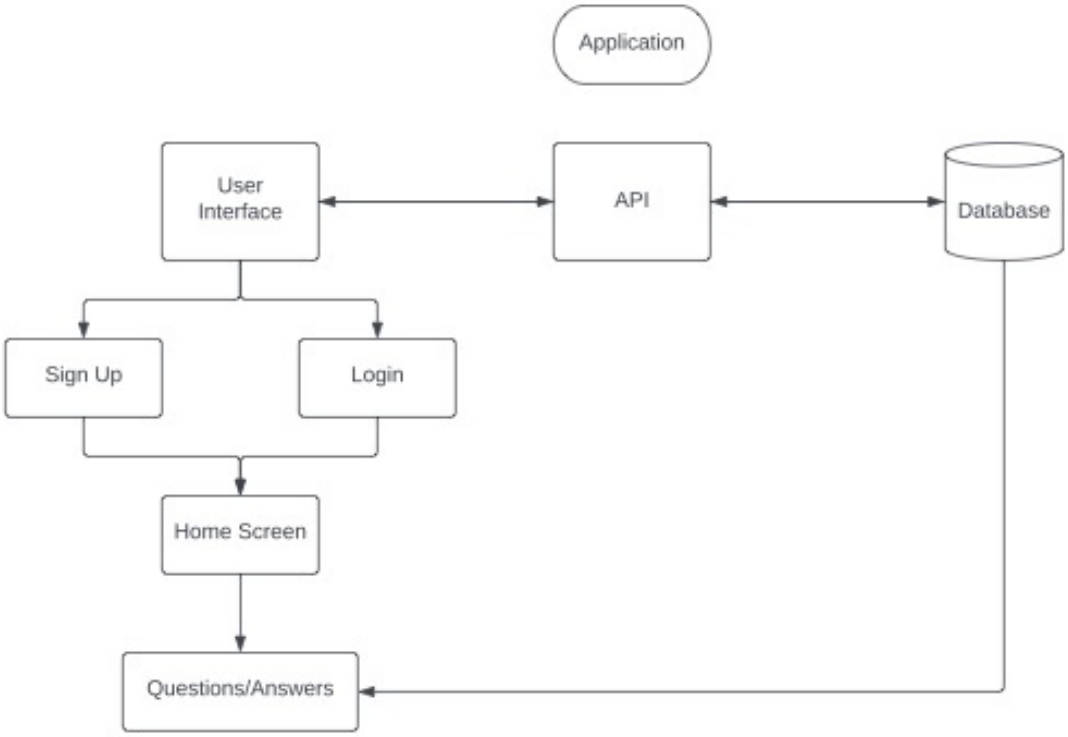

Figure 1: System overview

8 Roles & Responsibilities

The stakeholders of the Corps Coins project include the team members(Kevin Le, Bijan Saud, Jingliang Liu, Oluwaseetofunmi Komolafe, and Kouassi Brou), the sponsor (Nikisha Cook), and the Professor (Shawn Geiser). The primary point of contact for the sponsor will be Bijan, but we will all have her contact information in the case that he is not able to do so. The main point of contact our team will have with the sponsor is Nikisha, and she stated that she is available pretty much any time.

The roles that everyone will have are fairly similar, except for the scrum master. Everyone will have responsibilities of their own whether that be doing certain documentation or implementing a feature on the app. However, if someone is stuck on a task for too long they will get help from other team members to improve productivity. Our group will also ensure that everyone will have a similar amount of work to do, so no one feels that someone is slacking off. In the case that someone decides that they don't want to put in a decent amount of work, the professor will be notified. We will be alternating scrum masters during the entirety of this project. Every sprint the scrum master will have to make sure that everyone is on the same page, and that work is being done by everyone. He/ she will also be in charge of planning the sprint and making sure that no tasks go into the next sprint. This role will be interchanging to get everyone a chance to experience leadership by taking charge and helping wherever needs it.

The sponsor will be responsible for validating the product we are making is tailored to his or her need. The sponsor and our team will be communicating often to ensure the development of the appli-

cation goes smoothly. With proper communication from both sides our team will have a clear idea of what the sponsor wants, and how she wants it done.

Every member of the group is expected to write ideas and solutions in their engineering notebooks. This will ensure that everyone is putting in an effort towards the project, and this will also show the professor that as well.

9 Cost Proposal

The budget given to the team amounts to 800 dollars. For the time being, we have yet to run into anything that needs to be purchased for this project, besides the engineering notebook. Since this project is exclusive software it is unlikely that we would need to spend any money on hardware.

9.1 Preliminary Budget

Item	Paid By	Cost	Quantity
Engineering Notebook	Student	$10	5
Software Programs	Student	$0	5

Table 1: Costs of Equipment

9.2 Current & Pending Support

The funding sources of this project are UTA and the US Army. The funding provided by UTA is $800 to spend on required product components, and US Army funding is unknown as of now (Sept. 26, 2022).

10 Facilities & Equipment

Since this project requires no hardware components, we will not need any lab space. Testing grounds will include grounds around the UTA campus. For equipment all members will have to have a computer/ laptop with Android Studios installed on it to develop and test the application. Android Studios will be the IDE that our group will be using as it allows us to visualize any changes we make to the application. Along with that group members should have access to internet to attend meetings when meetings are not in-person. We will also be using GitHub for our hosting service of the application, this will aid in version control, task management, etc.

For this project we will be using Microsoft teams to communicate and hold team meetings within ourselves as a team. We will be using Google Meet to organize meetings with our sponsor (US Army). We will also be using Jira for project management and task management. Each group member will pick what parts they want to do in each sprint whether that be implementing a new function to the app or writing documentation. For documentation including the project charter and the system requirements specification we will be using LaTeX and overleaf which allows the team as a whole to collaborate on each document, as well as see any changes made in the document at any time.

When brainstorming we will be using either our engineering notebooks (every group member must purchase) or google docs. In the engineering notebook it will include all our application diagrams and database schemas. Google docs will be used to take quick notes from our sponsors or just brainstorming ideas for functionalities. For presentations our group will be utilizing google presentation, and presentation layouts are provided by the professor.

As of now all of the software needed to coordinate this project including Jira, Android Studios, Overleaf, Google docs, Google meet, Microsoft teams are free. The only things that need to be paid for

by students will be the engineering notebook. The sponsor will not have to pay anything that is unless we encounter an obstacle that needs to be paid for.

11 Assumptions

- The site where the trails are located has decent network connectivity.
- Access to the Scissor loop trail would be made available by the 5th sprint cycle.
- The application should work on any Android phone meeting the minimum SDK level.
- Actual trivia questions and answers would be supplied by the sponsor.
- Designs for the Corps Coins would be a collaborative effort between the sponsor and the team.

12 Constraints

- Final prototype demonstration must be completed by May 1, 2023
- The sponsor will provide all coins needed to implement into the game as collectibles as well as the questions to be asked on the trails
- Sponsor site for which the application is intended must have a stable internet connection for the app to function as intended
- Total development costs must not exceed $800
- Post-launch of the application after May 1 our group will no longer be working on the app.
- Augmented reality use may be limited.
- Time constraint due to other classes and personal matters.
- Our app will only work on Android devices at the time of release.

13 Risks

Risk description	Probability	Loss (days)	Exposure (days)
Delays due to exams or personal reasons	1.00	30	30
Inexperience with Augmented Reality	0.50	14	7
Internet access not available at sponsor site	0.30	9	2.7
Initial setup complications with Git and IDE	0.20	5	1
Miscommunication between sponsor and team	0.10	14	1.4

Table 2: Overview of highest exposure project risks

14 Documentation & Reporting

14.1 Major Documentation Deliverables

14.1.1 Project Charter

This document will be maintained and updated throughout the term whenever any team members decide that our circumstances have changed. The initial version will be delivered on Sept. 26, 2022 and the final version will be delivered towards the end of the term.

14.1.2 System Requirements Specification

The system requirements specification will be updated throughout the term whenever any team members decide that circumstances change and we need to update our documentation. Initial version will be delivered Oct. 17, 2022. Final version will be delivered at the end of the course.

14.1.3 Architectural Design Specification

The architectural design specification will be updated throughout the term whenever any team members decide that circumstances change and we need to update our documentation. Initial version delivery date is November 2022. Final version will be delivered at the end of the course.

14.1.4 Detailed Design Specification

The detailed design specification will be updated throughout the term whenever any team members decide that circumstances change and we need to update our documentation. Initial version delivery date is February 2022. Final version will be delivered at the end of the course.

14.2 Recurring Sprint Items

14.2.1 Product Backlog

The items will be added as tasks in Jira. Through communication with team members we will decide which tasks are prioritized by how much they affect the other tasks. We will have a group vote on what items are prioritized, and who does what. Product backlog will be maintained in Jira, and we will format the backlog into a table for the presentation and for the sponsor to view.

14.2.2 Sprint Planning

Each spring will be planned during our team meeting on Wednesdays, and there will be a total of four sprints.

14.2.3 Sprint Goal

The team as a whole will get together and decide what needs to be done in the upcoming sprint, and the customer will be informed and can add or remove items from the spring if need be.

14.2.4 Sprint Backlog

The team will get together and decide what items go on the spring backlog, and we will be using Jira to maintain the items.

14.2.5 Task Breakdown

Each volunteer will voluntarily claim a task from the task list, everyone will document when they worked on each item to ensure that the burndown chart is accurate each sprint.

14.2.6 Sprint Burn Down Charts

The whole team is responsible for creating the burn down charts and would rotate between teammates. Teammates can access hours expended on what day through Jira.

14.2.7 Sprint Retrospective

Sprint Retrospective will be done as a team, and will happen after every sprint is finished. We will document what was done, as well as what was not done. We will also document what we can improve on, and what we did well on.

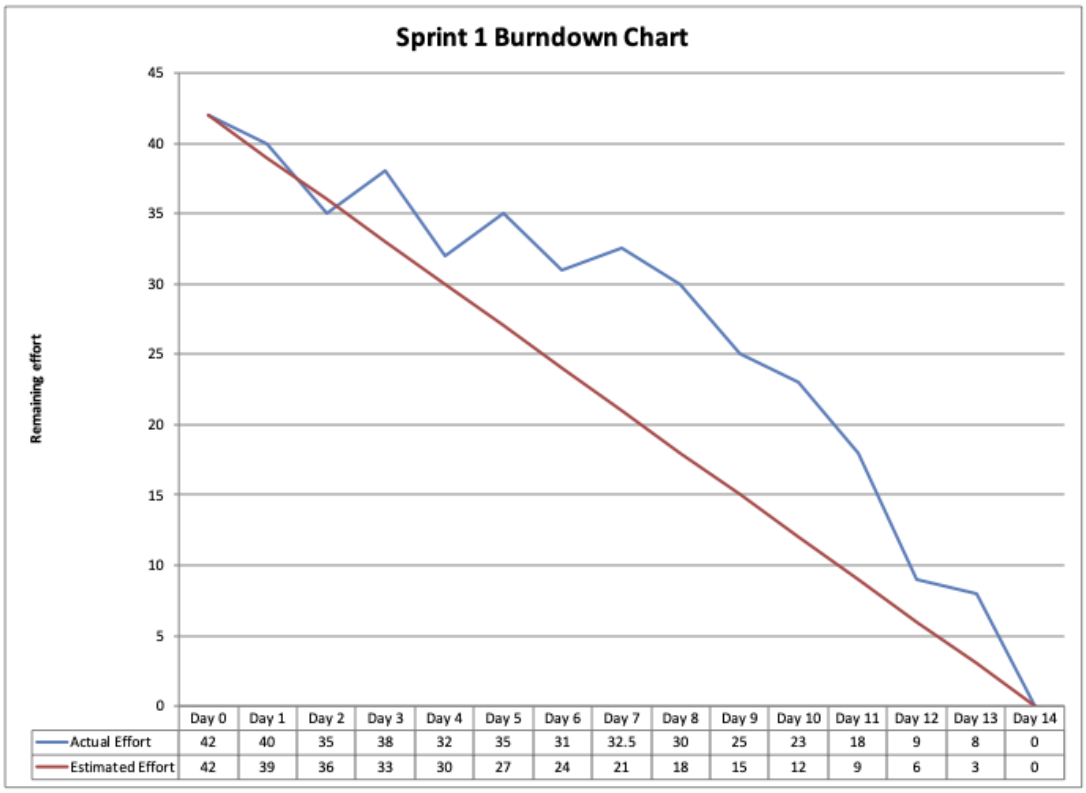

Figure 2: Example sprint burn down chart

14.2.8 Individual Status Reports

There will be individual status reports will contain individual time expenditures, self review, peer review, and the sprint backlog. This will be reported after every sprint.

14.2.9 Engineering Notebooks

The engineering notebook should be updated whenever an individual is working on the project, whenever the team member is brainstorming ideas for screens or diagrams. Each sprint each member should have at least three pages completed. Any team member should sign as a witness for each page.

14.3 Closeout Materials

14.3.1 System Prototype

The final system prototype will include the finished application, and it will be available to download from the app store. We will have to discuss the PAT and FAT with the sponsor. We will be testing off-site to make sure the application works as intended.

14.3.2 Project Poster

The poster will include the reason for the project, major functional components of the app, and how the app works, where the app is used, and where to find it on the app store. The dimensions of the poster are TBA, and it will be delivered in April 2023.

14.3.3 Web Page

The project web page will include why the project was made, where to find the app, how the app works, and the location of the trails. This will be delivered with the final project demo in May 2023.

14.3.4 Demo Video

The demo video will show a walk-through of us using the application and answer questions along a path. This path may or may not be the trail the sponsor wants, it is undecided at the moment. It will also show the login and sign-up functionalities. The video will be around 15 minutes long.

14.3.5 Source Code

Our source code will be maintained using git, and everyone on our team will have a branch in which they will push code to the master branch whenever they are done implementing a feature. Source code will be available for the sponsor, and we do not have license terms at the moment.

14.3.6 Source Code Documentation

For documentation we will use LaTeX, and we will use overleaf to collaborate on each document.

14.3.7 Hardware Schematics

Not Applicable

14.3.8 CAD files

Not Applicable

14.3.9 Installation Scripts

We will create a document that instructs the sponsor on how to download the product, and any other tools if needed.

14.3.10 User Manual

The sponsor will have a digital user manual, and it will most likely be in a readme file. There will be an example of the setup in the demo video, so the sponsor can reference that if they need to.

REFERENCES

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