

# GoMe

## A Life Improvement App

### Project Plan

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Client: General Public

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Created: 02/17/2019

Updated: 04/23/2019

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# 1. Introductory Material

## 1.1 Acknowledgement

We would like to thank Iowa State's Dr. Goce Trajcevski for giving technical advice and resources in our weekly meetings. We would also like thank the Iowa State University Department of Electrical and Computer Engineering for the opportunity to work on this project and gain professional experience before graduation.

## 1.2 Problem Statement

Scheduling applications currently available to users around the world have static layouts which require them to input their information and edit it as needed. Users manage their own time and make adjustments where they see fit. GoMe is a mobile application with the primary goal of making scheduling easier for users. GoMe adjusts a user's schedule dynamically while helping them identify areas where improvements are needed in order to reach their goals. The application monitors what a user has done throughout the day by asking them to input a tentative schedule of activities for their week, then passively reading user information to determine if they are on schedule or not. This input comes from various activities and tasks the user has done throughout the day such as sleeping, going to work, and/or attending social events.

Using data gathered from the user's everyday activities, GoMe adjusts the user's schedule to react to changes in events. Whether this be a work meeting running long, waking up later than scheduled, or staying late at the office, GoMe adjusts scheduled times accordingly. The application provides an adjustable and flexible schedule for the user, provides feedback on how they spent their time, and builds an ideal schedule for them to meet their goals. Our application's objective is to motivate users with this information so they can develop a balanced lifestyle by optimizing their time between tasks, resting, and pleasure.

### 1.3 Use Case Diagram

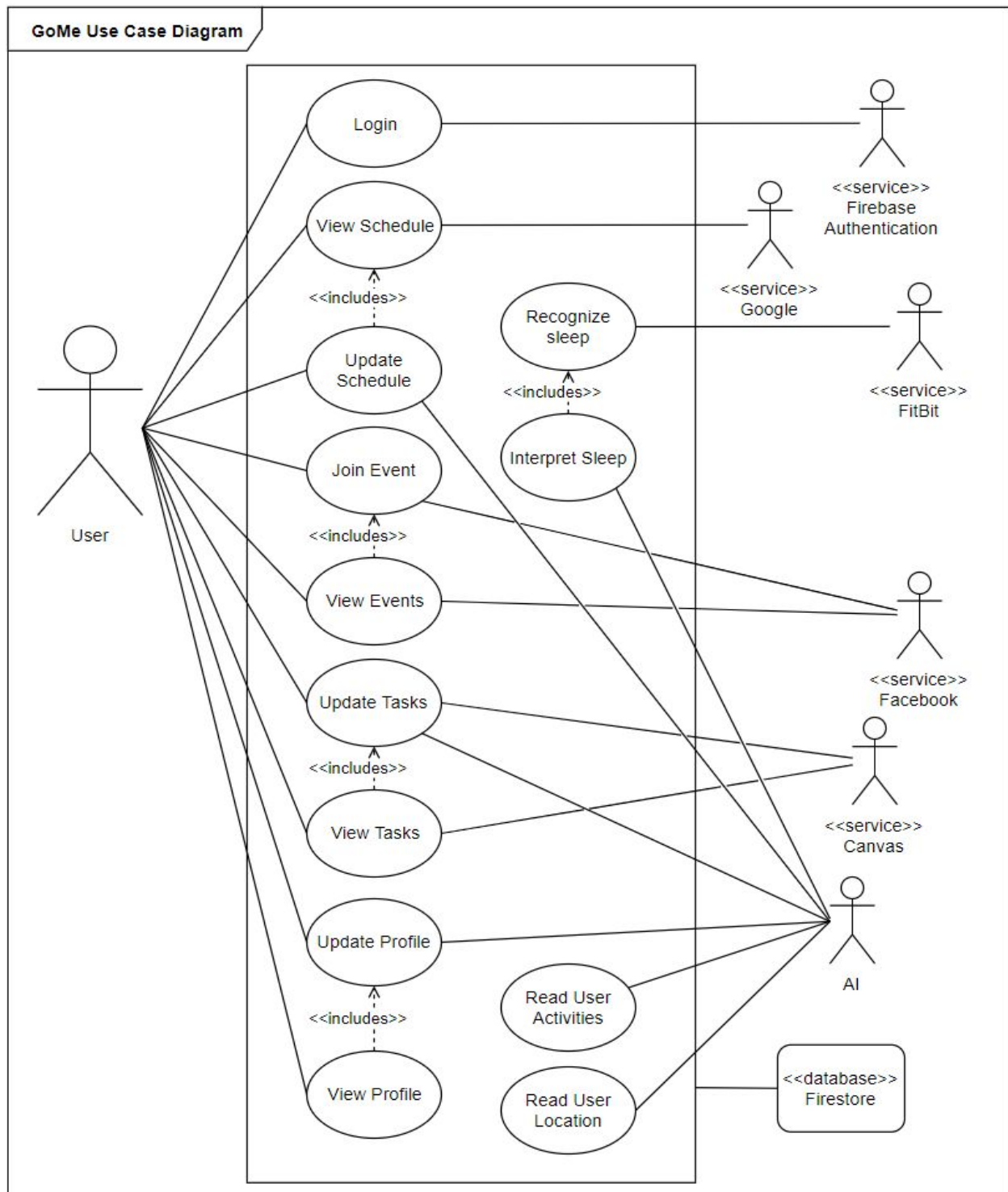


Figure 1: Use Case Diagram

This is our use case diagram for our application. It fully demonstrates the use case ideas, services and actors for the application. For graphic simplicity, Firestore connections are grouped into one for the use case diagram.

## 1.4 Operating Environment

The operating environment of GoMe will be from a mobile device. Our application will be built on Firebase which will provide authentication, databases, and file storage. Due to the necessity of location tracking to determine users' activity, it is intended that this application is active on the user's mobile device even when not in use.

## 1.5 Intended Users and Intended Uses

The intended users for our application are people who want to optimize their schedule to increase their productivity and balance their time. User's will typically be schedule-oriented and have the desire to track their activities in order to reach optimum hours of sleep and/or work goals while still making time for social events and/or other activities.

We intend for users to use our application on a daily basis to track their schedule. According to the use case diagram above ([Figure 1](#)), they will be able to use the application to view and update their schedules, view and join events, view and update tasks, and create or update their profile. Examples of more specific use cases would be determining when to leave for work, choosing an optimal time to go to sleep, or determining if the user has time after work to attend a certain social event.

## 1.6 Assumptions and Limitations

### Assumptions

- Users will carry their powered-on cell phones to/from all activities
- Users will have the app enabled constantly in order to track location data
- The team will be able to obtain sufficient test data

### Limitations

- Application is only available on Android devices
- Application must not use an unreasonable amount of battery life in order to ease problems for the user

## 1.7 Expected End Product and Deliverables

This project is open-ended, but using our defined use cases described in Figure 1, we expect our end product to be an Android application with the following features:

### 1) Schedule

The schedule resolves uncertainty a user may have about what they should do throughout the day. The data provided will come from the individual's data profile as well as information from what is going on in their area (other users activity, traffic, resources available to user, etc.) to ensure they are as efficient as possible with their time. If something happens that impacts the user's ideal schedule, their schedule will update. For example, if the application notices that the user received less sleep than usual the previous night, in order to compensate this it will suggest going to bed earlier on a future night.

The user's schedule will also change to reflect how the user performed throughout the day. This schedule will be created by tracking the user's location and input where they've been or what they've been doing. It will display to the user what they actually did and adjust their future schedule as needed.

Use cases for schedule revolving around work/school, sleep, and events:

- When user works longer than usual, do not look to schedule a social event.
- If the user has been less social this week and has some free time, recommend to schedule an event for the user to attend.
- If the user works late and has a lot of tasks to do tomorrow, recommend an earlier bedtime.
- If it's the weekend and the user typically doesn't work the weekends, look for social events that the user might like to do.

## 2) Personalized Feed

The goal of the feed in GoMe is to present information that the user might be interested in. The ML algorithm will determine events going on that the user would like to know about, and put those at the top of the user's feed. The feed will also display important updates from around the user's location so they will know about events that might affect their day. The user's friend's achievements and accomplishments will be highlighted in this feed.

## 3) Time Breakdown

The user's profile will display a report of how the user spends their time. Categories will be the following: sleep, social, work/school. The user will have the ability to sort by day, week, month, or year.

## 4) Motivation

The app will work to motivate the user in several ways:

- A. Experience Points (XP)
  - a. Users will be rewarded for doing things like accomplishing tasks, going to events, helping friends, how productive they were throughout the day, etc. with points
  - b. When the user obtains certain amounts of XP, they will "level up".
  - c. Rewards, statuses (like professional or expert), posts celebrating achievement, leaderboards, and bragging rights are all incentives to leveling up.
- B. Motivational Messages
  - a. In the personalized feed or through the use of notifications, the user will receive fun, motivational messages to provide encouragement.
- C. Goals
  - a. The app provides the ability to create a list of goals to accomplish throughout the day (user would also gain XP for completed goals).

## 5) Recommendations

If GoMe notices something that the user could correct, it will notify the user so they can make the adjustment and help them reach a goal, schedule an item, or complete a task.

## 6) Notifications

Notifications will be sent to the user whenever something important and/or urgent comes up. Notifications can be turned on and off as desired. The type of notifications consist of the following:

- When to leave for an event
- If user hasn't left for an event on time
- Changes to the schedule
- Suggest an event the user might like and ask if they should schedule it for them
- Time to go to bed
- If the user is late to an activity by an hour, ask if they are still going to noted activity. If not, update their schedule.

## 7) Event Page

A page listing available events in the user's area with the option to see details about each event and add an event to the user's schedule.

## 8) Tasks Page

The user can create a list of tasks they are hoping to accomplish and associate those tasks with their schedule accordingly. The application will be used to optimize the user's schedule to complete these tasks on time.

## 9) Profile Page

The user will have their own page dedication to information about themselves. Here they will be able to see data about themselves as well as change their preferences (including security allowances).

Over the next year, we will have many reports and presentations regarding GoMe. Each of these reports and presentations will be solely created by the 6 team members of our group with advice from our faculty advisor.



# 2. Proposed Approach

## 2.1 High-level Block Diagram of System

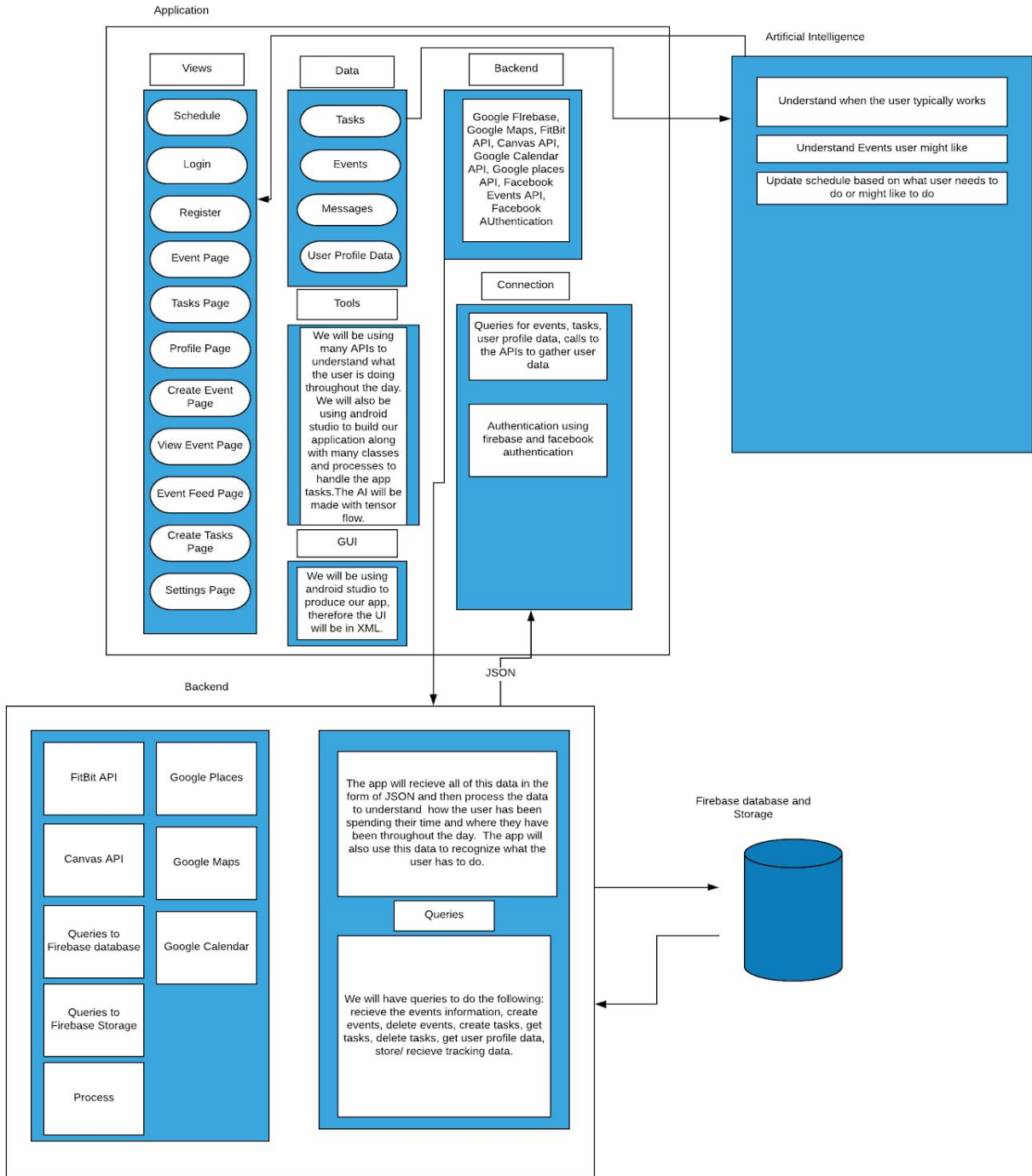


Figure 2: Block Diagram

## 2.2 Functional Requirements

1. Users will be able to login and register through the application.
2. The user's schedule will change dynamically as certain key events are recorded.
  - a. Events such as late arrival, different position than normal at a given time.
3. The user's sleep schedule will update after the AI model has been trained with the user's preferred sleep schedule.
4. The user will be able to see all of their tasks in a prioritized fashion on the tasks page.

## 2.3 Constraints Considerations

For this project there are many constraints to consider. One of the biggest constraints that our team will be dealing with throughout the development of our project will be our limited knowledge of certain technologies necessary to build this app. Some of our group members have little or no experience in building android applications and only one of our group members has experience with AI. Another constraint of the project is time. This project is ambitious and will require a lot of hard work and time to build the application so that it lives up to our team's standards and abilities. Due to this reason, our group may have to adjust our scope and timetables as we go along with the advice of our advisors. We have worked with our advisor to limit the scope of the project thus far by defining more focused user activities. If our machine learning algorithms do not work as planned, we may have to alter the application to ask for more user input. Additionally, we hope to implement the social aspects of our application later on in development, but may have to change or eliminate these features if we run out of time.

### Non-functional Requirements

- Easy and visually appealing user interface (UI)
- The application must have fun and interactive features

## 2.4/5 Technology Considerations & Technical Approach Considerations

There are many things to consider when thinking about all of the technologies required to create an app like GoMe. The main things we will be focusing on are the technologies that will make the user experience the best it can possibly be along with the technologies that will help us gather the most accurate and important information. With the data that GoMe collects, we will be able to create a data model to feed our AI and help the AI learn more about the user and relay useful information to the user.

To do these things, we decided to use the following technologies:

- Android Studio
  - We believe an Android application will be a great starting point for this application. Android Studio is the best IDE available to design and create Android applications.
- Tensor Flow
  - To create the AI for our application, Tensor Flow is the best choice due to the fact that it is easily integratable with android.
- Fitbit

- We will be using fitbit to track the sleep activity of the user in order for our application to get a good idea of the users typical sleep habits and relay feedback back to the user based on the information obtained.
- Canvas
  - We will be using the Canvas API to import the user's school tasks and manage the tasks for the user.
- Google places API
  - This will help us understand where the user has been throughout the day and obtain an understanding of what kind of place they are visiting. This will also aid us on knowing whether or not the user attended an event in their schedule.
- Activity Tracking Sensor (built into android mobile devices)
  - This will help us understand when the user is driving, standing still, walking or biking.

## 2.6 Testing Requirements Considerations

Testing is a huge key to success of any project which is why it will be a main focus for our group throughout the development of our project. We will be implementing test driven development practices into our code to ensure the project is running as expected at all times as well as ensure the user will not run to any bugs while the application is running. In addition, we will practice CI/CD which will allow us to only push out code that passes our build pipeline. CI/CD will also automatically deploy the pushed code to all devices for us.

We also plan on putting the project into a beta in order to better improve our models. For our AI to learn about people's schedules, it first needs to obtain a lot of sample data in order to form models about the user's day. For this, we will need people willing to participate in our beta to allow our AI to obtain data early on and learn from the control group, so when the app is fully released, it will have more appropriate responses rather than training itself from the ground up.

## 2.7 Security Considerations

GoMe will be dealing with a lot of sensitive information such as location, screen-time usage, and other metrics taken about the user. Therefore, we will implement a secure database server which allows only the specific user to access their own data, as well as remove data that they would not like the application to store. Since Europe will have GDPR policies, we will need to abide by those laws in order for GoMe to be used worldwide. Otherwise, GoMe will have to be limited to the United States.

## 2.8 Safety Considerations

To prevent any fatal errors in our coding practices, we plan on implementing guidelines when it comes to new features as well as adding frameworks for the initial application. Our plan is to have the complete application as multiple, modular components which link to new components through a interfaces. This will allow us to expand the scope of the project without having to implement a connector method everytime we create a new module ("Software Safety:

Examples, Definitions, Standards, Techniques”). This might remind you of the adapter design pattern, which we will showcase in later design documents. Unfortunately, some of the IEEE standards are behind a paywall. However, some of the topics listed on the cited sources will help us develop an application where our design decisions will be low risk.

## 2.9 Previous Work / Literature Review

There are example projects on the web which showcase different parts of our envisioned applications, but none of them have all the features we plan on implementing into GoMe. An example would be the website ‘Monday’. Monday is an online scheduler for daily use (“Monday - Team Management Software”). There are not any applications on the web with the ability to plan and understand how you spend your time while actually devising and maintaining a schedule for you to follow. Thus, we needed to search for outside inspiration to understand how to handle our this scheduling problem.

For the user data analysis parts of GoMe, we will be looking at applications that handle large amounts of data from the user and return large quantities of feedback back to the user. We will look at the methods we deem most user friendly when serving users large amounts of feedback.

For the social media aspects of the application, we will be looking at applications like Twitter and Facebook to further understand some of the best aspects of their applications and decide where they fall short in our situation. One of the main focuses of our application is connecting people in more useful ways than any other social media application. Therefore, when we are researching other social media platforms, we will make sure to keep this focus at the forefront of our minds.

A key concept in determining our schedule is our vehicle routing problem with additional constraints. This problem is well described in an article titled “Capacitated Vehicle Routing Problem” on Google’s developers website. We need to optimize routing to different places and locations based on certain “weights” or frequencies in which a person will visit such place or location, then leverage the weight with the time available in the user’s schedule (“Capacitated Vehicle Routing Problem”). This will be the most complex part of the project and will take a fair amount of time to develop.

## 2.10 Possible Risks and Risk Management

**Technology Knowledge:** Some of the members of the group are working with frameworks they have used before. For instance, the front-end development for GoMe will be created using primarily Java & XML which some members may not have too much experience with. With machine learning, some of us do not have much experience with the technology and concepts behind TensorFlow. We will take several steps to mitigate these risks. One of these steps is to draw on the knowledge of those who are familiar with this technology and let them teach the others how to solve their specific problems. New information learned can also be shared on GitLab as a reference for others who may not be as familiar with the same technology.

**Machine Learning Data Input:** In order to train TensorFlow, we will need to send a lot of data which may cause congestion on mobile bandwidths and use a substantial amount of data on the user's phone. To mitigate this, we will make a comprehensive data model for the data we are collecting and figure out if there is a way to streamline the data flow so we do not send unnecessary data to the user.

**Machine Learning Data Output:** There will be times where our model will give incorrect data to an user, simply based on uncertainty and unavoidable bad data. In order to alleviate this, we need to allow the user to tell the application that this suggestion/schedule is not optimal for their day, which will allow the AI model to retrain and return proper output to the end user.

**Privacy assurance:** Like mentioned before, we do not plan on limiting this application to only the United States, so our team will need to review privacy guidelines for each country our app is released in. We are observing a lot of user information, so we will need to be very careful with how this data is handled. We will assure users that their privacy is the very utmost importance to us and give them the ability to delete all information about themselves out of our databases and prevent future monitoring. Every user will also need to 'opt-in' into GoMe's data collecting policies before GoMe can begin collecting information, so users will have full understanding of what kind of data the application will be collecting and when before they start to use it.

**Timely Responses:** GoMe will be in charge of handling and computing many computations on large data sets. It will be our job to make sure we are equipped to handle and get this data to the user in a timely fashion. We do not want to keep the user waiting; the user will likely stop using our application if they deem it slow.

## 2.11 Project Proposed Milestones and Evaluation Criteria

Milestone 1: Determine the Requirements

Milestone 2: Develop a mock application

Milestone 3: Develop the application with the following sub milestones:

1. Information Gathering for AI
2. Schedule
3. Real time assistance from AI
4. Analysis
5. Social Media

Milestone 4: Obtain feedback and create final version

## 2.12 Project Tracking Procedures

To track the progress of our application, we will be using a Trello board. Every team member will make sure they keep the board up to date so we can see and understand what everyone is doing and has completed, as well as what still needs to be completed.

We will also be holding meetings every Monday with our advisor Dr. Goce Trajcevski to get his input on our progress for the week and help us to solidify our ideas. On Fridays, we will be

meeting as a team to help us get a better picture of what the group has accomplished throughout the previous week and to talk about what we need to do next.

### 3. Statement of Work

Build the GoMe Android application.

The application will be comprised of four main components: Database, Front-End, Back-End, and AI. We will implement each component separately (for the most part) while communicating the parts of each component which are dependent on one another so it is planned for. Then, the components will be integrated, tested, and optimized until they all function properly with one another and are optimized.

The goal of this project is to build a fully functional Android application that can help to improve the life of any user that downloads it.

#### 1. Structure the Database

This process will evolve a lot over time, but we will start by simplifying all data types stored in a calendar into tasks. Much like an abstract parent class with child classes, we will design a broad generic task that has many of the data elements shared across tasks such as start time, location, title, etc.. Then, we will create more specific task data types as needed and store them accordingly.

The goal of this task is to format the database in a way that allows it to easily interact with the AI and the back-end. In addition, it will be important for the database structure to be fairly generic to increase scalability. In doing so, adding new features to GoMe will be simpler since we will not need to refactor large portions of the design.

#### 2. Implement the Front-End/UI

This process will be broken down into the incremental development of the numerous pages described above. We will work to design a common theme that stretches across all pages.

In addition, we will design page layouts in a way that will display the gathered data in the most useful ways possible for the user.

The goal of this task is to design and build a clean, easy to navigate interface that will be simple for the user to understand and interact with.

#### 3. Implement the Back-End

The goal of this task is to design and build a back-end with little to no coupling, high scalability, and smooth interaction with the third party APIs and services we will be using.

#### 4. Implement the AI

The AI will be built through a lot of practice, experimenting, and research. We do not have much prior experience with implementing neural networks, so it will be an incremental learning process. We will largely be figuring this out as we go.

The goal of this task is to build an AI using TensorFlow that will take in large amounts of user data and help advise the user on the optimal schedule for them while adapting to real time changes affect the generated schedule throughout the day/week.

#### 5. Integrate the Elements

This will be done after the other components have been mostly completed. It will happen incrementally by removing the test/dummy functions used to see that each element works and replacing them with actual functions each component uses. Then, test all the components and their functions together and bug fix as needed.

The goal of this task is to combine all of the main components of the application, ensure they work together smoothly, and optimize any areas where improvement is needed.

We will be implementing a sprint-based agile practice when developing GoMe. We believe that the Agile development method will help our team become more optimized and give us the ability to align planning and feedback. This will allow our application to constantly reflect the needs of our users and the opinions of our team members and advisors. To confirm that Agile will fit well with us and our project, we read Linchpin SEO's "A Beginners Guide to Understanding The Agile Method". After reading, we believe that using the Agile method instead of other traditional methods like Waterfall will benefit us greatly. Using Agile will help us with this project along with giving us professional experience with a methodology commonly used in our field of work ("A Beginners Guide To Understanding The Agile Method").

We will be developing on an iteration based schedule (see [Project Timeline](#)) where we plan on conducting meetings as a team to decide how much work and what work needs to be done during each iteration. During the iterations, we will be meeting twice a week to catch up on what is going on, mimicking the well known daily stand up. We will be using Trello not only for planning but as an online kanban board for story cards. This will allow us to easily view dependencies as well as prioritize tasks and keep track of each team members progress.

## 4. Estimated Resources

### 4.1 Personal Effort Requirements

Table 1 below outlines our vision for the tasks that need to be completed in order for GoMe to be considered finished by our standards. The major tasks below were brainstormed by the entire team. Based on these tasks, it will take roughly 800 hours to complete the core tasks of the project. The majority of the following major tasks include research/learning, designing, implementing, and testing.

Table 1: Major Tasks

Task	Description	Estimated Time
Database setup and Connect	Configure the Firebase database and integrate it into the application, allowing for real-time updates.	5 hours
Research and implement good software design	Lookup and research good practice for software design within Android Studio so that we have organized code and low coupling, high cohesion	30 hours
Integrate Canvas for Student	Set up the ability for a user to import their class schedule for canvas, so if you are student, the app automatically knows when you have class and what tasks you need done.	20 hours
Machine Learning and Patterns Research	Getting familiar with tools like tensorflow and reading advisor's recommended literature to make sure we correctly implement machine learning features	50 hours
Integrate Google Places	Set up Google Places in our application so the the user's location and mode of transportation is known.	10 hours
Auth	Implement a Register and Login functionality, so a user profile can be created and accessed. This includes through Facebook and Google	10 hours
Event Stream	Create an event stream page where the user can look through events near them that they may want to join. This will also pull from Facebook Events.	10 hours
Event Chat Room	Implement a chat room for people participating in a certain event	20 hours
Tasks	Implement a tasks page where the user can create tasks to do, or pull them from Canvas or other task	10 hours



	applications	
Profile Pages	Implement a customizable profile page where the user can decide how they will be seen by other people (pictures, quotes, etc.) and review their data and get feedback.	20 hours
Make the App Social	Make users followable and see their social activity and stats. Also integrate a motivational aspect into app so users can motivate each other through	15 hours
Experience Points/Levels	This makes the app into a game, where the user can get XP points for doing their tasks and achieving their goals while using the app.	20 hours
General Social Feed	Create a feed page where users can see posts from people they follow, schedule updates or motivation generated by the app, and interact with post (like, reply)	20 hours
Recognizing Sleep	Research, design and implement a way for the app to know when the user is sleeping and track it by time.	40 hours
Recognizing Work/School	Research, design and implement a way for the app to learn and realize when you are going to work and how long you are there.	60 hours
Fetching Data for AI	Finding a main data source to base off of when we create and test our machine learning algorithms	40 hours
Daily Recap	Use data collected from day and organize it into a daily recap, where the user can see where they excelled and how they could be more balanced in the future.	30 hours
Recommendations	Generate advice for the user to be more balanced throughout the day	20 hours
Notifications	Notify the user based on their notification preferences. This could include reminders, friend updates, advice, etc.	10 hours
Schedule Page	Make a page displaying your schedule based on all of the things that you need to do for the day.	30 hours
Ideal Schedule	Generate an ideal schedule for the user that accounts for the things they need to get done while adding recommendations to make the user's day	100 hours

	more balanced between exercise, work, sleep, etc..	
UI Research / User Surveys	Research color psychology and modern UI designs. Design 3-4 UI prototypes and survey random people to get their opinion about which looks the most attractive.	20 hours
Optimize UI	Implement UI designs through multiple iterations	80 hours
Testing	Test the software ourselves by writing cases, exposing the app to weird data, and try to break the code.	60 hours
User Testing	Deploy the app to some of our friend's devices and see how it works for them.	20 hours
Documenting and Final Touches	Document all patterns used, architecture designs, and any other important information.	50 hours

**4.2 Other Resource Requirements**

Since this is a near 100% software project, we do not require many physical resources. The only resources we will be relying on are existing application APIs, frameworks, a reliable network, and other software technologies coming from cell phones, fitbits, etc..

Among these resources, GoMe will rely heavily upon data from other technology platforms. This includes, but is not limited to, Google Calendar, Google Places, Facebook Events, Canvas for Student, and other scheduling applications. This will provide us a great shortcut for knowing what the user is doing throughout their day and will assist us in figuring out important parts of their schedule. We will rely on Google Firebase to update information in real-time and store our user's information and profile data.

As for frameworks, we will be using Android Studio as the main IDE for building our application. We will also leverage TensorFlow to aid us in understanding the user's patterns in order to machine learn from their daily lives and make adjustments for a more balanced life.

**4.3 Financial Requirements**

GoMe will use information recorded via FitBit. To begin development for this feature we had to gain access to a FitBit device. This would have required a purchase, however a group member already has one available for team use. Therefore, funding for GoMe will not be necessary.

## 5. Project Timeline

We have organized our major tasks into 5 iterations in order to obtain better workflow and give us time to learn and understand TensorFlow and the topic of neural networking. Iteration 1 and 2 will be completed by the end of the spring semester. These iterations will primarily cover getting the basic features out of the way and having an app that works without any pattern recognition features. While implementing this minimal viable product version of the app, our AI tech team will be teaching themselves machine learning technologies in order to prepare for the more complex features to come for the future iterations. Going into iterations 3 and 4 next semester, we will begin implementing machine learning features so GoMe will be able to recognize the user's sleep patterns and work schedule, build an ideal schedule for the user, recommend events, and prioritize the user's tasks. Finally, we will make sure to get the final testing done in iteration 5 as well as adjusting small features and refining the overall application.

### Semester 1 Schedule

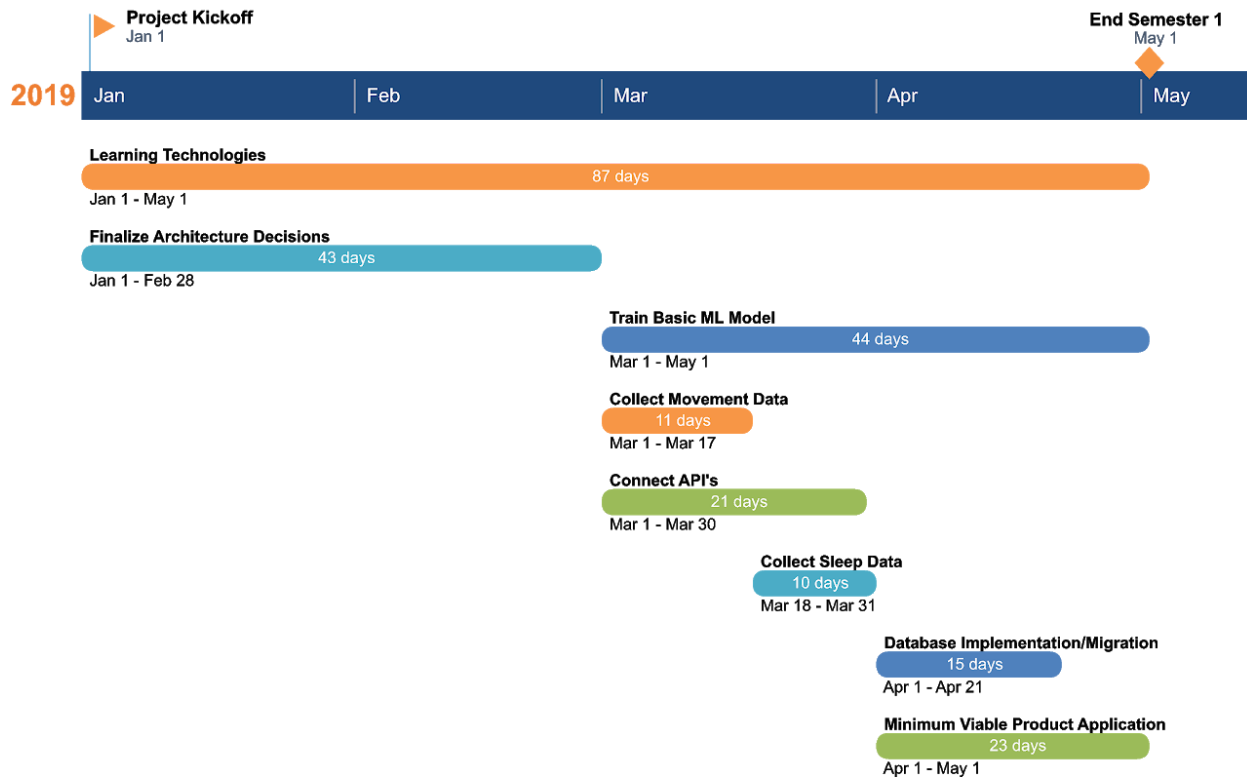


Figure 3: Semester 1 Schedule

## Semester 2 Schedule

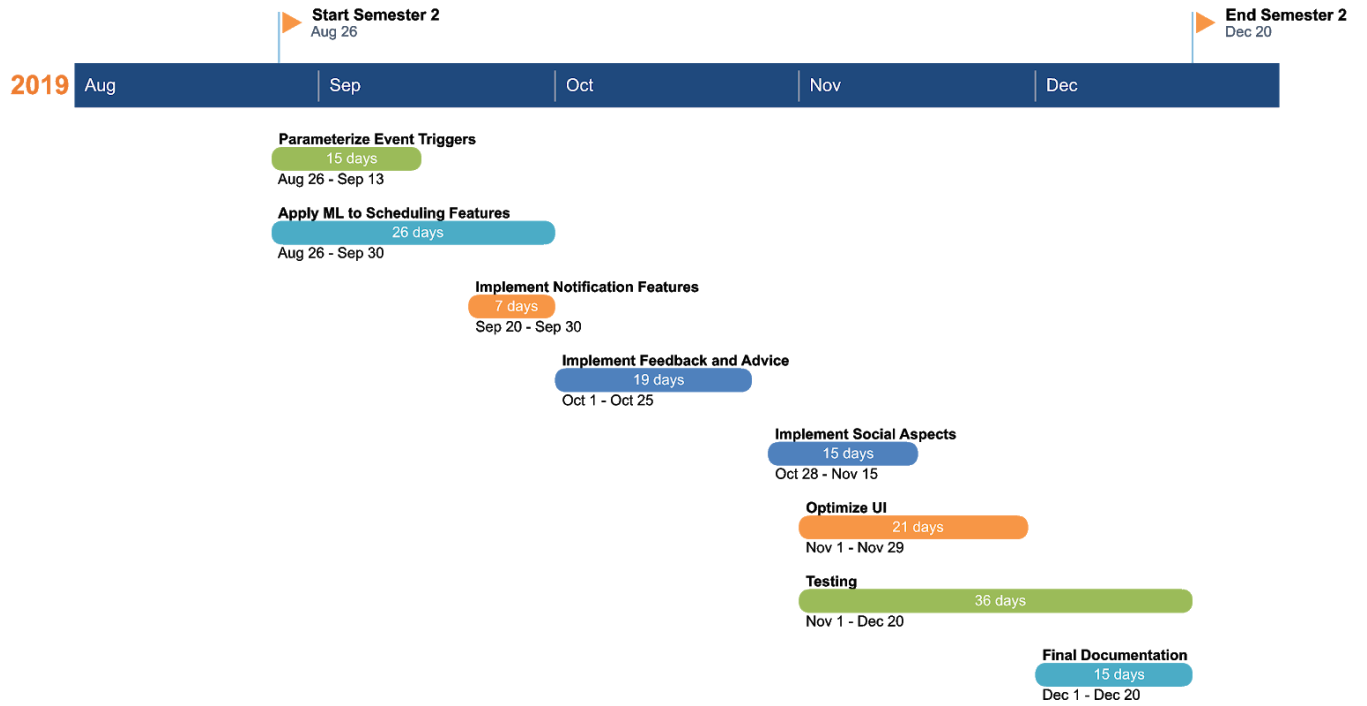


Figure 4: Semester 2 Schedule

## 6. Closing Material

### 6.1 Closing Summary

To summarize, GoMe will be an application that seeks to better the user's life by creating an automated schedule able to give the user feedback and help them live a more balanced life. This scheduler will be exceptionally user friendly and much easier to use, understand, and navigate than other scheduling apps. GoMe will also understand the user and give them analysis based on what the user did throughout the day. It will also attempt to motivate the user to do the things they need to do by building a social media platform that revolves around the user's schedule and other motivational features. All in all, GoMe is for the user, and will aim to make the user's life much easier and more enjoyable.

### 6.2 References

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### 6.3 Appendices

None used.