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A Web-Service Based Fitness Application to Promote Healthy Lifestyle among the Masses using Gamification

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ABSTRACT

Fitness apps have been increasing in popularity in the past few years, especially during the COVID-19 pandemic, people have become more health-conscious. But, as the world is opening up on the streets again, people are getting back to their hectic schedules and work lifestyles, leading to a decline in the retention of people to their fitness routines and dropping off midway. This project focuses on designing a fitness service available as an android app and a web client that uses a structured 'Reward System' to keep users hooked on their fitness routine. The service also has a community area where people can join and connect with other people and track and carry on their fitness journeys. The service aims to make people more fit by motivating them to stick to their fitness routines using these monetary benefits from completing their tasks and challenges.

***Key Words*:** Fitness App, Gamification, mHealth App, Flutter, ReactJS, Firebase

1. INTRODUCTION

Even with 300,000 fitness apps present in the market offering loads of options and services, the efficacy of these apps, on the contrary, is quite non-significant. For a data analysis on 6 out of 6000 pieces of research, researchers concluded that fitness app users walked 476.75 steps per day more than non-fitness app users, which was not an increase worth considering. Also, 73% of users quit their training programs without completion while 50% quit within the first six weeks of the starting.

The 2020 **mHealth** app retention and engagement were all-time low at annual retention rates of about 19% ***[1]***. Even with the mentioned results, fitness apps are booming in popularity over the last few years with their enhancements and usage of wearable technologies.

Points mentioned, most people give up their fitness routine due to their ever-increasing hectic schedules, no short-term rewards, and uneasy, complex, and boring fitness programs with no accountability to quit their fitness routine.

Hence, to keep people motivated to stick to their fitness routines, the concept of **'Reward System'** and **'Gamification'** has been introduced in our Fitness app F3 designed for Android which gives users a **'Gamified'** experience of the fitness routine with User Experience Levels, Daily Challenges and Events to compete with others in the community and makes user motivated to complete his/her daily fitness routine to gain monetary rewards for various e-commerce and online stores over the course of the program.

This app enables users to customize their profiles, according to some categories, Working Professionals, Students, and Homemakers, giving them personalized fitness routines. The app also has a complementary web app using standard Web development languages. The app and web client will also use APIs to gather data from wearable technologies and give users a tabulated and graphical representation of their training data to help them keep track of their routines.

Compared with already existing apps in the market with these features like **StepSetGo** and **Nike+**, **F3-Fitness App** offers increased options and utilities to make users choose their fitness journey more immersive.

2. PROPOSED WORK

2.1 Problem Statement

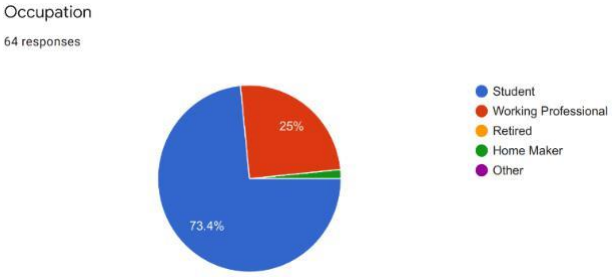
About 73% of people quit their fitness resolutions without completing them, according to a study done in 2019. The main reason for this issue is the long-term commitment to a fitness routine and confusing and complex procedures to follow through without any substantial short-term benefits and materialistic gain other than just getting fit.

Many apps over the years have addressed this issue by incorporating subtle and unique features to increase user retention of the app, though all of them lacked in one aspect or the other in terms of options, plans, and services offered. For example, the app **StepSetGo** only focused on walking the users to make them fit without considering other factors. Also, many mHealth apps were divided into either physical fitness apps or diet and nutrition apps, making users download two apps for their fitness needs.

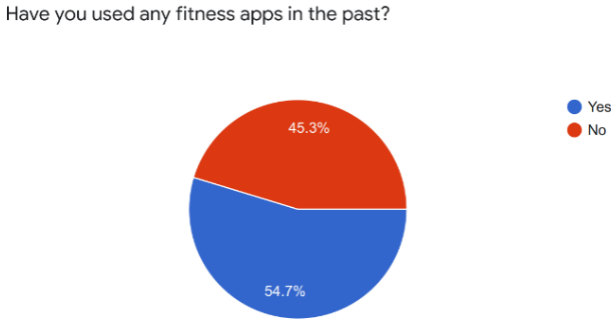
These problems require a full-fledged app that bridges and combines these important features from different apps and create an all-in-one fitness app for the users.

2.2 Proposed Approach

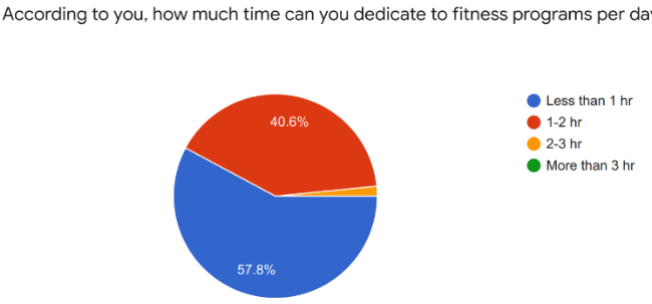
We surveyed 500 people among all age groups and profession types and have met with the following results:



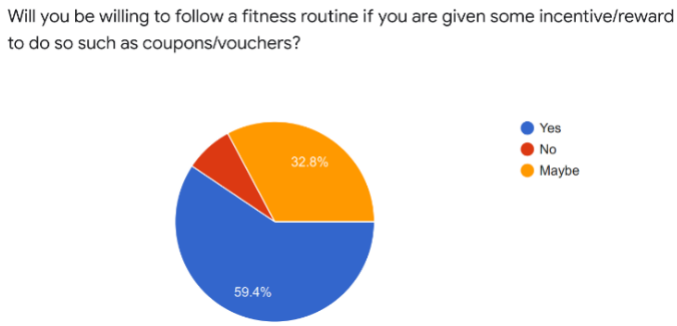
57.8% of the survey takers were '**FEMALE**' while 42.2% were '**MALE**'.
Amongst them are 25% working professionals, 1.6% homemakers, and 73.43% students.



This data set had 54.7% of people who had tried some sort of fitness app in the past, and among them, 50% were satisfied with the results, and the other 50% were not happy with the outcome.



On the topic of the total time they were willing to spend on the app to do some exercises, 57.8% of the people could only spare less than **1 hour** per day, 40.6% could give anywhere between **1-2 hours** per day, while 1.6% agreed on the **2-3 hours** per day mark. These results show that most people have a busy life and thus are not willing to spend lots of time on their fitness. However, with a balanced and healthy diet, this is achievable.



When asked if people are willing to follow a fitness routine if given some incentive/reward, such as coupons/vouchers, 59.4% responded with 'YES' while 32.8% responded with a yes and a mere 7.8% responded with 'NO'.

We also asked the people to mention the features they would like in any fitness app they may use like ours.

Some of the most common responses are:

- Good UI
- Compatible with smart watches
- Time required per day
- Long term benefits
- Provide diet information
- Tracking calories burnt
- Analytics
- Video demonstration
- Personalized plan as per height/weight
- Have soothing music
- Variety in exercises
- Push notifications as a reminder
- Motivational

Although most of the people who took our survey were students, it is safe to say that most of the people do care about their health and fitness but at the same time cannot give a whole lot of time to any fitness programs due to a busy work schedule. So the app must be very effective in terms of efficiency and must also be very easy to use. It is also clear that people also want a do-it-all app as they do not want to go through the hassle of downloading multiple apps, so the fitness app has to have as many features as possible while still keeping the interface clean and user friendly.

To achieve the desired results, the following proposed approach for the app would be the most effective:

A web interface will complement the mobile application for desktop/laptop users. Both interfaces will be connected to a single backend database using Firebase.

The app will have a structured 'Reward' and 'User Level' systems (Gamification) which would work on inputs of different fitness metrics like heart rate, calorific expenditure, and steps covered in a given time (daily, weekly, monthly, and yearly) and through different mediums like walking running or cycling depending upon the user's preference. This data can be directly taken by the app on the Smartphone or using the built-in APIs to gather data from wearables.

The 'Reward System' will let users gain monetary rewards such as gift cards and coupons from online stores and e-commerce websites for completing the given tasks and challenges (both routine and events related) by earning the in-app currency and redeeming them for rewards in the shop.

The app/web client will present fitness tracking data using infographics for easy access for users for any timeline needed.

The app will also contain a feature called 'Group Fitness', a community feature, to help people form a group and compare and compete with others in their fitness routines and challenges, thus making the experience more fun and competitive. They can also track the progress of others to help them keep an edge over their competitors.

A new study published in the journal Preventative Medicine Reports, from the Annenberg School for Communication at the University of Pennsylvania looked at key motivators for exercise concerning social media. It was found that competition motivated participants to exercise overwhelmingly more than social support. Attendance rates were 90% higher in the competition-motivated and the combined group when compared to the other two groups that had no competition.

The app can also be linked to the users' social media handles to help them share their achievements with the world. In this manner, others would also be motivated to join the program to get fit and earn rewards on their fitness journey.

Using **Behavioral Analytics Algorithm (BAA)** and **Reinforced Learning**, the users can have a personalized profile for their requirements and goals, increasing the overall step-count (calorific expenditure) of users over the period of a few weeks (**mSTAR Study**).***[9]***

2.3 Methodology

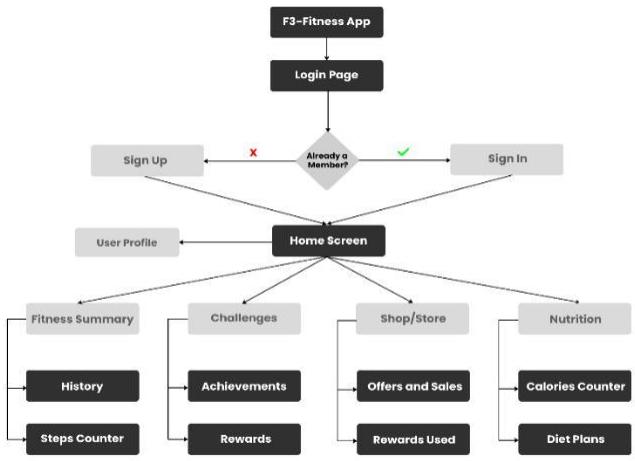


Figure 1: Basic Flowchart of the Mobile/Web Client (Final results may vary)

1. Log-in/Sign-up: The users would land on this page the first time opening the app/website. They would have the option to either create a new account or use their existing email to sign-up. If their account already exists, they can just log in.

2. Fitness History: A daily report of the tasks you have completed will be available on this page. This way you can track your tasks and finish them before the day ends. Also, your current steps count, oxygen levels, heart rate, etc. will be shown here.

3. Daily Activity: This section shows users' daily progress along with their pending tasks and challenges.

4. Challenges: This section includes the tasks categorized for the users based on daily, weekly, community, and personal criteria. Completing them earns the users the in-app coins used in the shop for redeeming discounts and offers.

5. Shop: This section shows the total points received by the user and all the coupons/ offers that the app has to offer that can be redeemed by the user using the coins earned.

6. Profile: Here, the users can change their account information like- profile picture, username, password, etc. Also, they can view their current "level" based on how many tasks they have completed. Also, a summary of their overall progress is shown here.

7. Socials: This section allows the users to share their accomplishments with their friends and followers. They can also view their friends' posts and react to them via likes/ comments.

8. In-app Community: You can invite friends and connect with other users on the platform to compete and track their progress individually in a competitive environment.

3. TECHNOLOGY

3.1 Front-end

Many front-end frameworks and libraries support JavaScript because of the V8 engine's innovation, so to search out the leading front-end frameworks and libraries below the business normal, we tend to collect usage information using GitHub, which is the largest **Git** repository hosting service globally. Its usage statistics will replicate international front-end developers' tendency on every front-end framework and library.

3.1.1 App

Developing an application based on cross-platform technology that would be compatible with both IOS and Android. To do so, we used the flutter framework, an SDK capable of developing apps that are simple and have a high-performance throughput. Based on Dart language, it provides high performance by supplying the UI directly to the canvas of the operating system. Dart is an open-source, object-oriented programming language, originally developed by Google. It supports programming concepts like interfaces, and classes.

3.1.2 Website

In addition to the app, we built a website using **ReactJS**, a declarative, fast, and flexible JavaScript library for creating reusable UI components. It's an open-source, component-based front-end library that is just responsible for the view layer of the application.

The MVC (model view controller) design is being used by the majority of websites. React is the 'V' in MVC architecture, which stands for view, while **Redux** or **Flux** provides the architecture.

A **ReactJS** application consists of several components, which are responsible for producing a short, reusable piece of HTML code. All React applications are built around components. These components can be stacked with one other to create complicated applications out of simple building blocks. To insert data in the **HTML DOM**, **ReactJS** uses a virtual DOM-based technique. The virtual DOM is efficient for it simply modifies individual DOM elements rather than reloading the entire DOM every time.

3.2 Back-end

Firebase is a Google platform that makes it simple for designers to develop, manage, and scale their projects. It allows the user to create apps more quickly and securely. On the Firebase side, no programming is involved, making it simple to take advantage of its features. It works with Android, iOS, the web, and Unity. It gives you access to cloud storage. It also employs **NoSQL** as a repository for data storage.

Services included are:

- Realtime Database
- Cloud Firestore
- Authentication
- Remote Config
- Hosting
- Firebase Cloud Messaging(FCM)

CONCLUSION AND FUTURE WORK

F3-Fitness App combines different aspects of the already present fitness apps and other technological concepts like gamification and machine learning to create an all-in-one place for users to have a competitive, motivated and personalized fitness experience. The app makes sure that the user is retained to their fitness program by using the 'Reward System' inside the app. Hence, the app is aimed at lowering the quitting percentage of the fitness resolutions people.

The most important addition to our service is to expand the support to iOS. Apart from the already diverse and beneficial features in the fitness apps across the market, there are still a few tweaks and additions possible in this sector. The app can have a complimentary 'Find your Gym' feature to help people get gym memberships near them on a discounted plan than regular gym members, like **Zomato** or **Swiggy**, but for gyms.

The idea of gamification can be extended to adding in-app community events to take place at a nearby community park or playground to make people come out of their sedentary lifestyle and connect with like-minded people in person, making the community stronger and motivated together.

Also, adding a camera tracker to include exercises like push-ups, pull-ups, crunches, planks, etc. to give users a more enhanced fitness experience.

Apart from these user-related additions, the concept of **Virtual Reality** can be added to the app to make people compete alone with a virtual opponent on a fitness routine which a few apps have already incorporated into their structure. However, this concept needs a lot of improvements and enhancements given the recent rise in the usage of **Augmented Reality** and Virtual Reality to provide entertainment and ease of access to people much faster.

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