

Timinder: Location Based Time Tracking and Reminders

Prof. A. U. Chaudhari¹ S. A. Wankhade² A. V. Raut³ V. J. Narkhedkar⁴ S. P. Golhare⁵

^{1,2,3,4,5}Department of Computer Science and Engineering

^{1,2,3,4,5}Prof. Ram Meghe Institute of Technology and Research, Badnera

Abstract— In this study, a location-based time tracking application TiMinder, which tracks the time spent by user on each location is proposed. The main objective of this application is to track the time spent by user on every location and then figure out time wasters locations. First of all, the user has to login with required information and the application starts tracking the time. A monthly report is generated which shows the time spent by user on each and every location. The time wasters locations are separated out. Next time when the user goes to any of those locations, an alert pop out to ask the user to get out of that location quickly.

Key words: Fused Location Provider, Android, Firebase

I. INTRODUCTION

The pace of human life has significantly increased in recent years and we are becoming more and more productive day by day. There are many applications which help users become more productive and use their time more optimally and efficiently. All those traditional applications have various ways mentioned that could help users to increase their productivity. Instead, we need a system which will monitor user's actions and will make users aware of their exact time utilization, where the time is being wasted and help them in effective time management. For example, in a scenario where a student spends much of his time sitting in a canteen. The application will generate a monthly report showing how much time was wasted in the canteen in that month. The main premise of the application is that it lets you find time wasters locations and help you become more productive.

Recently many applications have location-based reminders functionality but none of them have time tracking feature and location filtering ability to figure out which ones are time wasters considering the user. For example, spending time at a movie theater would be time waster location for a student but not for someone who works at the theatre.

Google have designed apps that alerts the user on the basis of user's location. One application that gives location-based reminders is "Google Keep". It is a simple application which can take notes and has a dashboard like appearance having a location-based option for every note. All we have to do is just tap the "Remind me" option and then choose "Pick Place" option and search for the place by entering name or address of the place. Google Keep does not have any radius feature and hence it can remind you only when you are entering and not when you are exiting. All the notes that we create and the location-based reminders associated with these notes can be shared with any user who has a Google Gmail account.

One more app that has the location-based reminder service is 'ToDoist'. It is a robust productivity app with location-based reminders included in the Premium version. It provides option to set reminder when we are entering or leaving a location. We can also share it with collaborators. The business version of "ToDoist" provides project

management features such as managing project tasks with location-based reminders.

Another application which is one of the best free productivity applications is "Evernote". We can gather all our notes, thoughts and ideas at one place and across as many devices as we want and because of this feature, it is possible to access all our university assignment and plans in one click. Evernote provides us option to save any webpage, article or a film clip and access it later and on any device. It is perfect for those people who get ideas when they are doing some other work and cannot remember about it later. Evernote also helps with multimedia presentations and conducting research. All of these applications have location-based reminder system but they do not track user's actions and how much time they spend on every location.

In this study, a location-based time tracking application TiMinder, which contains location-based reminder functionality in a different manner, is proposed. TiMinder shows a reminder when the user approaches to a location which is filtered as time waster location. This application consists of a unique feature which automatically filters out time wasters locations according to the user. First of all, there is a login panel to authenticate user and save his data to real-time database. The location tracking feature starts calculating the time user spends on every location. The Fused Location Provider API's provided by google gives the most accurate location without any additional power consumption. It manages the underlying location technologies such as GPS and Wi-Fi automatically.

The Google Maps API's are used to include a map and tag some important locations such as user's home and workplace. Once the application has gathered data of a month, it generates a report showing the average time spent by user on every location in that month. This way user knows where he is wasting his time and be more mindful about it. The application also asks the user for some important locations where he goes and spends more time and creates a geofence of 500 meters' radius to monitor the 'enter' and 'exit' events. The login panel and registration panel is hosted by firebase backend platform. It provides various services such as storing real-time data and authentication.

The user interface is designed using material design which provides functionality to create a sleek UI for the application. Material Design can be used on all android phones with API level 21 and above. The support library can be used for phone with API level lesser than 21.

II. SYSTEM ARCHITECTURE OF TIMINDER

TiMinder application consists of four major modules namely creating user profile, location tracking, analyzing location information, location based reminder.

A. Creating user Profile

The user has to create an account to use the application. When the user opens the application for the first time, he has to

authenticate himself using the account he has created. The login panel is hosted by firebase backend platform. Whenever a new account is created, the users email is listed in the firebase console.

B. Location Tracking

The application will constantly monitor the time user spends on every location. The location services in android gives the most accurate location data. Google provides Fused Location Provider API that intelligently combines different signals to provide the location information. The fused location provider manages the underlying location technologies, such as GPS and Wi-Fi, and provides a simple API that you can use to specify the required quality of service.

C. Analyzing Location Information

Based on user's profile, locations will be filtered as prioritized and time wasters. A report will be generated to show user average time spent on every location and the time that can be used mindfully which was spent on time wasters locations.

D. Location Based Reminders

When user will enter into a time waster location TiMinder will show a reminder to get out of the location in lesser time. This way user can use the time in a productive way instead of wasting it. The notification manager in android provides way to notify the user whenever required.

III. CREATING USER PROFILE

The first module of TiMinder is to create user's profile. User has to first create an account and log in with that account to use the application. This registration page and login page is designed using firebase backend platform. Firebase gives functionality like analytics, databases, messaging and crash reporting so we can move quickly and focus on our users. It automatically scales for even the largest applications with huge user base.

TiMinder uses various firebase services such as authentication and real-time databases. Firebase Authentication allows an app to securely save user data in the cloud and provide the same personalized experience across all of the user's devices. It provides backend services to support authentication using passwords, phone number, and popular identity providers like Google and Facebook.

To sign a user into the app, we have to get authentication credentials from the user. These credentials can be the user's email address and password, or an OAuth token which is given by any identity providers such as Google and Facebook. Then, we have to pass these credentials to the Firebase Authentication SDK. Firebase's backend services verify those credentials and return a response to the client.

IV. LOCATION TRACKING

One of the unique feature of smartphones is that they are location aware. Google play services provides location APIs which facilitates adding location awareness feature to the application. TiMinder uses Fused Location Provider APIs to receive location information from the device. When location information of a device is requested, it is provided by

different location sources such as GPS and Wi-Fi. Earlier when Fused Location Provider APIs were not available, the programmer had to manually toggle between these sources and use whichever is available. The fused location provider API eliminates this difficulty by automatically changing the appropriate system settings. We just have to specify the desired level and TiMinder uses highest accuracy level.

Android provides four major components activity, services, broadcast receivers and content providers. A service is a component which constantly works in background and does the specified task. It can perform long-running operations in background and it does not have a user-interface like an activity. In TiMinder, all the work of receiving location updates is done in background using a service. The service starts as soon as the user allows TiMinder to access location information of the device.

In android devices with API level greater than 23, means if the device is running on Marshmallow or above, then the application has to request permissions at runtime. TiMinder requests all the permissions needed when it launches for the first time. Even though user can revoke the permissions that were granted initially, TiMinder requests for location permissions whenever it accesses location information of the device. If the user denies the permissions, TiMinder explains the user why it requires location permissions to work.

The location information of user is received periodically in the form of latitudes and longitudes. They are then saved to local SQLite database and firebase real-time database. The time spent on every location is calculated in this way. TiMinder also creates geofence around the locations where the user spends much of his time such as at home or at workplace. Then TiMinder monitors enter, dwell and exit events in these geofences.

V. ANALYZING LOCATION INFORMATION

When users create an account on TiMinder, the application filters the locations on the basis of information provided by user. When the report of one month is generated, TiMinder organizes the data in a specific format showing time spent at prioritized locations and time wasters locations.

This way user knows how much time he wasted and at which locations. Next time when user visits the same location, he knows that it's a time waster location and he is wasting his time.

VI. LOCATION BASED REMINDERS

Based on the data generated in the previous month, TiMinder gives a reminder when user approaches to a time waster location. TiMinder has functionality where user can set a reminder and specify in what time he wants to get out of a specific location. User can tag the locations on the map and set the reminder.

TiMinder automatically gives a reminder when user spends some time on a time waster location. User can still cancel the alert if he wants to spend more time on that location. Android provides notification manager to show to reminder. The service designed to receive location updates triggers an event to alert user when he spends specified time on a time waster location.

VII. KEY TECHNOLOGIES

TiMinder uses various technologies in background and foreground namely Android Operating System, Firebase backend platform and Material design.

A. Android

TiMinder is an application which runs on smartphones running on android operating system. Android is a linux-based operating system designed to run on touch screen devices such as smartphones and wearables. It is based on modified Linux kernel. It provides four major application components namely activity, services, broadcast receivers, content providers. An Activity provides all the components requires to design the user interface. TiMinder has a number of activities for login and registration page, graph showing the time spent on specific important locations and to display the map. Services are used to perform long running operations in background. Background work such as network operations, playing music, perform file input output, receiving location updates can be done using services. TiMinder has one service which is designed to receive location information in background and calculate time spent on every location.

B. Firebase

Firebase is a backend platform which provides various services to develop and test an application such as Authentication, Real-time Database, Cloud Storage, Hosting, Crash Analytics, Crash Reporting and Performance Monitoring. It also helps us to grow and engage our audience by providing services like AdWords, Cloud Messaging and Invites.

TiMinder uses Firebase Authentication to create user accounts and authenticate user into application. TiMinder provides three authentication options to user which means user can sign in to TiMinder using his email id and password or by using his google account or Facebook account. Whenever a new account is created, the email id of the user is listed into firebase console and the method he used to sign in to the application is shown. TiMinder also uses real-time database to store personal details of user such as name, age and other location and time spent details. This way it is easy to retrieve the data of user if the local databases fails.

C. Material Design

Material Design is a design language which is used to design sleek UI for applications. It was developed by Google in 2014. It is codenamed as 'Quantum Paper'. It was announced by Google in 2014 in Google I/O conference. Many of Google's applications such as Maps, Google Docs, Sheets have been applied this design language.

The android application development IDE that is Android Studio includes in-built material design themes which can be directly applied to the application. The UI of TiMinder is also designed using material design.

VIII. CONCLUSION AND FUTURE WORK

This application provides a feasible solution by using the available technologies and build a cutting edge software solution to increase productivity in daily life. TIMINDER is an application which works on location based information.

This app majorly focuses on tracking the time spent by user on every location and then analyzing the data to prioritize those locations.

TiMinder has a huge possibility of upgrade and it largely depends on the technologies on which TiMinder relies. The improvement in accuracy of location sources as well as android operating system will have a positive impact on the functionality of the application.

REFERENCES

- [1] Chi-Yi. Lin, Ming-Tze. Hung, Wei-Hsun. Huang, "15th International Conference on Network-Based Information Systems", A Location-based Personal Task Management Application for Indoor and Outdoor Environments, 2012.
- [2] Pradnya Battin, S.D. Markande, "Automatic Control and Dynamic Optimization Techniques (ICACDOT), International Conference", Location based reminder Android application using Google Maps API
- [3] Kushal Singhal, Gandhar Rane, Amruta Ambre, Nikhil. Surve, Jayesh Sonawane, "Location Based Reminder: An Android Application", International Journal of Advanced Research in Computer Science and Software Engineering, 2015.
- [4] Priyanka Shah, Ruta Gadgil and Neha Tamhankar , Location Based Reminder Using GPS For Mobile (Android) , ARPN Journal of Science & Technology Vol 2, Issue No. 4, May 2012.
- [5] Neelu. L, Aruna Kumara. B, Shashidhar.V, Bharath J, "Location Based Reminder Using Android and Google Maps", International Journal of Innovative Research in Computer and Communication Engineering Vol 3, Issue No. 5, May 2015