AssistME

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Abstract- There are many applications that are capable of making personal daily tasks convenient, but there is no application which includes the features of an intelligent alarm, Item tracker, Navigation, Health reminder. The application explained in the paper is an integration of all the features mentioned. The goal of this research is to play the role of an assistant, so called a Virtual Assistant capable to perform on its intelligence to make the daily chores convenient. "AssistME" application will be built on the technology of Bluetooth and Global Positioning System which enables the application to track the presence of Radio Frequency Identification (RFID) tags attached to the personal belongings of the user.

Index Terms- IOT, Health Monitor, Personal Assistance, Alarm, Item tracker, Health informatics, data Integration, Weather API.

I. INTRODUCTION

The majority of the people spend a hectic and a busy life. This effects a person's health physically and mentally that results them in oversleeping and being less punctual. This leads to a rush most of the mornings, because they are running late they tend to leave behind items. People rely on applications to make their daily tasks convenient. Most of the applications do not support notifying the user when the application is not open which actually drop down the application's importance.

AssistME was created to assist employed people, students or any other person who needs to be punctual in their daily tasks. A person who is late will be always in a rush, because they are behind the schedule. The alarm component will assist the user to ignore the hassle and to keep up with their schedule. As mentioned above most of the people who fall behind their schedule will spend their day in a rush which increases the probability of forgetting things. This directs to the second component of the AssistME application, which is an item-tracking component. If a person forgets one of his personal belongings, he/she can find the misplaced item(s) by simply launching the AssistME application.

The application also remind the user of certain items according to the factors such as weather. Additionally AssistME has a step counting component which will monitor the user's health and suggest the user with health advice and remind about the medicine dosage and consultation days. This component is included in the application because the targeted users will mostly spend their day outside, actively.

The research was intended to achieve the following objectives:

1) Identify the factors that will determine the wake up time of the user is based on his/her schedule, weather and traffic information.
2) Integrate with Google Maps API to determine the best path to a destination based on weather, traffic and transportation mode.
3) Remind and alert the user about a particular item that is left behind by indicating the location.
4) Attaching RFID tags to the items.
5) Develop an algorithm to determine the step count of the user so that the user can get constant accurate reminders about health issues. (Get medicine on time, step count, graph for the users health metrics).

II. BACKGROUND

The literature review was conducted by the AssistME research team under 5 main categories that are directed towards our project. There were many research papers that could be related to our research components which are the *Alarm System, Item tracking System, Navigation, Health System* along with *Artificial Intelligence* and *Internet of Things* that comprise the above four. Following researches were some among the research papers that were found out which could have a major impact on our innovation.

Alarm System

Early Bird Alarm Clock application consists of more additional features than a normal alarm clock. The alarm s will be generated according to the user's pre-entered schedule. The ringtones are shuffled and randomly played different tones so the users are not familiar to a specific tone. QR codes and voice recognition is used to stop the alarm to make the user wake up to switch it off [1].

McGee et.al discusses about a portable device that generates an alarm with the help of a location detector. The user can preset the alarm for multiple tasks and through GPS it will generate the alarm for the relevant task and indicates that it has been performed [2].

Item Tracking System
RFID tracker and locator uses Global Positioning System (GPS) to locate the RFID tags. The RFID interface is able to read an RFID tag on a RFID item and identify it uniquely. It is also capable of storing the GPS location. A Near Field Communications (NFC) communicator is used to read a RFID tag. [3]

Personal item monitor using radio frequency Research done by Robert C. Boman and Brian Hanson defines a system that consists of a monitor with a transmitter and a receiver which enables the user to monitor the location of personal items. RFID tags are attached to the items, so when the signals are transmitted from the tag it checks for the presence of the item. [4]

iBeacons uses Bluetooth Low Energy (BLE) to communicate with any smart device within a range. It will broadcast BLE waves periodically, rather than keeping a constant connection with the device it's communicating with. Upon broadcasting, the receivers will know of the exact location of the beacon which is much more accurate than Global Positioning System (GPS). It can be used to broadcast any kind of information. iBeacons can be used in stores and in many other areas. [5]

Navigation and IOT
Google Maps Application provides real-time traffic updates, navigation and details about places that enhances the real-time traffic updates for the user and the system to come up with an accurate estimated time of Arrival (ETA). They even contribute to update users without an internet connection. [6]

Future Internet: The Internet of Things Research paper conducted by Lu Tan and Neng Wang describes about a concept that could be foreseeable and discoverable in near future which would change people's life utterly. This concept expands the communication form of human-human to human-thing and thing-thing where interrelated electronic devices can transfer data without any human interactions. [7]

Health Reminder System
Google Fit and SHealth Applications provides features to keep up the body healthy. This enables the users to capture and store their health metrics and monitor them from anywhere. Displays the real-time exercises which motivates the users. [8][9]

Step counting algorithm Research paper discusses about a two phase algorithm implemented on the android platform. This algorithm has defined to overcome the restrictions that the users face and how to overcome them. [10]

Artificial Intelligence
Jibo is an intelligent home assistant that can remember people as they interact with it. This is capable to recognize people by their face and greet, ask a question or joke as they pass by. Jibo can take photos /videos, send/read messages, remind, make phone calls, place orders and connect with the home's devices. [11]

Cortana and *Siri* are Personal Digital Assistants (PDAs) that will learn about the user as the user interact with it. These PDAs are capable of storing reminders based on both time and location and are also capable of managing the user's calendars. *Cortana* and *Siri* can open any app in the system and can also fetch information about facts, files, places, people and other information. [12][13].

III. METHODOLOGY

A. Planning
AssistME research team was formed, selected the project and defined the requirements of the system along with the scope and the boundaries. Created the Schedule (Gantt chart), Cost plan for the project, Work Breakdown Structure, followed with a literature review and identified similar applications and researches conducted.

B. Requirement gathering and Analysis
AssistME research team chose the Android smart phone users as the population to gather the opinions of the questionnaire created. The sample size was nearly sixty (60) android smart phone users. We selected quota from the non-probability sampling method where the questionnaire was sent out to students as well as employees and others.

Then we created a questionnaire to collect the opinions of the users about the Android application that we will be creating. Most of the questions were based on the factors that would determine the punctuality of people in general such as weather, traffic, mode of transportation, time management and absent minded.

The overall analysis of data gathering was helpful to narrow down the requirements under each component. It was suggested that an intelligent alarm can be a handy tool, but the accuracy of it is a critical factor since variables like weather and traffic seems to affect daily schedules for most. Therefore we are to expect users with hectic schedules and use of public transportation modes which limits using of alternative routes to avoid traffic. It was recognized that keys, wallets, umbrellas are among the items that are essential but forgettable. This is helpful to understand what kind of items the RFID tags should be installed into, the number of RFID tags a single user requires and also to

implement the installation method. The application must offer better accuracy, good performance and interesting personalization options to the users in order to persuade user to leave the methods in place for these tasks and use the proposed application. The results are positive enough to anticipate acceptance to the application even among many competitors such as Siri, Cortana, TrackR etc. already in use.

C. Design

The four components of the application which is an intelligent alarm with a navigation system, item tracking component and a step counting component which will be managed upon the user's schedule. The application will run as a background process so the user will never have any trouble in finding the items as the application will notify without having it open.

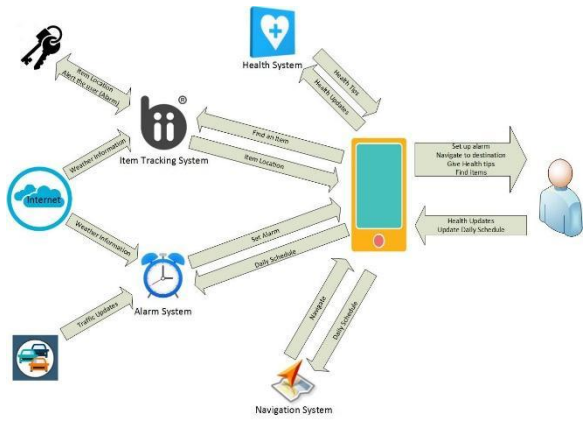

Fig. 1. System Architecture

Fig. 1. describes the overview of the AssistME android application. The user is able to provide health updates and schedules to the application and the use is able to set an alarm, navigate to destination, receive health tips and find items from the application. From the Health System, health tips are provided upon receiving health updates. The Navigation System will receive the schedules of the user and navigate the user to the appropriate location. Item Tracking System will return an item's location when an attempt is made to find an item. The user can be alerted about items through alarms. Specific items will also be reminded according to the weather condition. The Alarm System will set the alarm according to the schedule, weather information and traffic updates. The weather information will be retrieved through internet.

D. Implementation

The four components of the ***"Assist ME"*** application was implemented using Android Studio SDK. The application supports the Smart phones with Bluetooth 4.0 and Android Version 4.0 Ice Cream Sandwich and above.

Apart from all the built-in functions in the Android Studio SDK the alarm component required external API's. Google Maps API and the Google Place API was used to get traffic information and the duration to the destinations and the nearest train stations. To retrieve the weather details and the status Open Weather API and to retrieve the train schedules Sri Lanka Railways Website was used. Data and libraries from the ST1726H chip's datasheet was used to make the tags compatible with the application. The method of calculating BMR is retrieved by doing some research on the internet.

E. Testing

Each component was tested individually and another testing process took place after the integration. Then the final testing was done assuming the application is delivered to the user. All these were performed with the guidance of test specifications designed according to the test plan.

IV. Results & Discussion

This section explains about the results obtained from the AssistME application. It includes the major interfaces and important code segments.

From the tests that were performed it was clear that the accuracy rate of the functions are above 85%.
Almost all the outputs gained from the test results are dependable enough to determine that the users can rely on the application when they start using it.

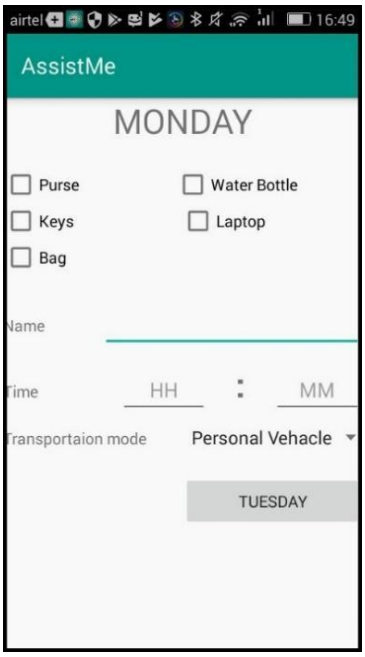

Fig. 2. Schedule Interface

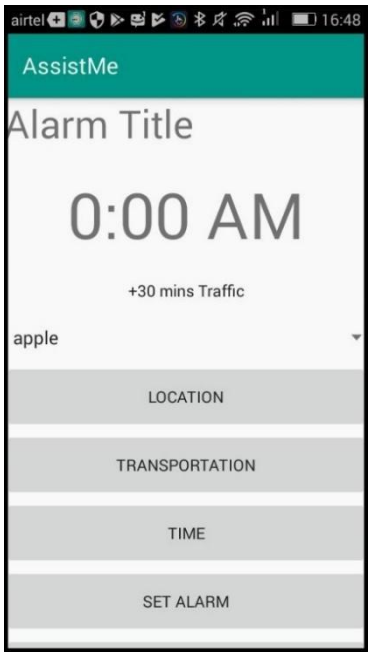

Fig. 3. Add Alarm Interface

Fig. 2. shows the initial interface of the AssistME application. This interface is only visible in the first time a user launches the application. This interface allows the user to choose the items that they carry, provide the destination, provide the time that they need to be present at the destination and the transportation method of their choosing. The above mentioned information will be collected for each day. Initial alarms will be made with the data gathered from the system.

Fig. 3. shows the Add alarm interface that allows the user to give a title to the alarm, choose a ringtone, the destination, transportation method and time that they need to be present at the destination. This interface is for the user to create an alarm to their liking, apart from the alarm which is made from the initial interface.

```
if(weatherCondition){
    minute=minute-15;
    if(minute<0){
        minute=60+minute;
        hour=hour-1;
    }

}


calendar.set(Calendar.HOUR_OF_DAY,hour );//set calendar instance with hours and minutes on the time picker
calendar.set(Calendar.MINUTE, minute);
```

Fig. 4. Alarm Code Segment

Fig. 4. explains a small code segment which is used when influencing the alarm with the weather condition.

Fig. 5. Search Item Interface

Fig. 5. shows the Add item interface. In this interface, the user can pair an iTag with the AssistME application which they can attach to the items that they need to keep track of. The user can toggle the tracking state of each tag and can search for tags to pair with the search floating action button.

```
@Override
public void onScanStart()
{
    devices.clear();
    stopScan = new Runnable() {
        @Override
        public void run()
        {
            mHandler.removeCallbacks(stopScan);
            mBluetoothAdapter.stopLeScan(mLeScanCallback);
            setRefreshing(false);

            if (!devices.isEmpty()) {
                displayListScannedDevices();
            } else {
                devicesFragment.snack("keyring not found");//if not found set snap bar
            }
        }
    };
    mHandler.postDelayed(stopScan, SCAN_PERIOD);//scan period 10 s
    mBluetoothAdapter.startLeScan(mLeScanCallback);
    setRefreshing(true);
}
```

Fig. 6. Search Tag Code Segment

Fig. 6. describes a code segment regarding the thread which is used to scan the iTags.

Fig. 7. Health Interface

Fig. 7. shows the Health interface of the AssistME application. It displays the step count of the user and calculates the BMR according to the health information captured from the user and their step count.

V. CONCLUSION

The main goal of this research was to develop an application that can perform as a virtual assistant who is capable to work on its own intelligence. All the objectives were achieved through the implementation of algorithms according to the components functionality. The components were designed with necessary assumptions to produce a reliable and accurate output to the user in order to enhance the quality of the application.

Assist ME application was built on assumptions such as the user will have a simple knowledge in English as well as the smart phone. The GPS component in the phone must function as designed and all the information and the notifications can only be received through their own account. In addition the processing power and the internet connectivity of the smart phone will affect the speed of the application to perform its tasks.

The current application includes all the essential features as the proposed concept. Additional features like connecting the Alarm component to Google Transit which is supported by some

countries might help the users to get more accurate results regarding the public transportation. A person with an interest of continuing this research to the next level can enhance this by enabling a vocal representation to answer the questions as a normal Virtual Personal Assistant.

ACKNOWLEDGEMENT

We dedicate our special thanks to Sri Lanka Institute of Information Technology for the opportunity to conduct a research on information technology and implementation and our lecture in charge Ms. Gayana Fernando and Dr. Yasas Jayaweera for the tremendous support.

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