DEVELOPMENT OF ANDROID MOBILE APPLICATION FOR RUNNING STATISTICS

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   4.2. To study the mechanism of calculate the calories.
   4.3. To study an applications programming technique for mobile devices on the Android OS platform.
   4.4. To carry out the analysis of popular programming languages, to select optimum for writing of a program application code.
   4.5. To develop the interface of a mobile application.
   4.6. To develop the structure of the required database for registration in the application.
   4.7. Test the application.

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**The task is taken to perform**

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ABSTRACT

Mobile phone applications are one of the most widely used techniques and have begun to interfere in all areas of our lives. The methods of developing existing mobile applications from custom practices to complex standard formats vary. Most application developers use custom methods in complex applications that increase the challenges of the application market to a tight state. This is true when application projects increase in size and complexity as developers continue to use traditional technologies to address the growing demands of this applications.

The project is development of android mobile application for running statistics. The objectives of this project is to count the number of steps that the user run it in each day, calculate the amount of calories that he spent in each time he run, the time that he spent in running for each day and show the history details of his running in previous days. The project provides a documented infrastructure for completion, future expansion and improvements.

To achieve the objectives I used JAVA for build the functions of the application, for design the interfaces of the application I used XML programming language, the impalement environment that I used is Android studio and for build the database of the application used MySQL to save the database of each user and I used preferences shared method to save the history running for each user in the device itself. The development approach is to conform to Software Engineering and Web standards to improve quality, accessibility and usability.
INTRODUCTION

Actually

The principal direction of enhancement of mobile devices of telephony is their multifunctional performance, an convenience, practicality.

The main functional capacities of normal phone, its direct missions are calls and obtaining messages. Thanks to technical progress, there can be such devices which are not included into frames of our understanding, being "behind the horizon" our imagination.

In fact, all smartphones became the small copy of the computer which permanently can be had in case of itself. Presently there are more and more smartphones, communicators, tablet PCs and other types of the devices convenient for use both in everyday life, and on the international trips in particular, are issued on the basis of Android OS.

Android maintains a large number of devices of different vendors. Android is characterized by high accessibility of development tools. Development tools for the Android platform are free while development, for example, under iPhone demands considerable initial financial attachments (from the Apple company).

Except all above-mentioned, advantage of Android OS is existence of free libraries for operation with third party resources (Yandex Map Kit, Google Map API) while for Windows Phone Mobile such libraries are not widespread.

The advantages stated above cause mass character and wide circulation of the modern devices on the basis of Android equipped with different functions and applications.

Research goal and objectives

The goal of this research is to development android mobile application for running, sport and counting the steps of the user.

For reaching this goal we must solve these following objects.

1. To study the mechanism work of the mobile applications for running.
2. To study the mechanism of calculate the calories.
3. To study an applications programming technique for mobile devices on the Android OS platform.

4. To carry out the analysis of popular programming languages, to select optimum for writing of a program application code.

5. To develop the interface of a mobile application.

6. To develop the structure of the required database for registration in the application.

7. Test the application.

Android Studio programming environment tools were used to implementation of an objective. In the course of execution of the thesis it was developed, corresponding to the specification, application.

Hypothesis: we assume that development of mobile applications in a software environment of Android Studio is most acceptable for application creation for mobile devices on the Android platform.

In chapter 1 of the thesis the analysis of techniques of development of mobile applications, an algorithm of development and methods is carried out attending on a network. Here the analysis of programming languages and application development environments is carried out.

Chapter 2 describe the functional requirement of the application with the UMLS diagrams, the program that used to build the application and describe the database of the application with screenshots of the database tables and the design of the interfaces.

In a chapter 3 describe the codes of the application and the function of each code and the deployment diagram of the hardware parts of the system.

In a chapter 4 the course of testing, adaptation and advance of a software product is described with the conclusion of the whole scientific research.
1. THEORETICAL BASES OF RESEARCH

1.1. The problem statement

I will build android mobile application for running, it object is calculate the distance that the users run it for each day and show the history of run for each day in previous week, the users must registered in the application by enter the details of them, this project will be available for android users. The system will be developed on the open source platform, so we can get an access to the system from anywhere and anytime and navigate easily, the user can just press the button (Run) and start the running after that the application will calculate the distance that he ran it, this application help the user to calculate the distance that he run it accurately also the time that the user spent it in each run and the amount of the calories that he burned it.

The project’s main aim is to build android mobile application which are the following.

1. The application count the number of steps that the user run it.
2. The application can calculate the calories that the user spent.
3. The user can make account in the application.
4. Can show the distance that the user run it in kilometer.
5. Can show the history of the running in previous days.
6. Can manage users through administrator account.
7. Keeps the database correct and up-to-date.
8. The user can change the settings of the application.

1.2. The mechanism work of the counting steps applications

I used the accelerometer sensor that build in every modern smart phone, its Use the Pythagorean theorem to calculate the magnitude of the acceleration vector of each sample from the accelerometer. Low-pass filter the magnitude signal to remove high frequency noise and then look for peaks and valleys in the filtered signal, Setting a changeable threshold level, When signal from accelerometer is above it I count it as a step. You may need to add additional
requirements to remove false positives. This is by far the simplest way to detect steps, it is also the way that most if not all ordinary pedometers of the sort that you can buy from a sports store work, fig. 1 shows the accelerometer sensor.

![Accelerometer sensor](image)

**Fig. 1. Accelerometer sensor**

1.3. Overview about how the application calculate the calories

Physical activity has a large effect on total human energy expenditure, and contributes 20-30 % to the body's total energy output. The amount of energy expended for different activities will vary with the intensity and type of exercise. For each person, the range for total daily energy expenditure is highly variable, it depends on many factors, including: activity level, age, gender, size, weight and body composition.

One of the easiest methods for recording of the intensity of a physical activity is the Metabolic Equivalent Task (MET) method. The energy cost of
many activities has been determined, usually by monitoring the oxygen consumption during the activity, to determine an average oxygen uptake per unit of time. This value is then compared to the resting oxygen uptake. One MET is the energy expended at rest, two METs indicates the energy expended is twice that at rest, three METs is triple the resting energy expenditure, etc.

Remember that MET values for each activity are approximations; there may be considerable individual variation. To get daily or weekly MET scores, multiply the MET value for each activity (from the table below) by the hours expended in that activity each time, then add all the activities over the time period.

Table 1. Metabolic Equivalent Task for all activities (MET)

<table>
<thead>
<tr>
<th>No.</th>
<th>Activity level</th>
<th>MTS/Hr of activity</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Light [18]</td>
<td>2.0 [18]</td>
<td>Walking at a slow pace (1-2 mi/hr), playing musical instrument, Light gardening, Light office work, light use of hand tools (watch repair or micro-assembly, light assembly/repair); standing, light work (bartending, store clerk, assembling, filing) [18]</td>
</tr>
<tr>
<td>3.</td>
<td>Light plus [18]</td>
<td>2.5 [18]</td>
<td>Walking downstairs, Cooking, light housekeeping, shopping, Pushing stroller with child, walking dog [18]</td>
</tr>
</tbody>
</table>
After choose the MET, multiply the MET value by your weight in kilograms. If you weigh 80 kilograms and perform an activity like running with a MET value of 8, for example, this would give you 640 as a product.

Final step is multiply the product by the time you performed the activity in hours to get the number of calories you burned. For example, if you running for 30 minutes then you would multiply 640 by 0.5 to get 320 calories.

### 1.4. Overview of programming languages for mobile application development

For creation of the web applications intended for portable devices often the HTML5 language is used. Its basic functions give the chance of an insertion of various data types on Android, to improve input and output parameters.

Other important advantage of this language is that practically any modern mobile device supports the standard HTML5 language, including Android, iPhone OS, Windows Phone. Recently it became known that the mobile iPhone
OS platform completely does not support Flash technology, and the Android operating system is compatible only partially. In the HTML5 language such problem is absent as it is cross-platform.

The HTML5 language is very simple in comparison with his competitors and does not require great efforts in its mastering. On the relation of efficiency and labor input this language has essential advantage. To develop the browser and web-centric software, the HTML5 language will become a quite good choice.

The single programming language which has a direct connection with mobile devices, the Java language. It is designed for object-oriented programming which owner is the largest company SUN Microsystems founded at the end of the last century. The Java language belongs Oracle corporations. According to a judgment of experts of Java is the advanced programming language now, knowledge of this language will allow to develop not only private programs, but also these skills will be useful also in the large companies.

One more important distinctive feature of this language is its polytonality. In case of conversion of the test file to the binary code, Java it can be used by two methods: in a window of the observer or via the virtual device which operation does not require the browser. Such universality plays an important role if business reaches before repeated application of a code or up-dating of the software, we will explain below each programming languages that we will used to build this application.

1.4.1. Java programming language

JAVA was developed by Sun Microsystems Inc in 1991, later acquired by Oracle Corporation. It was developed by James Gosling and Patrick Naughton. It is a simple programming language. Writing, compiling and debugging a program is easy in java. It helps to create modular programs and reusable code [3].

Java is a general-purpose computer-programming language that is concurrent, class-based, object-oriented [10], and specifically designed to have
as few implementation dependencies as possible. It is intended to let application developers "write once, run anywhere" [4] meaning that compiled Java code can run on all platforms that support Java without the need for recompilation [12]. Java applications are typically compiled to byte code that can run on any Java virtual machine (JVM) regardless of computer architecture. As of 2016, Java is one of the most popular programming languages in use [15], particularly for client-server web applications, with a reported 9 million developers [17].

The original and reference implementation Java compilers, virtual machines, and class libraries were originally released by Sun under proprietary licenses. As of May 2007, in compliance with the specifications of the Java Community Process, Sun relicensed most of its Java technologies under the GNU General Public License. Others have also developed alternative implementations of these Sun technologies, such as the GNU Compiler for Java (byte code compiler), GNU Class path (standard libraries), and Iced Tea-Web (browser plugin for applets).

The latest version is Java 10, released on March 20, 2018 [14], which follows Java 9 after only six months in line with the new release schedule.

1.4.2. Xml programming language

XML is a general purpose markup language that can be used to control the structure of data. Despite the fact that many prefer the simplicity of JSON, it still has many advantages.

XML is very similar to HTML and this is not surprising as they both stem from same base technology, SGML Standard Generalized Markup Language.

XML was designed to be both human and machine readable and as a result it can be verbose and not as compact a way of packaging data as you might desire. It can also be criticized for being too much to type in but in most cases XML generation and consumption is done by programs with humans only getting involved when things go wrong.

If you know HTML then you will certainly recognize XML. There is a sense in which XML is a general purpose version of HTML. You use HTML to
markup web pages but you can use XML to markup and give structure to any data you care to think of. There was even an attempt to make HTML a subset of XML i.e. XHTML but this has been abandoned in favor of HTML5.

Even though XML may not have taken over the data markup world as it was intended to it still has enough advantages to be preferred in many situations and this means that as a programmer you should know something about it. It does have a reputation for being difficult to process from scratch but the fact is that most languages have XML libraries that make working with it just a matter of making the right function calls [9].

1.5. Overview of Application Development Environment

Today the most popular operating system in the mobile industry is Android, constructed on Linux kernel. Along with this Android provides full access to the public interface of development of software products Application Programming Interface which is used in a kernel of programs.

Structure of OS it is realized so that any software can use already created functionality of the third-party application only if it provides open access to application of the opportunities. The architecture is realized in such a way that it uses the principle of repeated application of the OS or software components.

This OS on different types of devices which can only be imagined in the form of today's mobile gadgets - smartphones, e-books, pads, photo frames, the watch under control of OS, photo cameras and many other is used. As instruments of programming, developers of the Android operating system provide full access to assembly of Android SDK at which there is an emulator of a mobile operating system and also different components managing directors of settings by the selected platform that in turn, gives the chance with little effort to develop free applications or partially free applications. Therefore the developer needs to pick up the most convenient packet of tools for development, with support of SDK files. Similar development environments only a little, but one of the most popular the game engine of Unity3D and a plug-in of IDE Eclipse
"Android Development Tools" (ADT) and also Android Studio plug-in which recently appeared in the mobile market are.

The development environment of Eclipse is the integrated shell program intended for creation of cross-platform applications. For this environment there is a set of versions of the free and commercial components. Initially Eclipse was designed for Java object-oriented language. Today there are extensions with support of third-party languages, such, as With, With ++, JavaScript, Fortran, etc. For extension of opportunities of shell program, American diggings of Google, I created a plug-in of Android Development Tools (ADT). This plug-in provides an opportunity to dynamically process new projects, including an application interface, to connect different packets based on a framework of Android Framework API and also to realize debugging of the project with the help of the Android SDK tools [1].

Thanks to the practical graphic interface, it is visually visible to the developer that he makes at present. Also Eclipse automatically binds events to objects. However the engine of Unity3D shows only the end result of application, in other words, as the project looks in general. Also at the same time in Unity3D it is necessary most to create objects and to set up attachment of scenarios.

In addition to without which software tools it is impossible to create application, there is a set of the supportive applications facilitating development process.

For development of a mobile application not to do without the program Android SDK complex. This means is the universal which stores tool kit in itself(himself), required by development, compiling and also for package of a software product in one file.

We will consider briefly the main possibilities and also the tools participating in operation of Android SDK:

Android SDK Manager–function which loads the main Android SDK modules. Also displays the status of packets of Android SDK: if it is set, then
the status (Installed) if it is not set - (Not Installed), in need of up-dating (Update available).

Android Debug Monitor - the independent function displaying the graphic interface of tools, specially created for debugging and also for information collection about the found errors:

Hierarchy Viewer gives an opportunity to debug and also to improve the user interface of a software product.

Tracer for OpenGL ES (OpenGL for Embedded Systems) - the tool the analyzing program code of a mobile application. By means of it it is possible to capture the commands Open GL | ESS, then to display them on separate frames. These actions allow to understand how graphic operations are executed.

Dalvik Debug Monitor Server (DDMS) - the extremely useful tool which is responsible for transfer of different ports, screenshots of the screen of the mobile device. Provides information on worker processes, flows, memories of a device, outputs data on the operations Android in real time, as shown in fig. 2

![Android Debug Monitor](image)

**Fig. 2. Demonstration of the Monitor tool**

Android IDE (Android Development Tools) – an integrated development environment for operation on the Android platform, constructed on the basis of Eclipse. Provides tool kit for development, compilation, build automation and testing of the software, as shown in fig. 3.
Android Studio – the integrated development environment under Android OS constructed on the basis of IntelliJ IDEA. Basic functions same, as on Android IDE (Android Development Tools). However, contrary to waiting of IntelliJ IDEA, to all opportunities the following additions were realized.

1. Support of the mobile application created on the system of automatic assembly Gradle.
2. The utility of Lint intended for detection of problems with productivity with compatibility of releases.
3. The instantaneous correction of different defects.
4. The editor supports the majority of display resolutions.
5. The utility of Pro Guard which reduces is added and optimizes a program code. As a result apk the file of the smaller size which is more difficult for turns out.
6. The support of the Google Cloud platform allowing developers to create and test mobile applications on infrastructure of Google.

![Fig. 3. Integrated development environment of Android Studio (IDE)](image)

1.6. Comparison of the programming platforms for android development

The two most famous and usable platforms for building android mobile applications is Android studio and eclipse.
Android studio is the official android platform for development the applications from Google, It was announced by Google in May 2013 and the stable version was released in December 2014, the Android Studio IDE is based on very popular IntelliJ IDEA from JetBrains and is being offered by Google for free.

Whereas back in November 2001 a team has started working on Eclipse as open-source software, backed by IT giant IBM with close to $40 million investment, Eclipse 3.0 was officially launched on 21 June 2004, with a base workspace and an extensible plug-in system for customizing the environment. Table 2 show the comparison in different function between Android studio and Eclipse.

Table 2. Comparative function between Android studio and Eclipse

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Android studio</th>
<th>Eclipse</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Build System</td>
<td>Android Studio uses the time tested Gradle build system. It builds on Apache Ant and Apache Maven. Android Studio also introduces a Groovy DSL (Domain-Specific Language), which allows for scripted builds opening up many automation possibilities like uploading your beta .apk [22].</td>
<td>Eclipse uses Apache Ant as its main build system, a very robust XML based build system. Many Java developers may already be familiar with this robust XML based build system [22].</td>
</tr>
<tr>
<td>2.</td>
<td>Design/Layout</td>
<td>Android Studio has new interface design pretty faster. It responds to changes more robust and rapidly manner [22].</td>
<td>in Eclipse, we have to set them manually in XML file[22].</td>
</tr>
</tbody>
</table>
As a professional android programming, Android Studio seems more natural for me because its work smoothly and its interface is very simple to use but remember it takes some time to be familiar with Android Studio especially if you guys have been using Eclipse for a long time.

**1.7. Comparison of the most downloaded android applications for running**

In recent times, with the increase in the number of people who are overweight and with insufficient time to go to gyms, the use of applications for running and sports has increased over time due to the fact that it calculates the amount of time spent in running and the number of calories The thermal is
burned every day and also allows the user to view the duration of the day in which the previous week and the number of calories burned each day, so we will display the most used and downloaded applications for running: Run keeper [2]. fig. 4 shows the main page of Run keeper application.

![Run keeper application](image)

**Fig. 4. Main interface of run keeper application**

Run keeper application is one of the most downloaded sport and health application from Google play because it's simples interfaces and creative features, it provides the user many characteristics such as the user can set a goal by select the distance that he want to run it and the time that he think he need to achieve this goal and the second characteristic that it is allow the user to connect with Google music and listen to the music during running.

My ASICS is one of the simplest run application, the user can just press the button of run and start running and when the user finished the application display the distance that he run it by kilometer and the time that he take it, also this application allow the user to display the number of calories that he buried in each time he run and allow the user to share his high score of his running in the social networks [7]. fig. 5 shows the main interface of My ASICS.
Run tracker is new application. However, the users that download it are increasing day by day because of the unique features it offers, such as tracking the amount of calories burned in each run, displaying the user's run history from previous days, and sending daily challenges to the user [8].

Fig. 6 shows the main interface of the Run tracker application.
All these running and sports applications provide the user in many features like the simple interfaces that allow the user to use it easily, some of its can calculate the calories that the user spent it, allow the user to connect to the Google music and listen to the music during the running, sent daily challenges to the user and notified him when he finished it, display the history of running in previous week and the high score of the user running. There are some disadvantages in these applications a some of it's don't work in the backgrounds so the user must unlock his mobile every time that he want to see the distance that he run it, the high quality of these applications always need money to bought it or it Requires purchases inside the application, most of these application didn't add a graph for the running situation.
2. DEVELOPMENT OF THE APPLICATION

2.1. Functional requirements

The functions that will be available for future system of my mobile application for running.

The features that are available for the system.

1. The registered user must be able to display the number of steps that he run it.

2. The application must be able to view the number of user calories that he spent in each time he run.

3. The system must be able to display the history of the user running in previous days.

4. The system must send the notifications when the user achieved the challenges.

5. The system must be able to display the graphic of the distance, calories and steps that the user run it in each day.

6. The system must be able to display the distance that the user run it in the background.

The features that are available for the programmer.

The programmer must be able to manage, modify, updating by adding a new functions to the applications and delete the users account also can send the updates to the users.

The features that are available for the user.

1. The unregistered user must be able to register in the application.

2. The registered user must be able to change the settings of the application such as change the unit of distance measurement to kilometer or steps and turn the notifications on or off.

3. The registered user must be able to add new training.

4. The registered user must be able to add a new distance measurement option.

5. The user must be able to change his personal information.
2.2. Use case diagram

A use case diagram is type of UML diagrams Capture business requirements for the system and illustrate the interaction between the system and its environment its used to describe the basic functions of the information system [5].

Use-case models have two primary constructs: actors and use cases. An actor represents a role that a user of the system plays, not a specific user, A use case represents a major business process that the system will perform.

this use case diagram show six cases, there are one types of actor: register user. fig. 7 shows the Use case diagram of the Android Mobile Application For Running.

![Use case diagram](image)

Fig. 7. Use case diagram

The use cases "Change the settings", "Add a new training", Add new distance measurement", "Display and delete the history of running", " Display and delete the history of training option" and "Modify the user information" are available for register user.
2.3. Development of the database

Databases are where all your data is stored. It’s like a bunch of filing cabinets with folders filled with files. Databases come mainly in two flavors: SQL and No SQL [20]. In common parlance, the term database refers to a collection of data that is managed by a DBMS.

A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a database. A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data. A DBMS relieves users of framing programs for data maintenance. Fourth generation query languages, such as SQL, are used along with the DBMS package to interact with a database [13].

I used My Sql to build the database table to save the personal information of the user, step_user table save the personal information of the user like (ID, user_name, user_password, user_weight, user_height, user_phone, user_email, user_image), also put the date of created and the last modify of his personal information, as shown in fig. 8.

Fig. 8. The structure of the table "step_user"
2.4. Local save (Shared preferences)

Android provides many ways of storing data of an application. One of this way is called Shared Preferences. Shared Preferences allow you to save and retrieve data in the form of key, value pair.

Shared Preferences is an API from Android SDK to store and retrieve application preferences. Shared Preferences are simply sets of data values that stored persistently. Persistently which mean data you stored in the Shared Preferences are still exist even if you stop the application or turn off the device. Shared Preferences available at the Activity level or shared across all Activity in application package.

2.5. Development of the interface

A mobile user interface (mobile UI) is the graphical and usually touch-sensitive display on a mobile device, such as a smartphone or tablet, that allows the user to interact with the device’s apps, features, content and functions.

Mobile user interface (UI) design requirements are significantly different from those for desktop computers. The smaller screen size and touch screen controls create special considerations in UI design to ensure usability, readability and consistency. In a mobile interface, symbols may be used more extensively and controls may be automatically hidden until accessed. The symbols themselves must also be smaller and there is not enough room for text labels on everything, which can cause confusion [11].

Users have to be able to understand a command icon and its meaning whether through legible text or comprehensible graphical representation. Basic guidelines for mobile interface design are consistent across modern mobile operating systems.

The first interface that appear to the user after he install the application is registration interface that allow the user to register in the application by enter the details of him like (the username, the password, the height, the weight, the age, photo), which is shown below in fig. 9.
The user who enter to the application can easily see the information of his running in this day, first there is the number of the day in the calendar and how much steps he had run it in this current day, the number of calories that he spent it in this day and the graphic of his running in each hour of the day, also there is the run button it start counting the user steps after he press it and the user can enter the menu button to display the list of chooses such as (training, distance measurement and the settings), which is shown below in fig. 10.

Fig. 10. The main interface of the application
The interface of "week" display the details of user running in previous such as the distance that he running it in this week and the amount of calories that he spent and the graph running in each day of the week, which is shown below in fig. 11.

Fig. 11. The history of the user in previous week

The month interface shows the history running of the user in previous month with the graph of his running and the amount of calories that he spent in each week in the previous month, which is shown below in fig. 12.

Fig. 12. The history of the user in previous month
The training interface that allow the user to add new training and see the list of his previous training, also see the total steps of his training in previous month, which is shown below fig. 13.

![Fig. 13. The interface of the training option](image)

The distance measurement option allow the user to measure the distance that he want to measure it such as the distance between two buildings or see the distance that he think he can run it, which is shown below fig. 14.

![Fig. 14. The interface of the distance measurement option](image)
3. IMPLEMENTATION OF ANDROID MOBILE APPLICATION FOR RUNNING SYSTEM

3.1. Several fragments of JAVA-code for implementing the basic functionality

I build this application with many functions, some of them are complex and many of them are duplicate from others, the application has many functions and each function implement by Java code.

**Register Function.** fig. 15. displays the register function in the application and by enter the details of the user like "name", "email", "age", "height", "weight", "mobile number".

```java
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_register);
    setupActionBar();
    final ActionBar actionBar = getSupportActionBar();
    actionBar.setTitle getResources().getString(R.string.register));
    setUpUI();
}

private void setUpUI() {
    et_name=(EditText) findViewById(R.id.et_name);
    et_email=(EditText) findViewById(R.id.et_email);
    et_password=(EditText) findViewById(R.id.et_password);
    et_age=(EditText) findViewById(R.id.et_age);
    et_height=(EditText) findViewById(R.id.et_height);
    et_weight=(EditText) findViewById(R.id.et_weight);
    et_mobile=(EditText) findViewById(R.id.et_mobile);
    rel_register=(RelativeLayout)findViewById(R.id.rel_register);
    rel_login=(RelativeLayout)findViewById(R.id.rel_login);
    setClick(rel_register);
    setClick(rel_login);
}

@Override
public boolean onOptionsItemSelected(MenuItem item) {
    if (item.getItemId() == android.R.id.home) {
        finish();
    }
    return false;
}
```

Fig. 15. Function for register user
**Login function.** fig. 16 displays the login function in the system by entering the E-mail and the password of the user that already registered.

```java
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_login);
    setUpUI();
}

private void setUpUI() {
    tv_skip=(TextView)findViewById(R.id.tv_skip);
    tv_forgotpass=(TextView)findViewById(R.id.tv_forgotpass);
    et_emailId=(EditText)findViewById(R.id.et_emailId);
    et_password=(EditText)findViewById(R.id.et_password);
    rel_login=(RelativeLayout)findViewById(R.id.rel_login);
    rel_register=(RelativeLayout)findViewById(R.id.rel_register);
    setClick(rel_login);
    setClick(rel_register);
    setClick(tv_skip);
    setClick(tv_forgotpass);
}
```

Fig. 16. Function for login user

**Daily report function.** fig. 17 for save the history of the user running I used preferences shared method to save the data of the daily report for count the summary of the number of steps that the user run it in each day and the amount of calories that he spent in each day and the chart for the step count compare with the amount of calories.

```java
public class DailyReportFragment extends Fragment implements ReportAdapter.OnItemClickEventListener,
        public static String LOG_TAG = DailyReportFragment.class.getSimpleName();
    private final BroadcastReceiver broadcastReceiver = new BroadcastReceiver();
    private ReportAdapter mAdapter;
    private RecyclerView mRecyclerView;
    private OnFragmentInteractionListener mListener;
    private ActivitySummary activitySummary;
    private ActivityDayChart activityChart;
    private List<Object> reports = new ArrayList<>();
    private Calendar day;
    private boolean generatingReports;
    private Map<Integer, WalkingMode> menuWalkingModes;
    private int menuCorrectStepId;
    private AbstractStepDetectorService.StepDetectorBinder myBinder;
    private ServiceConnection mServiceConnection = new ServiceConnection() {
        @Override
        public void onServiceDisconnected(ComponentName name) {
            myBinder = null;
        }
        @Override
        public void onServiceConnected(ComponentName name, IBinder service) {
            myBinder = (AbstractStepDetectorService.StepDetectorBinder) service;
            generateReports(updated = true);
        }
    }
```

Fig. 17. Saving data of the daily report
**Weekly report function.** Fig. 18 weekly report saves the summary details of the user running for each week.

```java
public class WeeklyReportFragment extends Fragment implements ReportAdapter.OnClickListener, OnBackPressedListener {
    public static String TITLE = WeeklyReportFragment.class.getSimpleName();

    private ReportAdapter mAdapter;
    private RecyclerView mRecyclerView;

    private Calendar mCalendar;
    private ActivitySummary activitySummary;
    private ActivityChart activityChart;
    private List<JSONObject> reports = new ArrayList<>();
    private boolean generatingReports;
    private Map<Integer, WalkingMode> mWalkingModes;

    private final BroadcastReceiver broadcastReceiver = new BroadcastReceiver() {
        @Override
        public void onReceive(Context context, Intent intent) {
            String action = intent.getAction();
            if (action.equals(StepDetectorService.ACTION_RECORD_COMPLETE)) {
                String userId = intent.getStringExtra(StepDetectorService.EXTRA_USER_ID);
                String date = intent.getStringExtra(StepDetectorService.EXTRA_DATE);

                // Logic to handle the step detector data
            }
        }
    };

    public void onServiceConnected(ComponentName name, IBinder service) {
        boolean serviceConnected = (service instanceof StepDetectorService) && ((StepDetectorService) service).connected();
    }

    public void onServiceDisconnected(ComponentName name) {
        myBinder = null;
    }
    ...
```

Fig. 18. Saving data of the weekly report

**Monthly report function.** Fig. 19 monthly report saves the details of the user history running in each month, like the number of steps in each week in the month and the amount of calories, also saves the summary of user running in each month.

```java
public class MonthlyReportFragment extends Fragment implements ReportAdapter.OnClickListener, OnBackPressedListener {
    public static String TITLE = MonthlyReportFragment.class.getSimpleName();

    private ReportAdapter mAdapter;
    private RecyclerView mRecyclerView;

    private final BroadcastReceiver broadcastReceiver = new BroadcastReceiver() {
        @Override
        public void onReceive(Context context, Intent intent) {
            String action = intent.getAction();
            if (action.equals(StepDetectorService.ACTION_RECORD_COMPLETE)) {
                String userId = intent.getStringExtra(StepDetectorService.EXTRA_USER_ID);
                String date = intent.getStringExtra(StepDetectorService.EXTRA_DATE);

                // Logic to handle the step detector data
            }
        }
    };

    public void onServiceConnected(ComponentName name, IBinder service) {
        boolean serviceConnected = (service instanceof StepDetectorService) && ((StepDetectorService) service).connected();
    }

    public void onServiceDisconnected(ComponentName name) {
        myBinder = null;
    }
    ...
```

Fig. 19. Saving data of the monthly report
Activity distance measurement fig. 20: this activity allow the user to measure the walked distance, so when the user press start running button the system start counting the steps of his running.

![Activity distance measurement](image)

Fig. 20. Function for distance measurement activity

Saved instance state function. fig. 21: this function allow the user to save the distance that he running it after pressing the stop running button and when he re-pressed the start run button the system continue measured the distance that saved.

![Saved instance state function](image)

Fig. 21. Function of saved instance state
**Training activity function.** fig. 22: this function allow the user to start a new training, and see the details of his training like "training steps", "training distance", "training calories".

```java
@Override
protected void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_training);
    // get current training instance
    training = TrainingPersistenceHelper.getActiveItem();
    if (training == null) {
        // if no training is active, start persistance service
        StartDetectionServiceHelper.startPersistenceService();
        // Now wait for steps saved broadcast message and then create a new training session.
        // We have to wait to ensure that only the steps since now are counted.
    }
    mTextViewSteps = (TextView) findViewById(R.id.training_steps);
    mTextViewDistance = (TextView) findViewById(R.id.training_distance);
    mTextViewDistanceTitle = (TextView) findViewById(R.id.training_distance_title);
    mTextViewCalories = (TextView) findViewById(R.id.training_calories);
    mTextViewCaloriesTitle = (TextView) findViewById(R.id.training_calories_title);
    mTextViewDuration = (TextView) findViewById(R.id.training_duration);
    mTextViewVelocity = (TextView) findViewById(R.id.training_velocity);
    mTextViewVelocityTitle = (TextView) findViewById(R.id.training_velocity_title);
    buttonStartStop = (Button) findViewById(R.id.start_stop_button);
    if (buttonStop != null) {
        buttonStop.setOnClickListener(this);
    }
}
```

Fig. 22. Function of training activity

**Activity day chart function.** fig. 23: this function display the distance that the user running it in the current day and the calories that he spent it in this day.

```java
public class ActivityDayChart {
    private String title;
    private Map<String, ActivityChartDataSet> steps;
    private Map<String, ActivityChartDataSet> distance;
    private Map<String, ActivityChartDataSet> calories;
    private int goal;

    public ActivityDayChart(Map<String, ActivityChartDataSet> steps, Map<String, ActivityChartDataSet> distance, Map<String, ActivityChartDataSet> calories) {
        this.title = title;
        this.steps = steps;
        this.distance = distance;
        this.calories = calories;
        this.goal = goal;
    }

    public String getTitle() { return title; }
    public Map<String, ActivityChartDataSet> getSteps() { return steps; }
    public Map<String, ActivityChartDataSet> getDistance() { return distance; }
    public Map<String, ActivityChartDataSet> getCalories() { return calories; }
    public int getGoal() { return goal; }
}
```

Fig. 23. Function of the activity day chart
**On shutdown broadcast receiver function.** Fig. 24: this function is receive the on shutdown and saves the count steps.

```java
public class OnShutdownBroadcastReceiver extends BroadcastReceiver {
    private static final String LOG_CLASS = OnShutdownBroadcastReceiver.class.getName();

    @Override
    public boolean onReceive(Context context, Intent intent) {
        Log.i(LOG_CLASS, msg: "onReceive");
        StepDetectionServiceHelper.startPersistenceService(context);
    }
}
```

Fig. 24. Function of On shutdown broadcast receiver

**Motivation alert receiver function.** Fig. 25 and fig. 26: its function is to receive the motivation alert event and notifies the user.

```java
public class MotivationAlertReceiver extends WakefulBroadcastReceiver {
    public static final int NOTIFICATION_ID = 0;
    private static final String LOG_CLASS = MotivationAlertReceiver.class.getName();
    private Context context;
    private AbstractStepDetectorService.StepDetectorBinder myBinder = null;

    private ServiceConnection mServiceConnection = new ServiceConnection() {
        @Override
        public void onServiceConnected(ComponentName name, IBinder service) {
            myBinder = (AbstractStepDetectorService.StepDetectorBinder) service;
            motivate();
            context.getApplicationContext().unbindService(mServiceConnection);
        }
    };

    @Override
    public void onReceive(Context context, Intent intent) {
        Log.i(LOG_CLASS, msg: "Motivate the user!");
        this.context = context;
        SharedPreferences sharedPref = PreferenceManager.getDefaultSharedPreferences(context);
        float criterion = float.parseFloat(sharedPref.getString("org.wordpress.privacyactivitytracker.pref.motiv...", if (criterion < 0 || criterion > 100) {
            Log.e(LOG_CLASS, msg: "Invalid motivation criterion. Cannot notify the user.");
            return;
        } // End to service
        Intent serviceIntent = new Intent(Context, Factory.getPrepStepDetectorServiceClass(content.getPackageManager()));
        context.getApplicationContext().bindService(serviceIntent, mServiceConnection, Context.BIND_AUTO_CREATE);
    }

    @Override
    public void onServiceDisconnected(ComponentName name) {
        myBinder = null;
    }

    Log.w(LOG_CLASS, msg: "Cannot get steps from binder.");
}
```

Fig. 25. Function of motivation alert receiver

```
Fig. 26. Function of motivation alert receiver

```
3.2. Deployment Diagram of mobile application for running

A UML deployment diagram is a diagram that shows the configuration of run time processing nodes and the components that live on them. Deployment diagrams is a kind of structure diagram used in modeling the physical aspects of an object-oriented system. They are often be used to model the static deployment view of a system (topology of the hardware) [19].

The term Deployment itself describes the purpose of the diagram. Deployment diagrams are used for describing the hardware components, where software components are deployed. Component diagrams and deployment diagrams are closely related.

Component diagrams are used to describe the components and deployment diagrams shows how they are deployed in hardware.

UML is mainly designed to focus on the software artifacts of a system. However, these two diagrams are special diagrams used to focus on software and hardware components [21].

fig. 27 displays the deployment diagram of the hardware parts of the system that connected with each other to make the system working smoothly, the deployment diagram contain of three parts, the first part is the application server that saves the (apk) of the application and it's connected with the client device to send the updates to him, the second part is the database server that saves the details of each user register that register in the application, the third part is the client device that has the environment to execute the application and it is connected with the application server and database server.

![Fig. 27. The deployment diagram](image-url)
4. PRINCIPLE TESTING OF THE MOBILE APPLICATION

4.1. The used methods of testing

Functional testing is an important checkpoint before releasing a mobile application. In this article, we will share a checklist of some of the basic points that will be common among mobile applications when you need to perform functional testing.

Mobile application functional testing usually covers user interaction testing, as well as testing of transactions. Important factors for this type of testing are the following.

1. The type of application defined by its business functionality (banking, gaming industry, social networks, education).
2. The target audience (user, company, educational environment).
3. The distribution channel for the application (for example, App Store, Google Play or direct distribution).

In simple terms, we check whether the application performs the expected functions, which are usually described in the specification or dictated by the business.

Therefore, functional testing can be carried out in terms of requirements. In this case, test cases are formed. Technical specification based on the business processes is used for its creation. Once this is done, so-called use cases for mobile testing are created which describe scenarios for daily or permanent use of the application [6].

Functional testing is a type of testing which verifies that each function of the software application operates in conformance with the requirement specification. This testing mainly involves black box testing and it is not concerned about the source code of the application.

Each and every functionality of the system is tested by providing appropriate input, verifying the output and comparing the actual results with the expected results. This testing involves checking of User Interface, APIs, Database, security, client/ server applications and functionality of the
Application Under Test. Therefore, we compare the actual results and the expected results (tab. 3).

Table 3. The functional testing of the application

<table>
<thead>
<tr>
<th>No.</th>
<th>Function</th>
<th>Expected result</th>
<th>Obtained result</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>The capability of the registration of the user</td>
<td>The user can register in the application by entering his details like the username, password, age, the height, the weight</td>
<td>The user can register in the application by entering his details like the username, password, age, the height, the weight</td>
<td>Passed</td>
</tr>
<tr>
<td>2.</td>
<td>Show the main interface of the application to the register user with all options</td>
<td>The system show the main interface of the application to the register user with all options</td>
<td>The system show the main interface of the application to the register user with all options</td>
<td>Passed</td>
</tr>
<tr>
<td>3.</td>
<td>Show the details of the current day of the user running</td>
<td>Show the information of the user running in the current day like the number of steps that he running it, the number of calories that he spent it, the time that he spent in running this day</td>
<td>Show the information of the user running in the current day like the number of steps that he running it, the number of calories that he spent it, the time that he spent in running this day</td>
<td>Passed</td>
</tr>
<tr>
<td>4.</td>
<td>Change the details of the user</td>
<td>The user can change his details like his height and weight</td>
<td>The user can enter to his profile and change his details like his height and weight</td>
<td>Passed</td>
</tr>
<tr>
<td>5.</td>
<td>Training option</td>
<td>The user can choose the training option and add new training</td>
<td>The user can choose the training option and add new training</td>
<td>Passed</td>
</tr>
<tr>
<td>6.</td>
<td>Change the mode of the running</td>
<td>The user can choose walking or running mode</td>
<td>The user can choose walking or running mode</td>
<td>Passed</td>
</tr>
<tr>
<td>No.</td>
<td>Function</td>
<td>Expected result</td>
<td>Obtained result</td>
<td>Conclusion</td>
</tr>
<tr>
<td>-----</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>7</td>
<td>The chart of the user running</td>
<td>Show the information of the user running of each day like the distance that he running it in the day and the calories that he burned it as a chart</td>
<td>Show the information of the user running of each day like the distance that he running it in the day and the calories that he burned it as a chart</td>
<td>Passed</td>
</tr>
<tr>
<td>8</td>
<td>History running of previous week</td>
<td>Show the history running of the user in the previous week like the distance he run it in previous week and the number of calories that he spent in previous week</td>
<td>Show the history running of the user in the previous week like the distance he run it in previous week and the number of calories that he spent in previous week</td>
<td>Passed</td>
</tr>
<tr>
<td>9</td>
<td>History running of previous month</td>
<td>Show the details of history running in the previous month like the distance he run it in previous month and the number of calories that he spent in previous month</td>
<td>Show the details of history running in the previous month like the distance he run it in previous month and the number of calories that he spent in previous month</td>
<td>Passed</td>
</tr>
<tr>
<td>10</td>
<td>Change the profile picture</td>
<td>The user has the capability to change his profile picture</td>
<td>The user has the capability to change his profile picture</td>
<td>Passed</td>
</tr>
<tr>
<td>11</td>
<td>Change the unit of the distance measurement</td>
<td>The user has the ability to change the unit of distance measurement like kilometer or steps</td>
<td>The user has the ability to change the unit of distance measurement like kilometer or steps</td>
<td>Passed</td>
</tr>
<tr>
<td>No.</td>
<td>Function</td>
<td>Expected result</td>
<td>Obtained result</td>
<td>Conclusion</td>
</tr>
<tr>
<td>-----</td>
<td>---------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>---------------------------------------------------------------------------------</td>
<td>------------</td>
</tr>
<tr>
<td>12.</td>
<td>Work in the background</td>
<td>The application display the details of the user running in the background of the mobile without opening the application itself</td>
<td>The application display the details of the user running in the background of the mobile without opening the application itself</td>
<td>Passed</td>
</tr>
<tr>
<td>13.</td>
<td>Send the notifications</td>
<td>The application send notifications to the user remind him to start running</td>
<td>The application send notifications to the user remind him to start running</td>
<td>Passed</td>
</tr>
<tr>
<td>14.</td>
<td>The admin must be able to modify and delete information about users’ accounts.</td>
<td>The admin can see the database of the user with capability of modify and delete any information of the user account</td>
<td>The admin can see the database of the user with capability of modify and delete any information of the user account</td>
<td>Passed</td>
</tr>
<tr>
<td>15.</td>
<td>Distance measurement option</td>
<td>The user can choose the distance measurement option to measure the distance that he want to run it</td>
<td>The user can choose the distance measurement option to measure the distance that he want to run it</td>
<td>Passed</td>
</tr>
<tr>
<td>16.</td>
<td>Change the settings</td>
<td>The user can enter to the settings interface and change the settings of the application like turn on/off the notifications, turn on/off the display in the background and change the personal daily steps goal</td>
<td>The user can enter to the settings interface and change the settings of the application like turn on/off the notifications, turn on/off the display in the background and change the personal daily steps goal</td>
<td>Passed</td>
</tr>
</tbody>
</table>
4.2. Result of testing of the application interface

The first interface that appears to the user after installing the application is the register interface, it allows the user to enter to the main interface of the application after he inserts his personal information like "Name", "Password", "Age", "Height", "Weight", "E-mail", "Mobile number" and this details saves in the database, as shown in the fig. 28, fig. 29, fig. 30.

Fig. 28. The register interface

Fig. 29. Insert the personal information of the user
After finished the register operation the main interface appear to the user, it is contain the details of the user running in the current day like the steps that he run it in this day, the amount of calories that he burned it, the graph of user running and the start/stop running button and the menu list, as shown in the fig. 31 and fig. 32.
Fig. 32 shows the graph in the main interface.

![Graph in Main Interface](image)

**Fig. 32. The graph in the main interface**

The user can enter to the history running details of the last week and see the distance that he running it in each day of previous week and the amount of calories, also can see the graph of his running with the sum of his distance running in previous week, as shown in the fig. 33.

![History Interface](image)

**Fig. 33. The interface history of the last week**
The user can display the details of his running of the previous week, as shown in the fig. 34.

![Step Count](image1)

**Fig. 34. The interface history of the last month**

If the user had an account in the application he just can login in by the login interface and enter to the application, as shown in the fig. 35.

![Login Interface](image2)

**Fig. 35. The login interface**
The user can display the menu list and select the option that he wants to make it like "Training", "Distance measurement", "Settings", as shown in the fig. 36.

![Menu List Interface](image)

**Fig. 36. The menu list interface**

The user can enter to the personal information interface and change his information, as shown in the fig. 37.

![Personal Information Interface](image)

**Fig. 37. Change the personal information**
The details of the user running show in the background of the mobile without open the application, as shown in the fig. 38.

![Fig. 38. The application work in the background](image)

The user can choose the "Distance measurement" option from the menu to measure the distance that he want to run it, as shown in the fig. 39.

![Fig. 39. The distance measurement interface](image)
The user can choose "Training" option from the menu and start new training and see the list of the previous training as shown in the fig. 40, fig. 41.

Fig. 40. The training interface

Fig. 41 shows history training interface.

Fig. 41. The training interface

The user has the ability to change the settings of the application from the settings interface like to turn on/off the notification, change the unit of...
measurement, change the walking mode and change the step length of walking or running, as shown in the fig. 42, fig. 43, fig. 44 and fig. 45.

Fig. 42. The settings interface

Fig. 43 shows the general settings interface.

Fig. 43. The general settings interface
Fig. 44 shows the notification settings interface.

![Notification settings interface](image)

**Fig. 44.** The notification settings interface

Fig. 45 shows the walking mode settings interface.

![Walking mode settings interface](image)

**Fig. 45.** The walking mode settings interface
CONCLUSION

Running is one of the fastest growing sports in the world. In Europe 50 million people do it on a regular basis, according to the Dutch Measure network. They spend nearly €10 billion a year on shoes, clothes and related technology. Two out of five Europeans now claim to practice a sport on a regular basis, with running and cycling at the top of the list. The motivation is clear: not only is an active and healthy life increasingly valued in our society, but the equipment available has become more sophisticated than ever [16].

There are many reasons to use the running and counting steps applications. Previously the running was without plan and we can't know the distance that we run it and how many calories that we spent it now its allow the users to calculate the distance and the calories that he burned it accurately, gives the user a look at how much weight he needs to lose and how much he needs to run each day to lose the weight required, the running applications are improved its services some of them allow the user to connect with their friends and see them running situation, the applications send daily challenges to the user to motivate them to run.

The goal of the research was the Development of Android Mobile Application for Running.

For the reaching this goal we resolved following objectives.

- analysis the problem statement of the application;
- analysis of modern technologies of web application development and choose which technology for project development was made;
- all the functions of "JAVA" and "XML" was tested and working correctly.
- use case diagram for the system was designed;
- database was designed;
- the interfaces of the application was designed correctly;
- the database of the application was designed;
The development that plan to add in future:

- select the user position by the GPS;
- ability to post your running achievements in the social networks;
- ability to find the near running areas in the GPS;
- send notification if the weather will be rainy in next hours to avoid running in the rain;
REFERENCES


11. Margaret Rouse. searchmobilecomputing.techtarget.com. [Electronic resource] URL:


14. Ragna I. SQL Server 2016 first public preview now available [Electronic resource] URL:

15. Redwood S., oracle.com. [Electronic resource] URL:


17. technologist.eu. [Electronic resource] URL:

18. topermissionsports.com. [Electronic resource] URL:
https://www.topendsports.com/weight-loss/energy-met.htm (date of access: 08.05.2018).

19. tutorialspoint.com. [Electronic resource] URL:
