ALL DATA IN ONE PLACE

User's guide
Version 1.0

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Introduction

This document describes Get&Check software. Get&Check sofware is product developed by members of SIDE project, working for SoberIT. SoberIT institute is involved in multiple research projects with broad range of topics including aging, healthcare, ubiquitous computing and intelligent home applications.

Get&Check is a tool, that helps individuals to collect data from various medical and wellbeing devices. The data from the devices is collected via Bluetooth into a smartphone and sent into cloud where it will be aggregated and interpreted. Collected data afterwards is accessible via Get&Check web site for the individual who collected the data. In this way he/she can have a history of the data collected from the different sensors/devices. Get&Check web site has a special secured area for medical personnel and/or researchers where they can monitor data from different individuals that are enrolled in the projects that they supervise.

At this stage three devices can be used with Get&Check: Zephyr Heart Rate Belt (1) and an arm type Blood Pressure measuring device Fora D40b (2).
The principal working schema is showing on the figure 1.

Figure 1. Principal working schema of Get&Check

Get&Check service has the following components:
1) Medical/Wellbeing devices

2) Smartphone running Android and mobile application Physical Activity
3) Get&Check web portal

The data from mentioned devices is collected with help of mobile android application Physical Activity using Bluetooth and it is automatically sent via a web service to a cloud. The mobile application sends the data immediately after collection if there is WiFi network available or mobile data transfer connection. If there is no data transfer plan and no WiFi available the data collected and stored in the phone and sent to cloud immediately when internet connectivity is available. Later on the recorded data can be easily visualized online via Get&Check portal for further analysis.

Get&Check is meant for use in researchers projects, where data collection from various range of users is needed. Get&Check gives an easy solution for data gathering and analysis for research purposes.

The following sections will describe main Get&Check components in a depth.

Abbreviations and terms

Bluetooth – is a proprietary open wireless technology standard for exchanging data over short distances (using short wavelength radio transmissions in the ISM band from 2400-2480 MHz) from fixed and mobile devices, creating personal area networks (PANs) with high levels of security.

Cloud service – is a service delivered via the internet, which are accessed from web browsers and desktop and mobile apps, while the business software and data are stored on servers at a remote location.

Heart beat rate – is the number of heartbeats per unit of time, typically expressed as beats per minute (bpm)

Blood pressure (BP) – is the pressure exerted by circulating blood upon the walls of blood vessels, and is one of the principal vital signs. The measurement blood pressure without further specification usually refers to the systemic arterial pressure measured at a person's upper arm. It is measured on the inside of an elbow at the brachial artery, which is the upper arm's major blood vessel that carries blood away from the heart. A person's BP is usually expressed in terms of the systolic pressure over diastolic pressure (mmHg), for example 140/90.

The blood sugar – concentration or *blood glucose level* is the amount of glucose (sugar) present in the blood of a human or animal. Normally in mammals, the body maintains the blood glucose level at a reference range between about 3.6 and 5.8 mM (mmol/L, i.e., millimoles/liter), or 64.8 and 104.4 mg/dL. (1)

ANT – wireless networking protocol and embedded system solution specifically designed for wireless sensor networks (WSN) (2)

ANT+ represents the interoperability function that can be added to the base ANT protocol. A managed network, ANT+ facilitates the collection, automatic transfer and tracking of sensor data for monitoring of all personal wellness information (2)

Using software

This section describes the necessary portable devices, prerequisites, users groups and how to get started with the Get&Check software.

Prerequisites

Portable devices prerequisites:
Get&Check software is fine-tuned to collect data from several devices. Before start using Get&Check, make sure that at least one of devices is available to use. Some devices uses the ANT+ connectivity (2).
List of currently used devices:

- Zephyr Heart Rate Belt sends precise heart rate information to mobile application in real time. Sensor is physically attached to the body (3).
- FORA Blood Pressure Monitor D40b allows blood pressure and pulse measurement and also blood glucose levels (4).
- Garmin Heart Rate Monitor, which helps to measure heart beat data. (5)

Mobile prerequisites:
Current implementation is completed for smartphones running Android OS 2.1 or later which have bluetooth support.

To be able to use use ANT+ belts, smatrphones have to provide ANT connectivity.
The list of mobile phones, possible to use with ANT+ belts:
- HTC Rhyme
- Sony Ericsoon Live with Walkman
- Sony Ericsson Xperia active
- Sony Ericsson Xperia arc
- Sony Ericsson Xperia arc S
- Sony Ericsson Xperia mini
- Sony Ericsson Xperia mini pro
- Sony Ericsson Xperia neo
- Sony Ericsson Xperia neo V
- Sony Ericsson Xperia pro
- Sony Ericsson Xperia ray
- Sony Ericsson Xperia X8
- Sony Ericsson Xperia X10 mini
- Sony Ericsson Xperia X10 Mini pro (6)

User groups

There are two types of user in Get&Check:

- Get&Check users. Persons, who were invited to participate in the experiment or project. They are allowed to use mobile application and monitor their own data via web site.They have limited access to web site. Further called '***users***'.
- Get&Check researchers. Persons, who have the full access to web site and allowed create new projects, to invite other users to the projects, monitor all collected data with in own projects. They are called further as '***researchers***'.

Customers and projects

A Customer can be an individual (private researcher) or an organisation (university, research programs etc). Each customer should have at least one associated Project. Customer obtains status Researcher upon email request sent to Get&Check admin.

Customers are allowed to create several research projects and invite there unlimited amount of research participants. Projects are like a folders of information that contain all recorded data collected from Physical Activity application.

Observation types

Get&Check service stores data collected from earlier mentioned devices. There are data of following types:

- *Accelerometer data* - acceleration estimates recorded on 3 axis internal accelerometer in m^2/s.
- *Average Heart Beat* - average heart beat per minute estimate is recorded several times per second.
- *Blood pressure data* - diastolic and systolic blood pressure is recorded in mmHg.
- *Glucose data description* - amount of glucose in blood. Recorded in mmol/l.

Getting started

Using mobile application
The Android Mobile Application can be downloaded from:
http://tinyurl.com/coucfel

Currently there are 2 servers where the data is uploaded:

1) Playground server - the data is uploaded in real time. Playground is a server where data can be uploaded from mobile via an API. The format of data has to be specified before in the Playground server. This is done by defining a Weblet that contains the structure of the data that will be sent from mobile.

2) SIDE Server - the data is uploaded manually session by session. This document is written based on the Service on SIDE Server.

Physical Activity mobile application

Current features available for Physical Activity mobile application:

1. Record Physical Activity
2. Vital Parameters
3. Sessions
4. Preferences
5. Clean
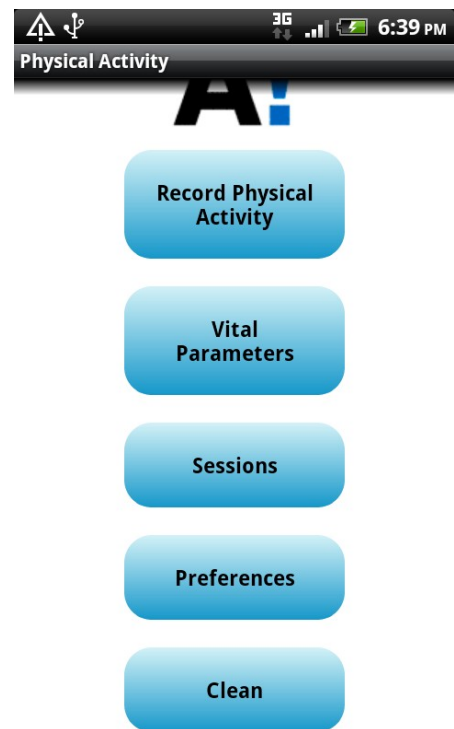
1. Record Physical Activity
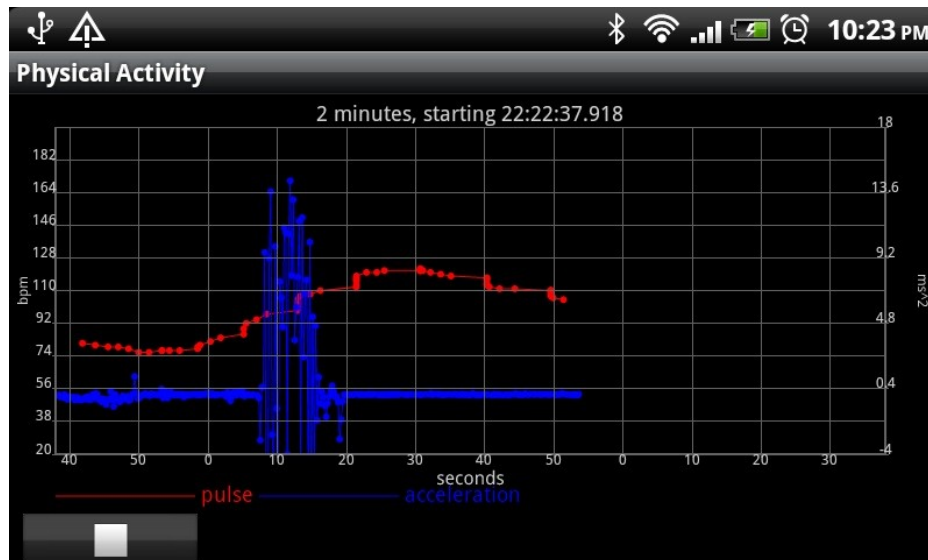
The user can see in real time his hear beat rate represented by the color red on the graph and the accelerometer data represented by the color blue on the graph. The screen indicates the starting time for the data display and the time frame for the display (2 minutes). The displayed data is also collected in the background. This data is uploaded in real-time to Playground. However for SIDE server the collected data will be sent using the Sessions menu item.

2. Vital parameters

Displays the data received from the FORA Blood Pressure Monitor D40b and the date and time. The data received and displayed is pulse and blood pressure values: systolic and diastolic. Turn off connection button has to be pressed after receiving the data from FORA device in order to close the connection and make the collected data available for being uploaded to SIDE server.	

3. Sessions

Users can see here the date and time when data recording was started and finished. The users can upload the data into the SIDE server by pressing longer on a session item list and clicking Upload Session from the contextual menu
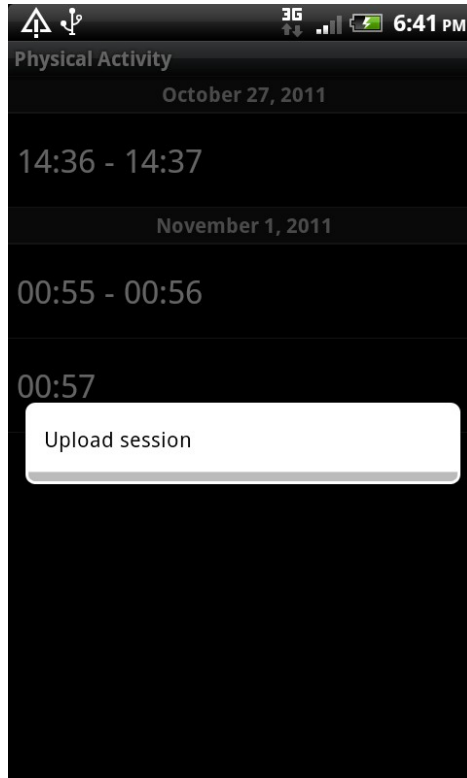
4. Preferences

Sensor delay - sets the interval of receiving data from devices - it is recommended to use default values
Values:

- Normal - default
- UI
- Game
- Fastest

Recording frequency - the interval for storing the data from device in milliseconds - it is recommended to use default values

Broadcasting frequency - the interval for sending data to server in milliseconds - it is recommended to use default values

AHL URL - the URL for the web service which will receive and store the data from devices

Physical Activity Preference
Username, Password for uploading the data in the Playground server and Weblet for displaying the data in portal.
This is used to store the heart beat measurements.

Vital Parameter Preferences
Username, Password and Weblet for recording the data on the target server for Blood pressure and Glucose level measurements
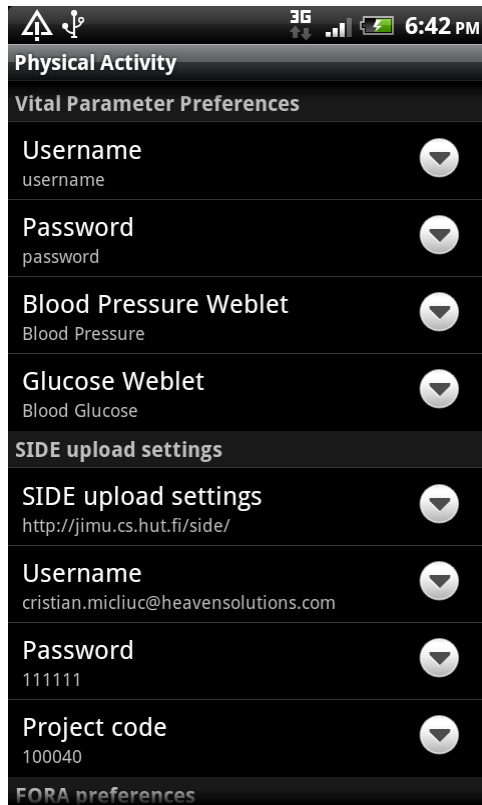

Physical Activity

Sensor delay
Normal

Recording frequency
1000 ms

Broadcast frequency
1000 ms

Pulse meter
Zephyr HxM

AHL URL
http://app.anypg.com/trigger/Receiver

Physical Activity Preferences

Username
username

Password
password

Weblet
physical_activity

Vital Parameter Preferences
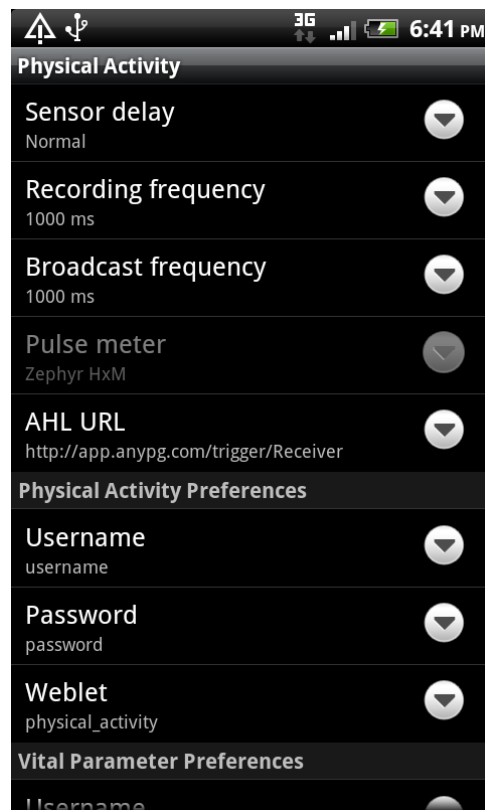
Username

SIDE upload settings
SIDE upload settings- the SIDE web service
URL where data will be uploaded
Username - SIDE portal username
(patient/person SIDE account)
Password - SIDE portal password
(patient/person SIDE password)
Project code - Side project code where the
person/patient is enrolled

Vital Parameter Preferences

Username
username

Password
password

Blood Pressure Weblet
Blood Pressure

Glucose Weblet
Blood Glucose

SIDE upload settings

SIDE upload settings
http://jimu.cs.hut.fi/side/

Username
cristian.micliuc@heavensolutions.com

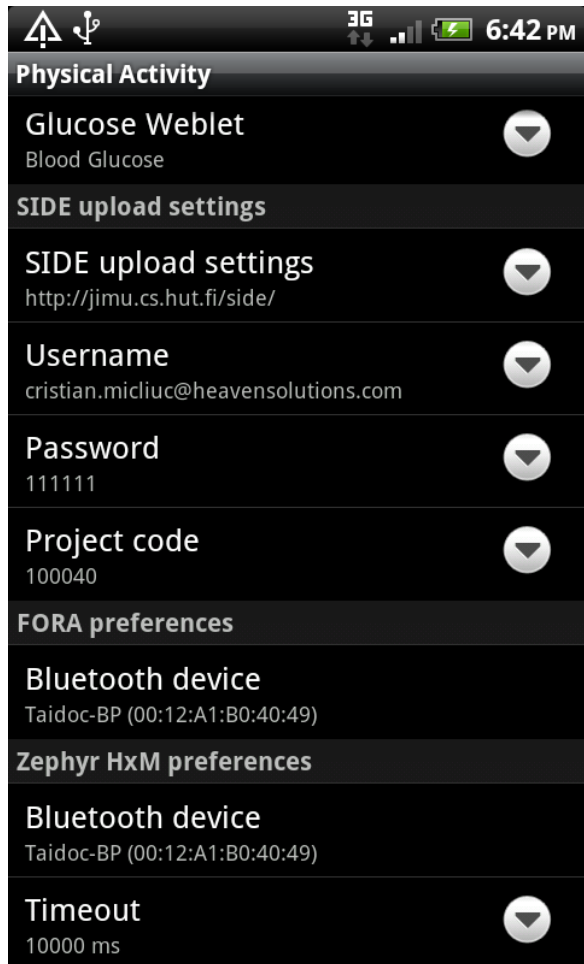Password
111111

Project code
100040

FORA preferences

Fora preferences
Bluetooth device- Select the device to pair
with and collect the data from - for blood
presure

Zephyr HxM preferences
Bluetooth device- Select the device to pair
with and collect the data from - for heart beat

Timeout - Timeout for the bluetooth connection in milliseconds	

6. Clean
This button will clean all the information stored in the phone by Physical Activity application

Using Get&Check web site

This chapter describes the functionality of Get&Check web site. The site can be accessed on address http://jimu.cs.hut.fi/getcheck/

Log in to the site/ registering new user
The front page of the site is shown on the figure 2 below. If person has already registered earlier, then he/she can log in to the site by entering username and password to the fields marked with number 1 on the picture. If person doesn't have yet an account, then it is possible to register a new account by following the link '*Create new account*', marked with number 2 on the picture. On the page for creating new account, shown on the figure 3, is necessary to enter the desired user name and email. After submitting the form account details containing password for the site will be sent on mentioned email address. Email will contain the further instructions regarding registering.
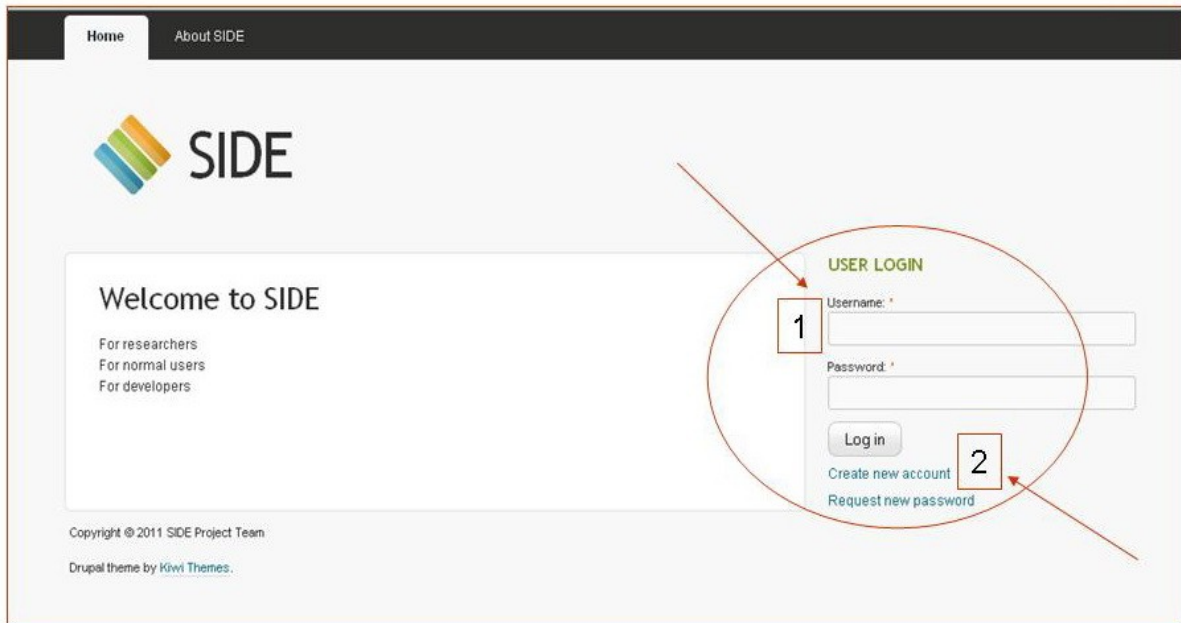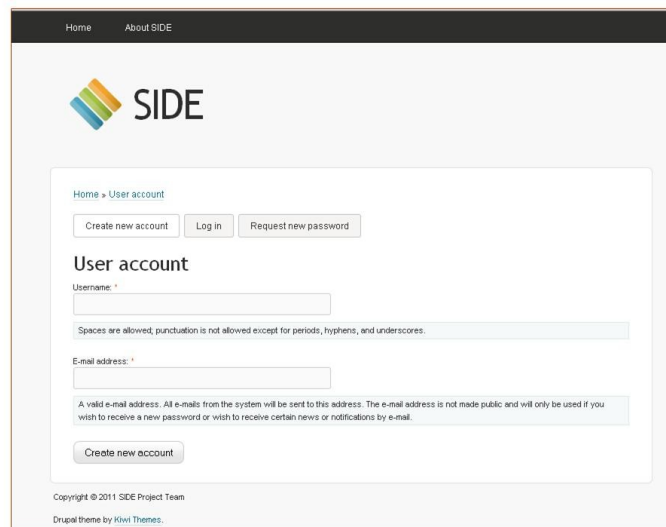
Figure 2. Get&Check frontpage

Figure 3. Get&Check -- Create New Account page

Registering a new researcher

While creating a new users account, user gets an email with account details. This email contains instructions for researchers, shown on the figure 4. Registering as a researcher is done upon email request sent to email address mentioned in account details email.

Figure 4. Register as a research instructions

Users view

After logging in user gets in to the service. Users view has three tabs: Home, For person and About SIDE.

Tab *About SIDE* tells about the development team of the project. Questions, feedback and improvements suggestions can be delivered to the team.

Tab *For person* has three submenus: My profile, My observations, My projects.
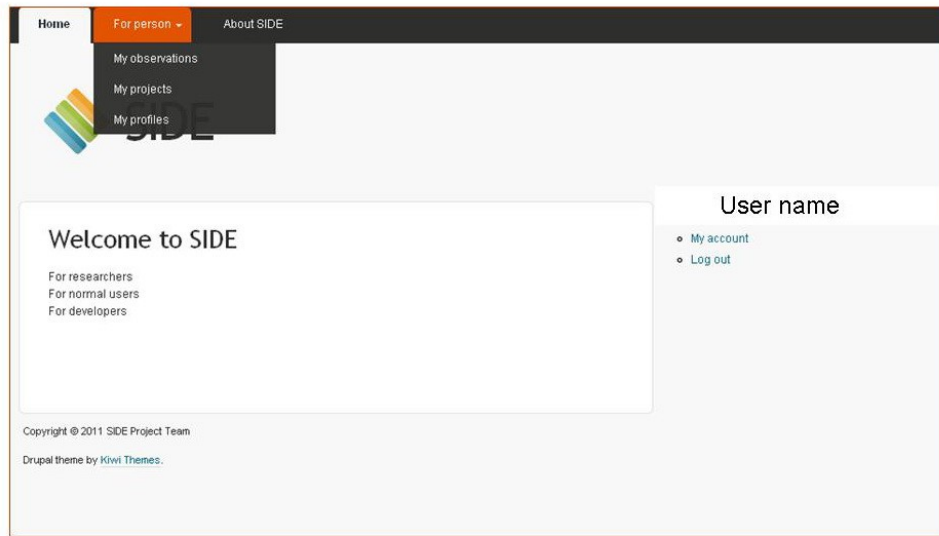
Users view can be seen on figure 5.

Figure 5. Get&Check -- User view

Submenu *My profile* – here user can fill up own profile by entering personal details. The profile information can be changed if needed.

Submenu *My Projects* shows the list of projects, where user participates. User can't join the project by own initiative, user has to be invited by researcher to the project. User sees only those projects, to which (s)he was invited earlier. Every project has a unique Project code. This project has to be used in mobile application Physical Activity to record the observations. Projects page is shown on figure 6.
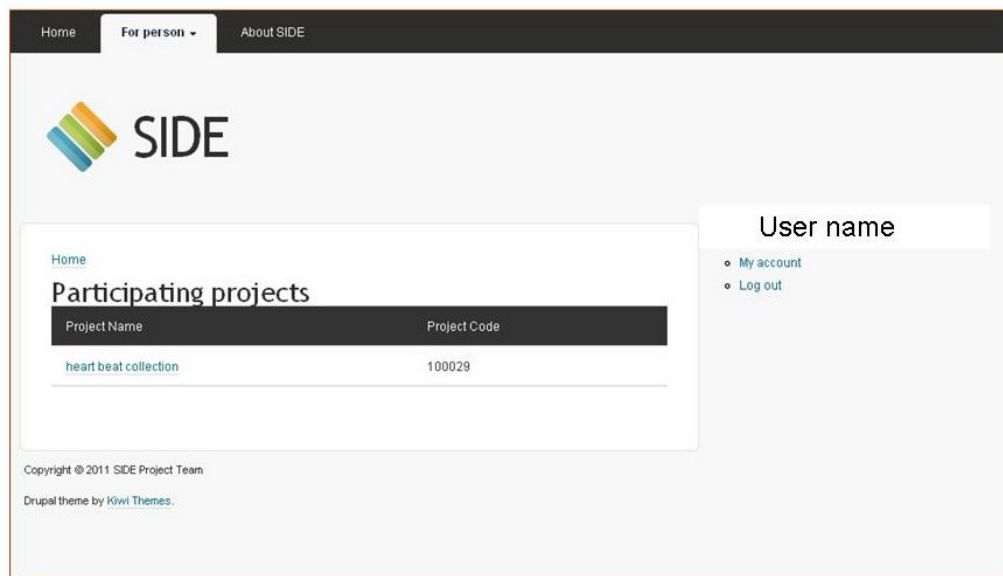

Figure 6. Get&Check -- Projects list

Submenu *My Observations* contains data collected by Physical Activity application. All the data can be found by Project name or by Date. The data is presented as a graphs. The example of Average Heart Beat data is presented on figure 7.

Figure 7. Get&Check -- Observation type: Average Heart Beat

Researchers view
The Get&Check service gives a wider range of functionalities for researches, home view of service for researchers is shown of the picture 8.
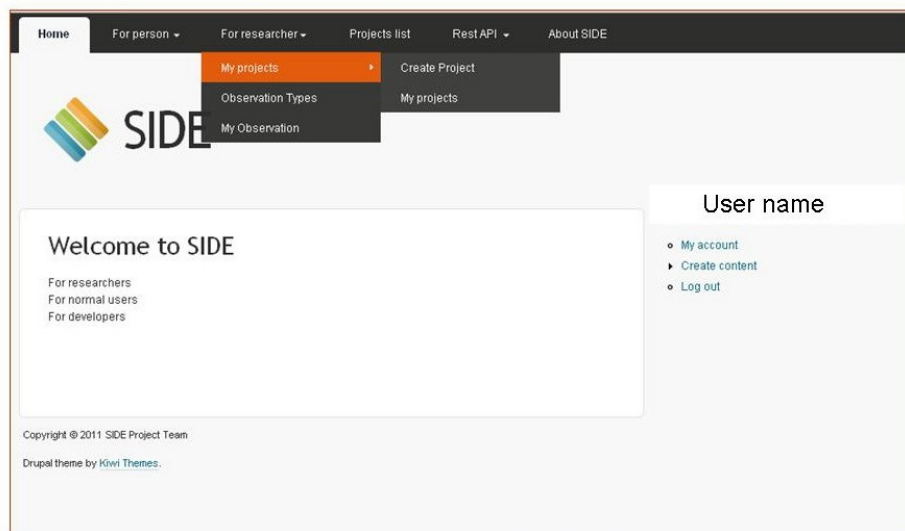

Figure 8. Get&Check -- Researchers view

In the tab *My projects*, researcher can view existing projects, created earlier, and also create a new project. Page for creating a new project is presented on the figure 9. Each project has a name and description field.

Researcher can invite test users for participating in the project by sending invitation emails to the users. If the invitation sent to the user, (s)he will get an email, where will be given project code. The project code is meant to be used in Physical Activity mobile application.
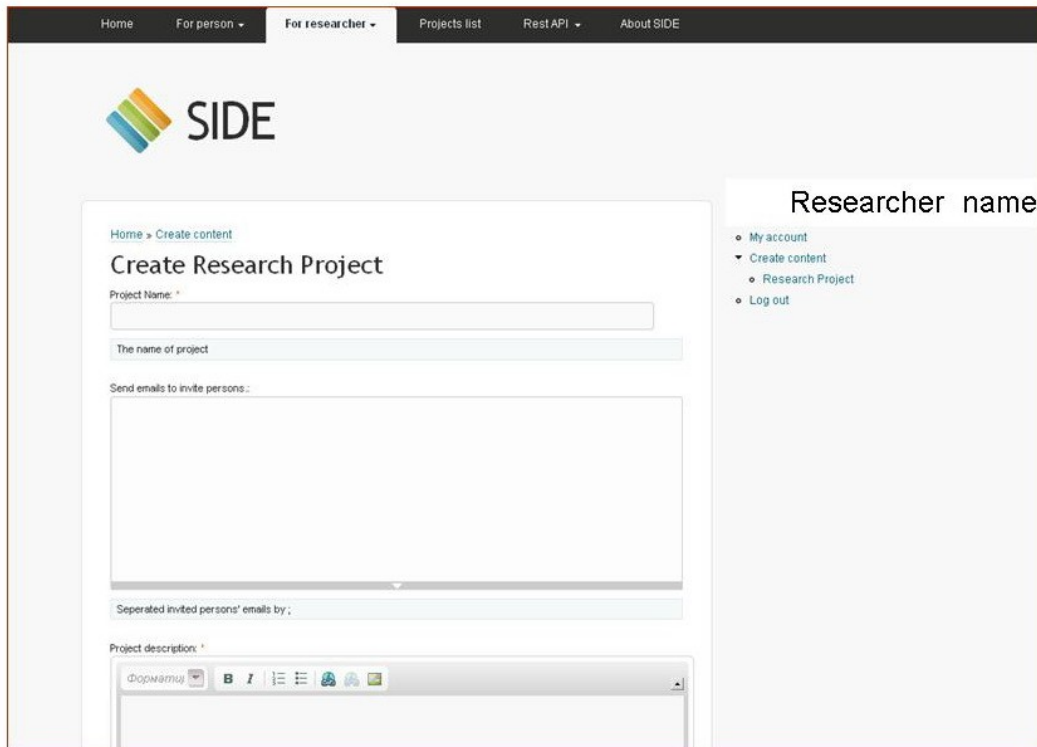

Figure 9. Get&Check -- Create a new project page

The submenu *My Observations* allows researcher to browse all collected data by mobile application Physical Activity. Collected data is presented in form of graph, showing the average heart beat rate depending on time. The average heart beat curves is built upon heat beat rate measurements at certain period of time, the exact heat beat measurements are shown on the graph as bigger dot. By clicking on the graph point the exact timestamp can be checked. The example of Observations is presented on figure 10.

The submenu *Observations types* explains what kinds of observation data can be currently collected and displayed by the application. Currently there two types of data are available:
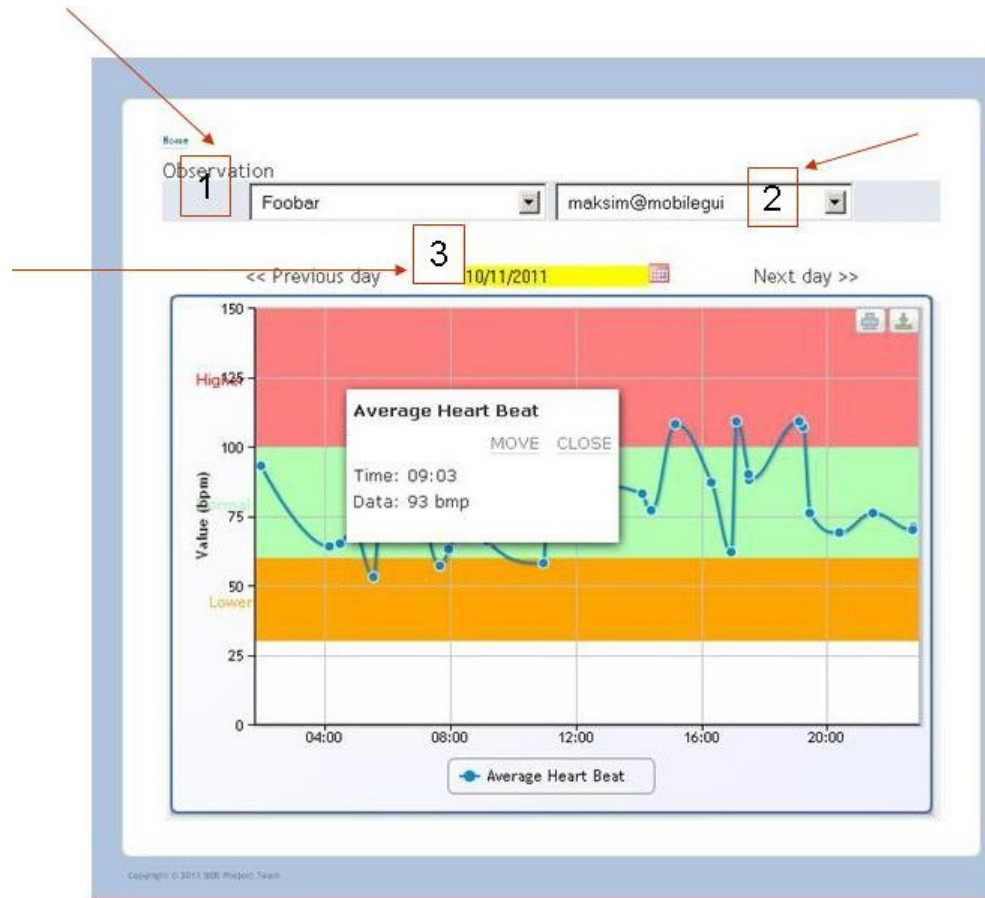
Accelerometer and Average Heart Beat.

Figure 10. Get&Check – Observations, with numbers are shown the selection types,
1- by projects name, 2- by users name, 3 - by date.

References

1. http://www.faqs.org/faqs/diabetes/faq/part1/section-9.html
2. http://www.thisisant.com/technology
3. http://www.zephyr-technology.com/consumer-hxm
4. http://www.foracare.com/products-2in1-index.html
5. https://buy.garmin.com/shop/shop.do?pID=10996&ra=true
6. http://www.thisisant.com/pages/developer-zone/android-api

Document history

Revision	Date	Description / Changes
-	08 Oct 2011	initial release
Cristian	11 Oct 2011	revision and mobile details added
Natalya	16 Oct 2011	smaller overall corrections, updating Prerequisites chapter
Natalya	20 Oct 2011	name change, schema change etc
Cristian	01 Nov 2011	Add Playground details and modify the mobile user guide to comply with new interface and functionality
Cristian	01 Nov 2011	Add new screenshots and correct some texts
Shuyan	11 Nov 2011	Update links for product system