

POSEiDON

PersOnalized Smart Environments to increase Inclusion of people with DOWn's syNdrome

Deliverable D4.5

HCI user and developer manuals

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1 Summary

Chapters 2–6 of this document are concerned with pilot 1, while chapter 7-15 are concerned with pilot 2. We have included the manuals for pilot 1 to show that there has been extensive development between the two pilots.

Chapter 2 presents an overview of the POSEIDON components developed for pilot 1. In chapters 3-6 the different POSEIDON components UIs for pilot 1 are presented, supported by the according user manuals for pilot 1.

Chapter 7 presents an overview of the POSEIDON components developed for pilot 2. Taking the feedback from pilot 1 into consideration, pilot 2 offers instruction videos which are available on the POSEIDON website in addition to the user manuals presented in this document. Chapters 8 - 15 present the user manuals for the six POSEIDON components for pilot 2.

As a first introductory overview we present all POSEIDON components and their availability in the different stages:

POSEIDON component user	POSEIDON functionality	Pilot 1	Pilot 2
POSEIDON App			
PU	Calendar	yes	yes, updated
PU	Navigation	yes	yes, updated
PU	Video	-	yes
PU	Shopping	-	yes
PU	Moneyhandling Training	-	yes
PU	Context	yes	yes, updated
POSEIDON Web			
SU	Calendar	yes	yes, updated
SU	Monitor (Tracking)	yes	yes, updated
SU	Video	-	yes
SU	Shopping	-	yes
POSEIDON Home			
PU & SU	Home Navigation System	yes	yes, updated
PU	Moneyhandling Training with Interactive table	Yes	no, updated
POSEIDON Route Creator			

SU	Navigation	-	yes
POSEIDON Context Settings			
SU	Context	-	yes
POSEIDON Ecosystem			
SU	Information page	-	yes
SU	Forum	-	yes
PU	Social Network	-	yes

In D5.2 Prototypic systems, the different POSEIDON components of the pilot 1, pilot 2 and the final prototype are presented. The main aspect is the functionality evolution, shown by the various functionality views added for each component. From interface point of view D4.1 Interface strategy and D4.2 Adaptive table interfaces also show the prototype evolution from pilot 1 and pilot 2.

2 Pilot 1 - HCI components

The four HCI components of the POSEIDON system for pilot 1 are:

- POSEIDON web – a web application that offers basic calendar and reminder capabilities, but also extends these by allowing to add additional information needed for the special calendar appointment, ensuring an extended functionality.
- POSEIDON app – a mobile application which offers diverse functionality like a calendar and navigation services, being strongly interconnected with the POSEIDON web and the stationary navigation training
- Navigation training system using Virtual Reality (VR)- offers the functionality to prepare and enrich routes with different media like photos and special instructions, allowing for the primary user to train in a safe environment
- Moneyhandling App with the interactive table (CapTap) – offers training for recognizing coins and bills and paying products as well. Real money can be moved on the surface of table. The table recognizes which coin has been selected.

POSEIDON guidelines for developing accessible user interfaces, explains the concept of the POSEIDON family design and the influencing factors which lead to the current design. These guidelines are presented in D4.1 Interface Strategy Chapters 5-8.

In the following Chapters 3 - 6 the HCI interface for each of these components will be described and available user manuals listed.

3 POSEIDON Web

3.1 Introduction

POSEIDON web is the personalized environment for attentive users, which are called the carers in POSEIDON project context. The target user of POSEIDON web is the carers of people with Down's syndrome, who are attentive of people with Down's syndrome and helps to plan their daily activities. The main component of the POSEIDON web is the personalized calendar which helps to schedule the daily events of people with Down's syndrome with specialized IT support. The POSEIDON web is cooperated with the POSEIDON app running on a mobile system, typically a smart phone, to coordinate the attentive users and the primary users.

In the following section, we will first introduce the POSEIDON system composition and functions in Section 3.2 and then give a screen shot based detailed illustration of the usage of the system in Section 3.3.

3.2 Preparation and system introduction

In order to run the POSEIDON web, the carers have to have a running operating system which is connected to the internet. The system has to install an up-to-date web browsers, e.g. Internet explorer (IE), Chrome, or Firefox browser on windows operating system or safari on iOS operating system. There is no specific system performance requirement.

1. Google Calendar account. We choose Google as the public calendar server to provide the service. In order to access the Google calendar service, the carer needs to apply for a Google account for each primary user. The document for helping apply for a Google account can be obtained from <https://accounts.google.com/SignUp>.
2. POSEIDON web. POSEIDON web is a web based system that can be accessible via any browsers. The main functionality contains three parts: First, a personalized event scheduling calendar; monitoring, showing information reported from the mobile app such as position, battery and possibly others. The third function is personalization: setting user preferences.
3. Personalization. The POSEIDON web is a customized and personalized event scheduling system with additional IT supports. E.g. the primary user who is holding the mobile version of POSEIDON app can be displayed on the map of POSEIDON web.

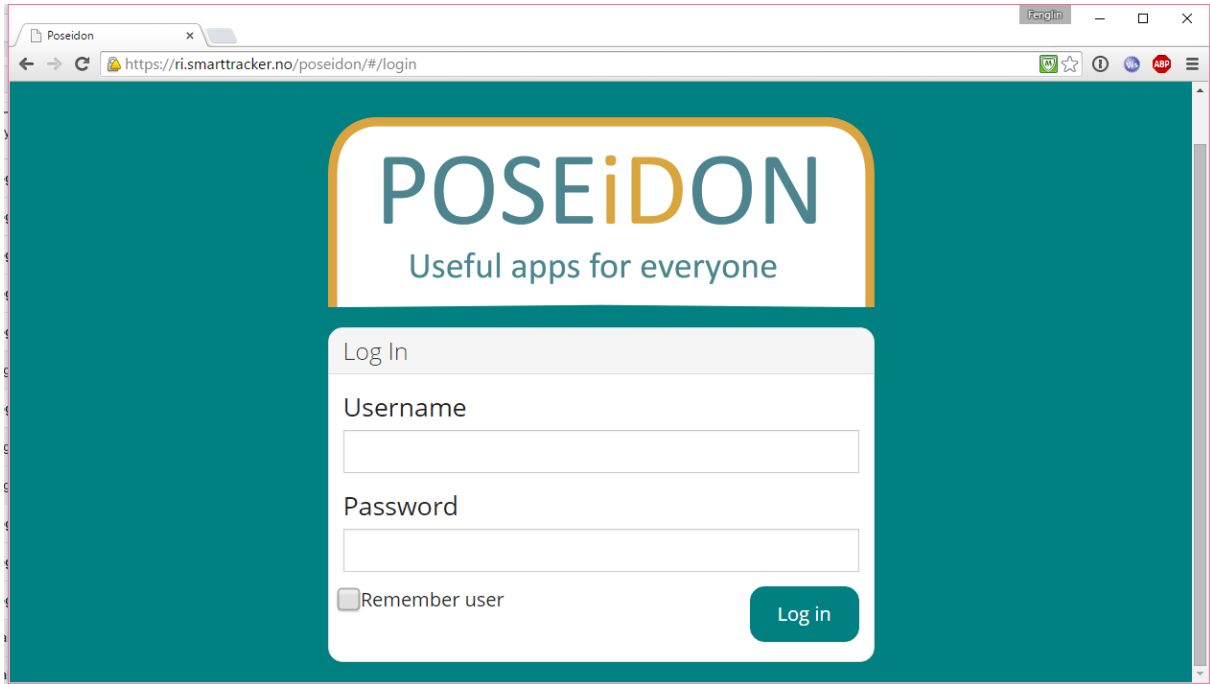
3.3 POSEIDON Web User Manual for pilot 1

Login and change settings

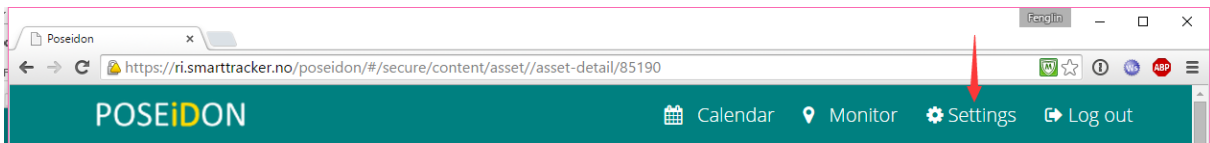
Open the POSEIDON web by clicking the link: <https://ri.smarttracker.no/POSEIDON>.

The best browser to use is Google Chrome. Make sure you have the latest version.

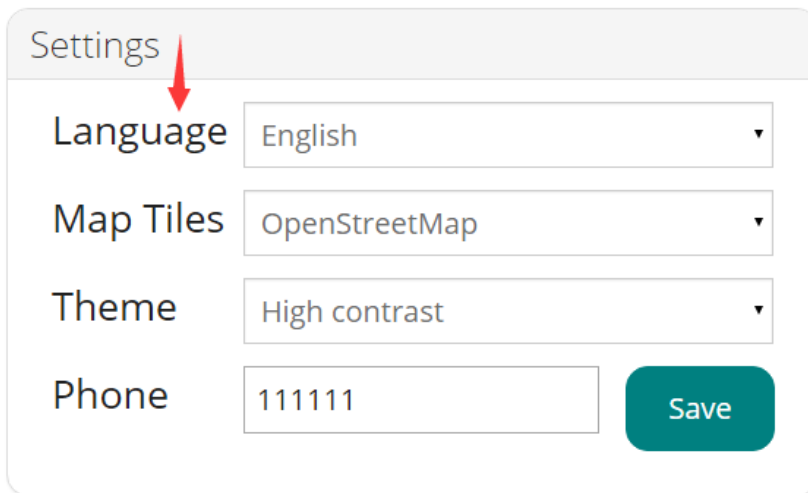
Use the distributed primary user name and password to log in.



After logging in to the system, you can change the language in **Settings**. Click the gear icon.

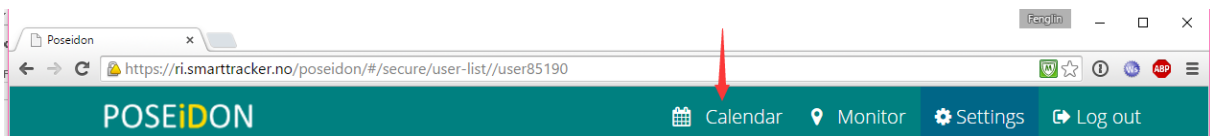


Choose the preferred language.



How to use the calendar

Choose **Calendar** from the top menu.

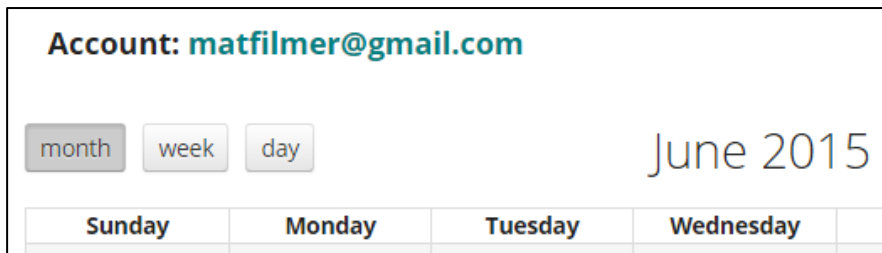


Connect to Google Account


The calendar must be connected to a Google Account, so you must be logged in on the POSEIDON Google account. Click on the **Connect to Google calendar** button to connect to the calendar.



The Google account you are using, is given on top in the initial calendar window. Below it is matfilmer@gmail.com.



If you are using another Google account than the one to be used for calendar entries to the POSEIDON app, you must go www.gmail.com. There you must **log out of your ordinary Google** e-mail account before you can **log in to the Google account to be used for POSEIDON**.

If you do not see the account you are logged in to, use the Chrome browser to be able to log out. You can log out of your Google account by clicking on the  icon and select "Sign out".

After the change of Google account, you must click on Calendar at the POSEIDON website and Connect to Google Calendar again.

Accept that a Google account is used for the POSEIDON web page

When the POSEIDON web tries to connect to a Google account for the first time, you must accept that the Google account is used for this in a pop-up window. Some browsers might prevent pop-ups. You need to **accept the pop-ups**. When a pop-up appear for authorizing the Google account to be used, click **Accept**.

Here is a link to an instruction about allowing or blocking pop-ups when using Chrome: <https://support.google.com/chrome/answer/95472?hl=en>

Add an event

To add an event click directly on one of the calendar days or click the **Add**-button or the date you would like to add the event.

Account: tellu.gtest@gmail.com

Add Edit

Month Week Day September 2015 Today < >

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	1	2	3
4	5	6	7	8	9	10

Choose **Start** date and points of time with hour and minutes and **End** date, hour and minutes.

Click on the icon to the right of the date. Then the calendar dates will appear again. Click on the date.

Details Instructions

Start 03.03.2016 11 : 00

End

Alarm

Summary

Routes

Describe

Image

Drag and drop here or click to upload event image/video


From the time picker you can use the middle button of mouse to stroll and select starting and end time.


Start 11.03.2016 10 : 00



End 11.03.2016 12 : 00

Add an alarm

To add an alarm, click the **Alarm** check box and specify how many minutes before the event by pressing the up or down arrow.

Start  :

End  :

Alarm  before 

Add title, route and/or description

In the **Summary** box add a title for the event.


Route contains a list of the routes created with the Home Navigation application.


If you want a specific route to be connected to this event, you can select it in the list.

You can also describe the event in more detail under **Describe**.

It is optional to use both Route and Describe.


Summary

Routes 

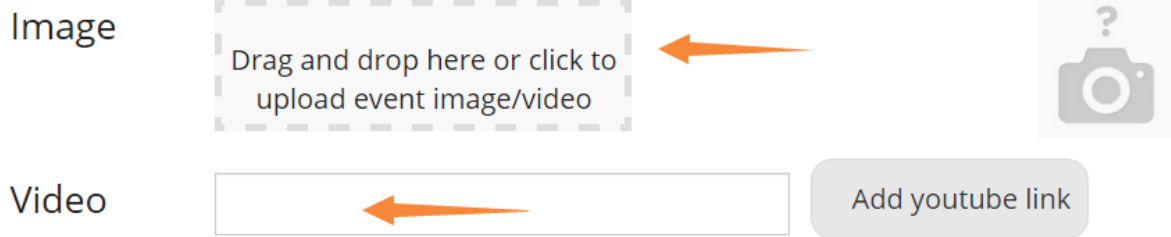
Describe 

Image

Drag and drop here or click to upload event image/video



Add image and videos



You can click to upload an image or video for the event, the image or video will be uploaded and kept in our file server, for videos, another choice is to add a youtube link at the video input field.

Save event

To save the event to your calendar, click **Save** at the bottom of the page.



Now the event is saved in the calendar, and will appear in the POSEIDON app on the mobile device shortly after.

Edit or delete event

Click on the event.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
30	31 <small>+4 to</small>	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18 3a asdf	19
20	21	22	23	24	25	26
27	28	29	30 9:45p Ut å jogge	1 8a From web	2 8a From web	3 8a From web

If you want to delete the event, click **Delete**. To edit the event, click **Edit**.

1 Bruk joggesko

2 Husk håndkle

3 Ta på T-skjorte

4 Ta på Shorts

Cancel Delete Edit

Add instructions

You can add instructions to an event. The instruction will be shown as a pop-up message on the mobile device of the user. The user should click a confirmation for seeing the message.

To add instructions, click **Instructions**.

Details Instructions

Description

Image

Drag and drop here or click to upload instruction image/video

Video

Add youtube link


Sound

Add instruction Instructions

You can make instructions by writing **text**, adding an **image**, adding a **video** and recording **speech**. The speech function works only in most updated chrome browser. It will not work on mobile devices. For entering any details, you must write something in the **Instructions box**. Written instruction is mandatory while image and speech are optional. You can add several sets of instruction to one event.

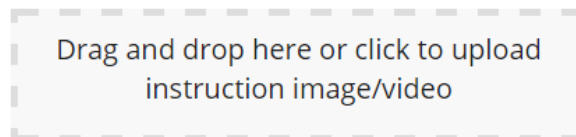
Write the instructions in the open text field.

Details **Instructions**

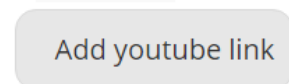
Description* 

Drop an **image** or **video** from your ordinary file system to the grey field or click on the text “(Drag and drop here or click to upload instruction image/video)”. Then you can upload the image/video from your PC. You can only add one image/video per instruction.

Image



Video

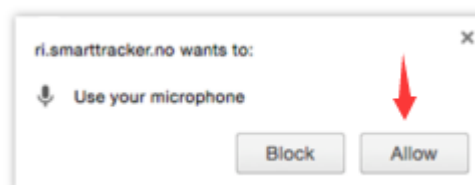


Record speech by clicking on the recording button.

Sound



When you want to stop the recording, click the same button.



If this message pops up, choose **Allow**.

To listen to the speech you have recorded, press the white arrow on blue background.

When you have written the instruction and, if wanted, added an image and/or recorded speech, click **Add instruction**.

Edit event

Details

Instructions

Description*

Image Drag and drop images here or click to upload instruction image

Sound

↓ Add instruction

Instructions

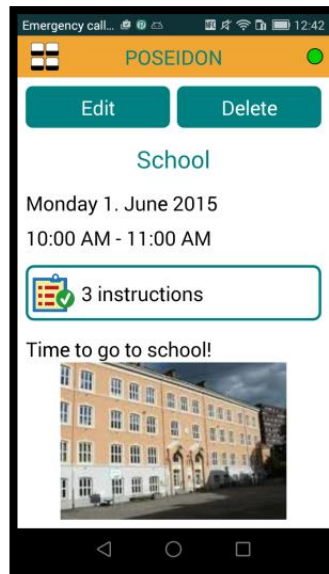
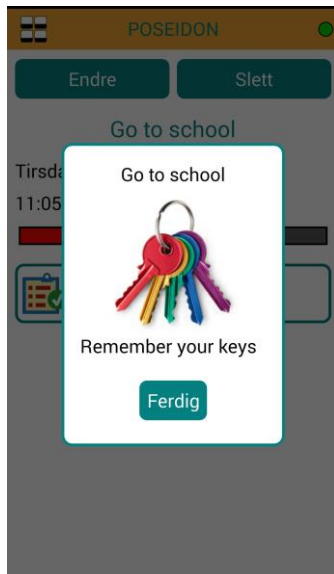
1			Bruk joggesko	
2			Husk håndkle	
3			Ta på T-skjorte	
4			Ta på Shorts	

Now the instruction is added, as you can see at the bottom of the page under the Add icon.

You can also **change the order of the instructions** by left clicking and holding down the mouse while you drag the instruction up or down. When you are satisfied, go back to **details** tag page and click **Save**.

When you click **Save**, the changes you have done will be saved to the server and transferred to the mobile app.

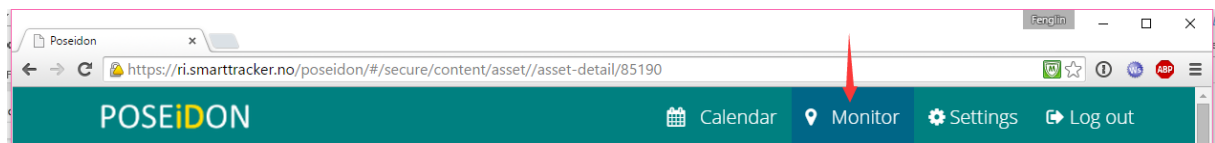
Below are some screenshots of the mobile app.



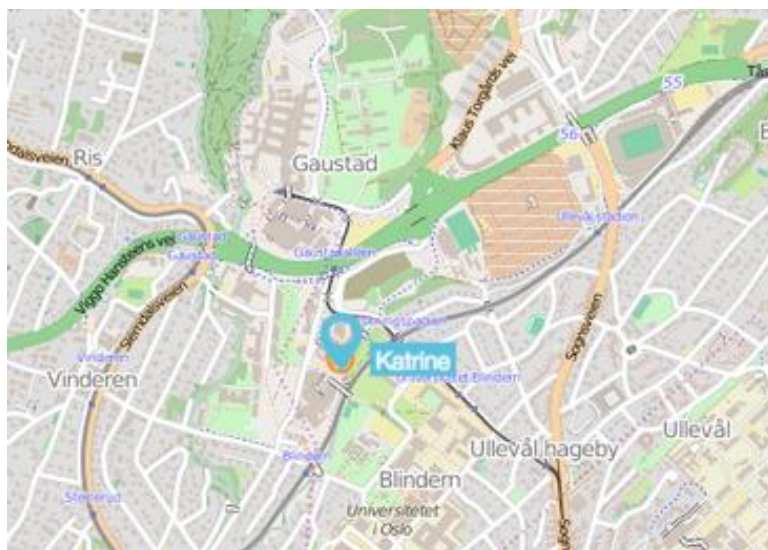
How to use the monitor

The monitor can be used to view the position of the person with Down syndrome. It works if this option is switched on in the mobile phone.

Choose **Monitor** from the top menu.



Here you will see where the primary user (here called Katrine) is right now as long as the primary user has not turned off the positioning on his/her app.



At the bottom, on the left, you find information about where the primary user is right now described in text. You can also see how much battery is left on the mobile phone of the primary user.

Name	Katrine
Tracked	Enabled
Position	Problemveien, Blindern, Oslo, 0313, no
Time	2015-06-16T07:26:56.201
Speed	Not available
Accuracy	38 meters
Devices	<div style="border: 1px solid #ccc; padding: 2px; display: inline-block;">Katrine phone PoseidonApp 67%</div>

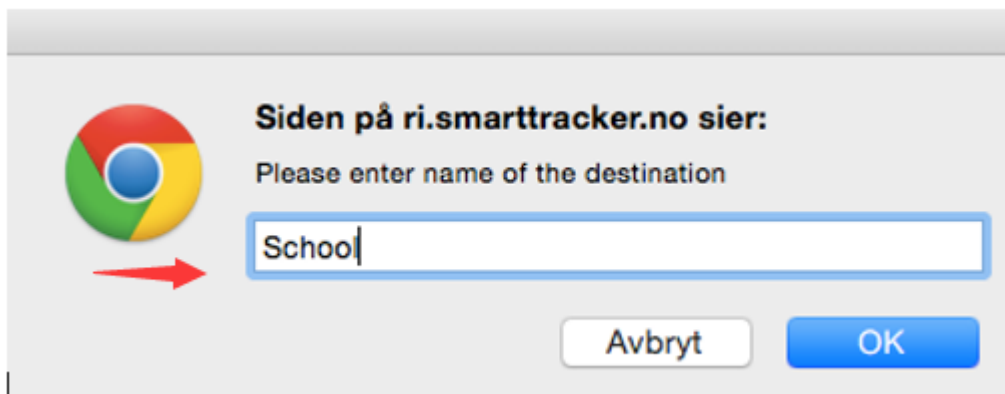
Positions

You can change the “destination” for where the map is centred by clicking on the **+ icon**. If you click on the **person-icon**, the map will be centred on where the primary user is now.



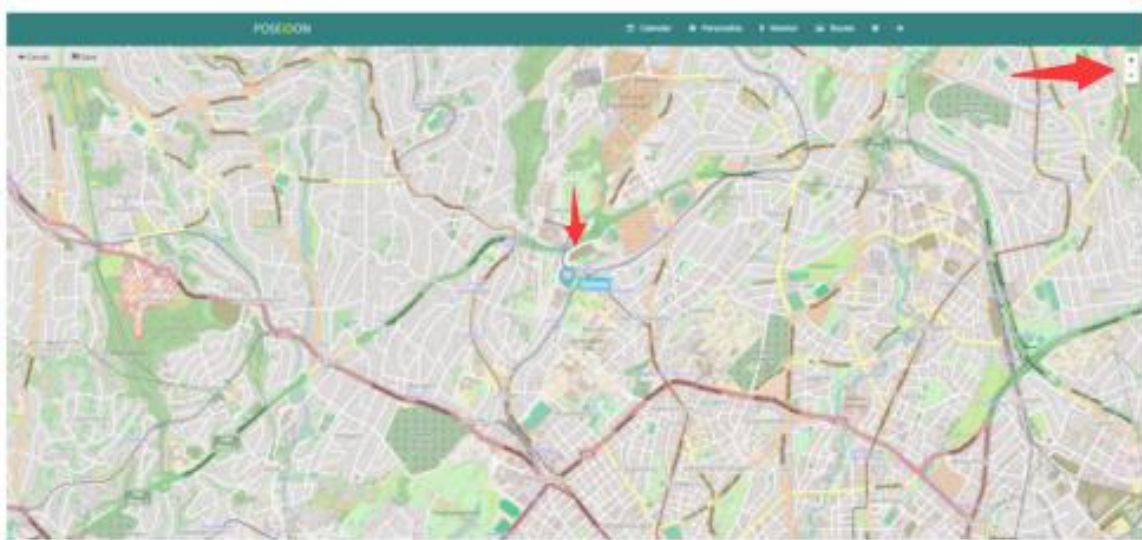
Add a new destination

When you click on the “+ icon” to add a new destination, you will get a pop-up window asking you to add a name on the destination.

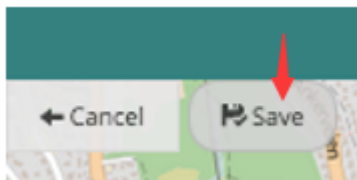


When this is done, you will get the full map view. Here you must click on the place of your destination.

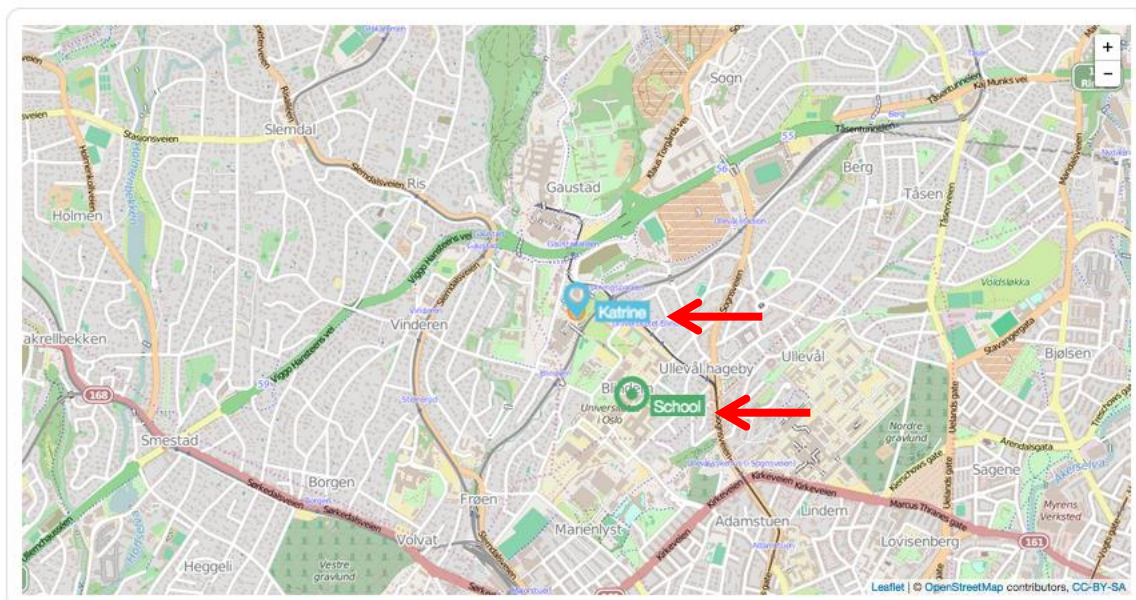
You can, on the left, zoom in or out by using the + and – to easily point on the correct place.



When this is done, select **Save** up from the menu in the left corner.



Now you will see the "Scool" destination appearing on the map together with the position of the primary user.



At the bottom you will now see a list of all the destination you have added.

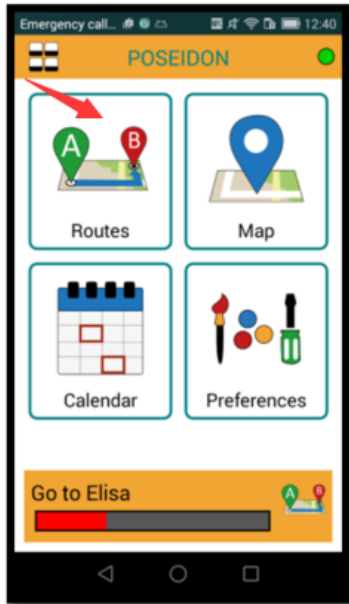
Name Katrine
Tracked Enabled
Position Problemveien, Blindern, Oslo, 0313, no
Time 2015-06-16T07:26:56.201
Speed Not available
Accuracy 38 meters
Devices
Katrine phone PoseidonApp 66%

Positions + ↓

- School Remove Show
- Home Remove Show

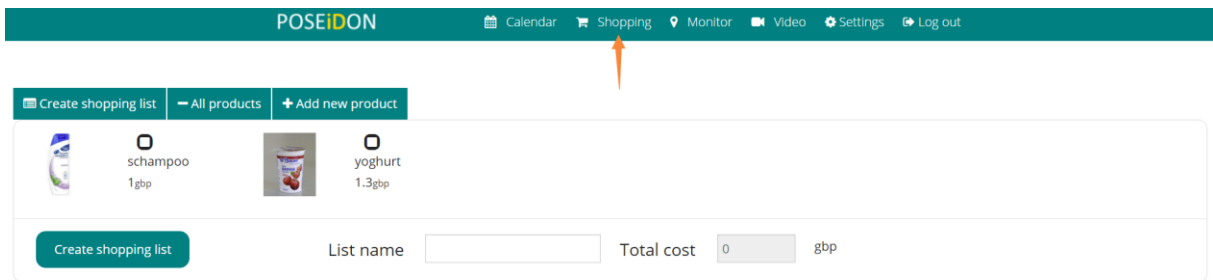


The same destination will now also be shown on the mobile app on the phone of the primary user phone if he/she click on **Route** and then **New route**.

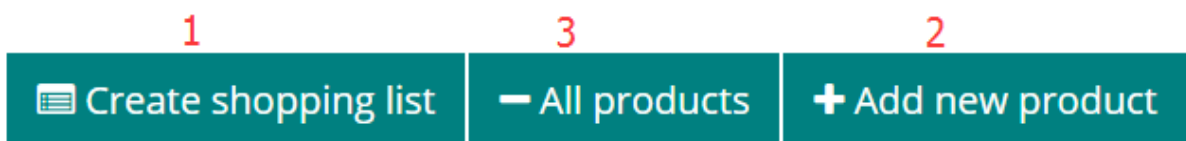


Shopping

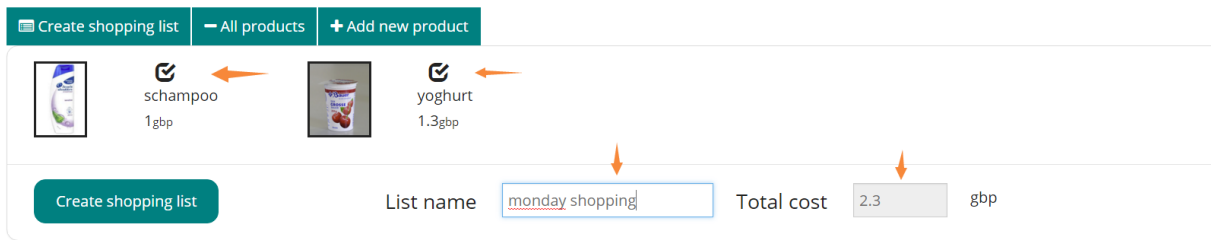
The shopping component is designed for the carers to give training and notification for primary users.



Click the shopping tag on the navigation bar, then you can see the shopping interface, in the shopping page, you can do three things, create a shopping list (1), add products (2) or delete products (3).



Create shopping list

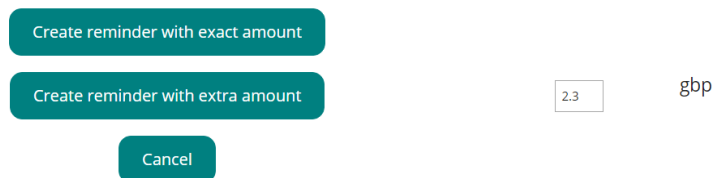


You can select the products listed in the “create shopping list” tag, give a shopping list name, the total price will be calculated automatically. Press the “Create shopping list” button to create a shopping list. Then the web allows you to create an event on the calendar with three choices:

Create a money packing event with the exact needed money.

Create a money apck event with the money amount as you entered.

Do not create a reminder.



If you make the first two choices, the web will jump to the event editing interface of Poseidion web with a text notification.

Edit event

Details

Instructions

Start  :


End  :

Alarm

Summary

Routes


Describe

Image 

Video

Repeated

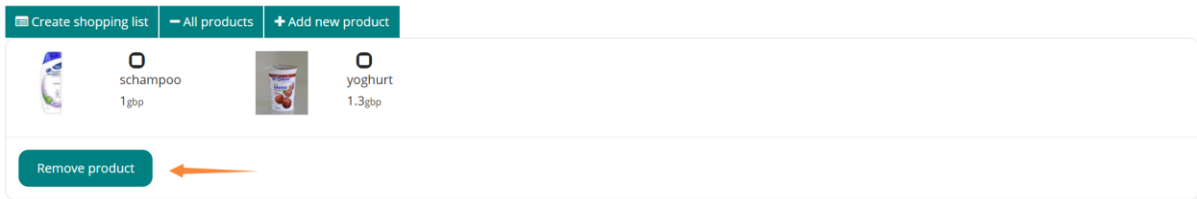
Add new products

Name
 Price gbp
 Image 

By clicking the “add new product” tag, you can add new products to the library of products. In the interface, you can edit product name, product price and give a image of the product.

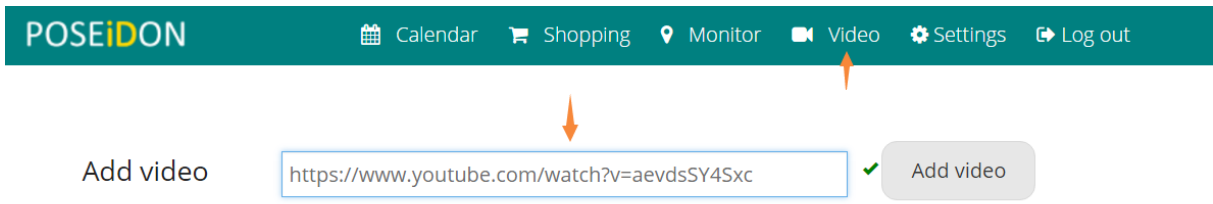
Deleting products

In the “All products” tag, you can choose the products you want to delete.

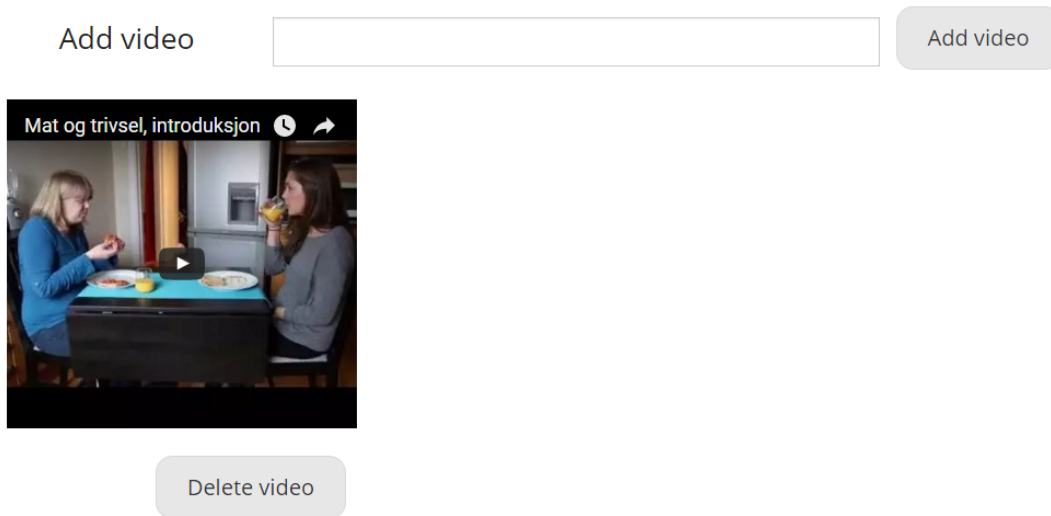


Video

We add an extra modular called “video” on the POSEIDON web, such that the POSEIDON team can push demonstration videos to carers, or carers can also give interested videos from a youtube link.



You can copy and paste a Youtube link to the “add video” field and click “add video” button. Then the Youtube video is maintained in this page.



4 POSEIDON App - Android User Interface Implementation

Android was selected as the primary platform for mobile (tablet and phone) applications in the project, and the platform for the first pilot, previously discussed in D5.1. When designing a mobile application, there are a number of aspects to keep in mind if the result is to be user friendly. One needs to know the possibilities and limitations of the hardware and the operating system of the target devices. One must also consider the type of functionality which will be included and the type of user we are targeting. Finally, it is important to not only consider the wanted functionality, but also non-functional requirements and how to handle all the errors and exceptions which may occur. As the focus of this deliverable is on user interfaces, we will not cover all these aspects here. We will mainly examine the possibilities and challenges for user interface implementation on Android, with a special focus on usability and personalisation/adaptivity as these are key aspects for the POSEIDON solution.

However, working with Android, as with any of the mobile platforms, it is important to understand that we do not have complete freedom as application developers. We work within a context which places restrictions on what we are allowed to do, and in addition there are user interface principles followed by most apps which we should follow unless we have very good reasons for doing otherwise. Android is an app platform rather than a general purpose operating system, designed with a specific type of use in mind, to keep the user in control of the device and minimize the possibility for making an app that violates the user's wishes or drains the battery. If we don't understand our target platform we risk planning features which cannot be implemented as well as making an app which does not behave the way users expect. Therefore, we look at some important topics of Android user interaction.

When reading this chapter, also keep in mind that Android has evolved a lot during the years it has been one of the two big app platforms. Aspects of user interaction have changed quite a bit. This is a usability problem, especially since Android devices typically only get a few updates before they are stranded on an outdated version, meaning not all devices have the same Android version. In addition, different manufacturers add their own features to the system, and while these modifications do not usually go very deep, they affect the look and feel of the user interface.

The Android developer web page¹ provides very comprehensive documentation for all aspects of Android development, and is the main source for this chapter, along with Tellu's experience developing both commercial apps and research prototypes on Android.

4.1 Android Device Interface

We start with a quick look at the fixed parts of the interfaces of Android phones and tablets. Just about all devices have the same three physical buttons along the sides: a power button and volume up/down buttons. Mobile devices are rarely turned completely off, but the power button is used to turn on and off the screen. All devices also have some navigation buttons (usually touch-sensitive areas rather than physical buttons) along the bottom of the front. These were originally below the screen, and there were four of them. Their order and icons varied between phone manufacturers and models, which was bad for usability. From Android version 4.0, the first version to fit both phones and tablets, navigation buttons could be shown on screen by the Android system. Google prefers this approach but does not enforce it on manufactures, so some (notably Samsung) still have external buttons of their own design.

Any app design, including POSEIDON, must take these navigation buttons into consideration. They are the intended way to navigate between functions in the device, and some of them are completely outside the control of the app, so we cannot prevent the user from using them. We may incorporate

¹ <http://developer.android.com>

some of their functions into our own interfaces for usability's sake, but we should keep in mind that screen space is limited, and that those who have Android experience expect the buttons to have their standard functions.

Two buttons are found in all interface variations: the home and back buttons. The home button (usually a house icon) hides any app currently shown, to bring up the home screen. This button can't be disabled by the app, and means the user can always leave our app. If we really want it to be persistent, we can detect every time it is removed and bring it back again, but this is generally a bad practice as it takes control away from the user and makes the device unusable for anything else. Note that the home screen is also just an app, a so-called launcher designed to start other apps, and it is possible to make our app a launcher and use it as the home screen, although it is always possible for the user to revert to the default launcher that comes with the device.

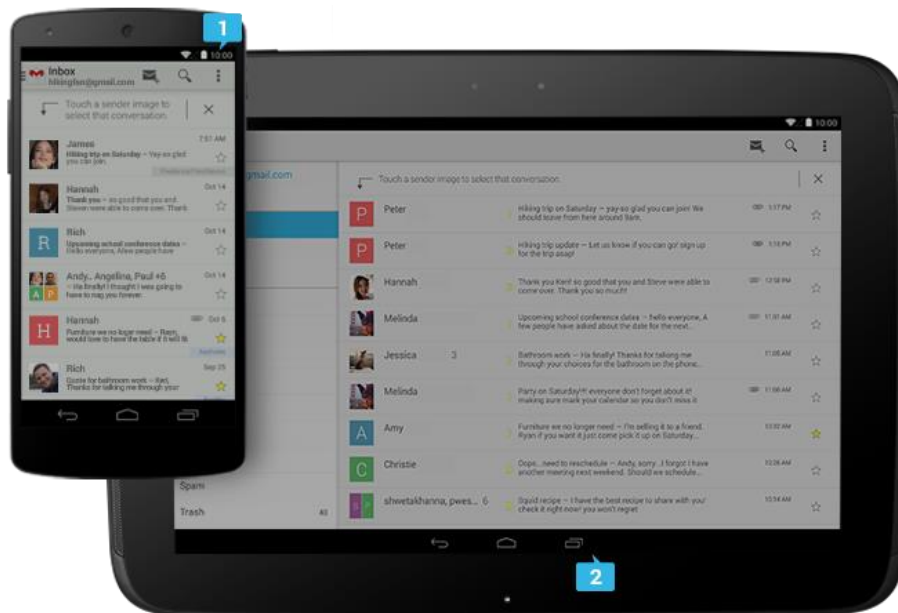


Figure 9 Reference phone and tablet from Google. Note status lines along the top (1) and navigation lines along the bottom (2)

The back button (with arrow icon) is meant to work much like in a web browser, going back to the previous screen. This button is under app control. It is generally a good idea to let the end-user backtrack in our app, as he would expect if he has previous Android experience, and to leave the app when backtracking beyond the first view (it can still be active in the background).

Of the four buttons on older phones, the other two were menu and search. The menu button brings up a pop-up menu, if one is defined by the app. A modern Android design guideline is to put the menu items in an action bar along the top of the screen instead, but the popup menu is still much used, and Samsung devices still has the menu button. The search button is not usually found on modern devices. It may be overridden by the app, otherwise it will bring up the built-in search function of the phone, hiding whatever the user was previously doing.

Finally, navigation includes a list of previously used apps, to allow the user to quickly switch between tasks. This function has its own button in the modern on-screen interface, but other designs do not. When there is no dedicated button, keeping the home button pressed for some time brings up this list. As with the home button, this function cannot be prevented by the app.

In addition to considering the use of these buttons in relation to the app being designed, one should also keep their location in mind when designing a screen layout. Putting a row of buttons along the bottom of the screen within the app interface makes it easy to hit the navigation buttons by mistake, especially for end-users with some impaired motor control. It may also be somewhat visually confusing, although their styles will be clearly distinct, with the device's buttons usually being quite small white symbols on pure black.

If the device has on-screen navigation, the navigation bar is a constant presence along the bottom of the screen. All devices have a status bar along the top. This shows vital status such as the time and indicators for battery and networks, and it can show notifications – messages from apps or the system. The status bar can be pulled down to show the notifications in full, and pressing a notification can bring up the app in question. It is possible to have our app hide the status bar, though we need good reasons to do so, as it is something users need if they are to use the device for more than our app. The details of these bars have actually changed quite a bit with different Android versions. On tablets they used to be combined in a single bar, and it is now possible to temporarily hide both bars, though the user can always drag the navigation bar back on screen.

The last interface feature which must be considered is the keyboard. Just about all Android devices today rely on “soft” keyboards shown on the screen. A soft keyboard will automatically show up when an input field is selected, and the app may also request it specifically. Note that soft keyboards are part of the Android system, not the app, and that device manufactures and individual users may install various keyboard types and switch between them. It need not be a keyboard in the strict sense either; it can be based on voice or handwriting input. This is a point of user customization of the device, but outside the scope of an app.

So we have no control over this when designing the app, we just need to keep in mind that the keyboard will probably show up when needed, taking over some of the screen space. In the vertical orientation, the keyboard will typically take up the lower half of the screen. The app interface can either shrink, effectively halving in size, or let the keyboard cover one half. The effect of the keyboard must be considered when designing the interface. On phones, the keyboard with an input field will generally take over the whole screen in the horizontal orientation. Regarding keyboards, it is also important to keep in mind that these are usually quite small and cumbersome to use, so it's always a good idea to design to minimize the need for keyboard input.

4.2 Android System and Application Model

As was discussed in the framework deliverable (D5.1), mobile apps can either be built “natively” for an app platform such as Android or iOS, or by using web technology so that it can (theoretically) run on all major mobile platforms. We chose the first approach for the main POSEIDON mobile prototype, partly because we have more of an existing code base to work from, but most importantly because we have access to much more device functionality in this way, which is needed for such things as sensor tracking in the background. For developing an assistive app we typically want a high degree of control of the device. But while an Android app has more control of the underlying system than a web application, and also somewhat more than an iPhone app, there are still clear restrictions. An app is not like a native piece of software for a traditional desktop computer, which can have pretty much full access to the system. Instead, it should be thought of as a plug-in to the app platform, where it must co-exist with many other apps as well as a system that control it all and doesn't give full system access to any app.

There are some central principles behind the Android application model. One is that the user should always be in control – the user can always close an app or change system-wide settings which affects

apps. Another is that of modularity and reuse – the user interfaces of an app should be able to mix with other components in the system, and use other components which provides the necessary functionality rather than reinventing the wheel. To give an example of both of these principles, let's say we want our app to send out an email. The Android way of doing this, is to send what is called an *intent* to the system, with the email details such as address and text. The system will then ask the user which of the email applications installed on the device should be used (the user can set a default to avoid this question), and then bring up the email app with the email filled in, so that the user can choose to send it or not. While these principles are good in many cases, they are problematic for us. Our app gives up control, and the user may be confused by the various user interaction presented. We cannot provide instructions for this, as it depends on what email apps are installed as well as Android version and settings. It is technically possible for our app to send the email itself, but some things, such as making a phone call, cannot be done without invoking system components and giving up control.

Another important principle stems from the fact that Android is made for mobile systems, particularly phones – an app can be closed by the system at any time, such as when battery is low or when a phone call is coming in. In fact, the Android execution model is quite different from that of traditional desktop applications, and it is important to understand it because of its implications for user interaction design. The end-user is not supposed to turn apps “on” and “off”; they should just navigate between the views they want, much like how you use the web. Some processes may be active in the background, based on an activity started from a view, or a configuration, but it is left to the operating system to destroy and recreate views and background processes based on available resources and what else is going on. When you navigate back to a previously used app or bring it back from the list of last used apps, you should not need to know if it was kept “behind the scenes” since you last used it, or if you get a freshly created instance. This is an execution model adopted to the mobile use – the phone could run out of battery at any time, or a phone call could come in forcing whatever else was going on to be removed. You should still be able to return to previous activities and resume what you were doing.

One consequence of this execution model is very important for interface design. In the Android convention, any input/changes the user has provided in a view should be preserved when the view is removed, whether it's because the end-user presses back, another view is taking over, or the phone is about to shut down due to low battery. Therefore, a save button is usually not needed. This differs from a desktop application, where you would expect to lose unsaved changes if you simply close the window. Of course, it is still possible to include an explicit save button, or a cancel to not save changes, but the convention of saving by default when removing a view should be followed for the most part, both because smartphone users will expect it and because of the inherent instability of the mobile device. If the end-user was editing something and then pressed the back button, consider showing a little message to verify that the data was saved. Without going into technical details here, we will just note that this “save on remove” behaviour is not something that comes for free. It requires great care from the app developer to make sure the user always comes back to the app in a consistent state independently of the rather arbitrary choice of the system to keep it in memory or create a new instance.

For the POSEIDON app, we will use a simplified model, where we say that the app can be running in the foreground or running in the background. No one but the app developer needs to know that the distinction between these two and between background and not running at all are not so clear in the Android execution model. We will say it is in the foreground when it is on screen and in focus, meaning it is what the end-user sees and interacts with when using the phone. It is in the background when it is running but not in the foreground. It is in the background when the end-user is not using the phone, turning off the screen to save battery, and when another app is in the foreground. We need some

background functionality, such as keeping some sensors active and communicating with servers occasionally. If we need to notify the user when running in the background, the Android convention is to place a notification in the notification bar (this can have sound and/or vibration). Placing an icon in the notification bar to show that the app is running in the background can also be considered. It can indicate app status, for instance with colour. However, we should strive to keep user interaction to a necessary minimum, and showing status might not be necessary.

4.3 Widgets and Styles – The “look-and-feel”

Turning now to the app user interface itself, we will consider options for its style. Widgets are the elements of an interactive GUI (Graphical User Interface), such as buttons, input boxes, check boxes, menus and scrollbars. Android has an extensive GUI framework, with widget types and visual styles for these. One fundamental question is whether to use the native Android look as much as possible, making the POSEIDON prototype look and feel much like other modern Android apps. There are several advantages to this. For users with prior Android experience, it provides familiarity, while a custom user interface may be harder to use simply for not following the learned conventions. And if we develop a simple, cleaner UI to make the app easier to use, the simplicity can make the app feel both less appealing and stigmatizing to some users. Using the default look also saves us the work of designing an alternative.

On the other hand, there are some usability issues with the default Android look-and-feel. One is that this is not the same on all devices. It has changed with different Android versions, and also manufacturers add style modifications. This makes it difficult to provide detailed instructions that fit all devices. However, the look-and-feel has become more stable and uniform from version 4.0 and above, with the Android theme called Holographic, although this could change again in future. The Holographic theme can also be criticized for its usability. It is a fashionable and somewhat minimalistic design, but has occasional problems of low contrast and abstract widgets that are hard to interpret.

The alternative is to make something with better usability by emphasising simplicity, large elements that are easy to see and interact with and good contrast. In fact we do not have to choose one or the other. We can provide both options and make this an area of personalisation.

4.4 Android User Interface Framework

As we at least want the possibility to use Android’s default look, we want to use the Android GUI framework. There is really no reason not to use it, at least as a starting point, because it is a flexible and powerful system, with all the functionality needed to build a user interface. It is built up like most such frameworks, with user interface elements (widgets), layouts for organising the elements on screen and hooks for app code to handle interface events. It cleanly separates the rendering of the widgets (how they look) from their logic, allowing us to change their style. We can both develop new or modified elements, or put a different look on the existing ones. We will examine Android’s GUI framework from the adaptability perspective, where there are strengths and weaknesses.

GUI adaptability on Android is closely tied to its system for application resources. We can say that these resources are application content which is not programmed in the source code. The classic example is media, such as images and sound we want to bundle with the app. But, just about everything you see on screen can be defined by resources. All text to be seen by the user should be defined in a text file put in the resources. And the user interfaces themselves – the structures of layouts and elements – can be defined as XML files in the resources. While the creation and organisation of a user interface can also be coded in the Java source code, it is easier to define this structure in an XML file. But the important point of the resource system is that any resource file can have different versions, and there are many different qualifiers which can be used to select between versions. One qualifier is

language and region, which is used for text. As long as all text is defined in a resource file, providing support for another language is as easy as providing a translation for the text in the other language. Other than language, the most important quantifiers are those dealing with screen properties, such as size, resolution and orientation. The resource system is important for making the app fit different screens. We will look at this in detail in the next section.

There is a whole system of resource files we can use to define a user interface, because we can define an entity using references to other resource files for some of its properties. This serves two important purposes. One is that it makes it easy to change a property for the developer, having the whole app affected by changing it one place instead of having to search through all the layout files. The other is that the referenced resource file can be qualified separately from the one which references it, so that different GUI properties can adapt to different types of context changes. We will describe a strategy for fulfilling this potential.

Firstly, a layout file defines the layout – the elements and how they are laid out in relation to each other – but with many of the properties defined in other resource files. All text is of course defined in its own resource, so that the app can be adapted to several languages. Sizes, such as margins between elements, should be defined in its own file and referenced from the layout file, both so that it is easy to change for the whole app in one place and so that we can provide variations based on screen properties if we want. For many GUI elements, we should define styles. A style is a collection of properties. Styles are especially important for text elements, where it typically combines font size, colour and other such properties. The font size of a style should in turn reference the size file already mentioned, while colour properties should reference colour variables defined by a theme. A theme is basically a style to be used for the app as a whole. In this strategy we mainly use it to give values to colours and other drawables (a solid colour and an image can often be interchanged). It is possible to have multiple themes and switch between them, thereby changing the look of the whole app with a single property. This system of resources is complex, and there can be difficulty in getting the full picture with the definitions spread throughout a number of files. However, it does make it possible to change certain properties while keeping the rest constant without redundant definitions that would damage application maintainability.

A resource in itself is static, so we should not completely define all user interfaces this way. If we need to adapt a user interface to content and context at runtime, this must be done by code. A simple example is a list of elements – we cannot fully define the interface statically because the number of elements and what they are will vary. Instead we can define the frame interface holding the list as one resource, and the list element as another resource. So for dynamic interfaces we break it down into pieces we can define as resources and then instantiate in code as they are needed to populate the interface.

Layout files are processed by the compilation process, and source code is generated which gives each resource element an integer identifier which can be used in the code. The Android system automatically selects the correct resources based on device configuration. For instance, language is an Android setting which the user can change through the setting interface. Whenever a configuration changes, including the orientation of the screen, the Android system destroys any currently visible apps and launches them again with the correct resources.

This brings us to the limitations of the resource system. One negative is that we as app developers have no control over what resources are selected; this is controlled by the system. We also cannot define our own qualifiers to use the system to do our own adaptations. Another drawback is that the whole resource set is “hard-coded” in the app by the compilation process. It is not possible to introduce

resources at run-time. We cannot even provide reference to resources directly from external sources such as a server or a file. If we have two themes, called “theme_a” and “theme_b” in the resource file, these will have integers assigned to them by the compilation process, let’s say 1 and 2. We can provide the value 1 from the external source to select the first theme, and it works, but if later we update the app and compile a new version we have no guarantee that the numbers are assigned the same way, so 1 may now refer to something else.

One of the most requested features for personalisation is text size. This however simple to implement can cause issues in the UI. One problem is inherent in the concept: it becomes harder to create good layouts if the text size can vary. What used to fit on a single screen does not any more when the size increases. Another problem is the implementation. When we define sizes in resources, we do so in a pixel-independent unit which is automatically scaled to different resolutions. We can also use a unit which in addition can be scaled based on a text size property. Although this unit type was there and documented from the very beginning, it took a very long time before it was actually implemented in Android. Now it is implemented, and it depends on a system setting the user can change in the setting interface. This typically has three possible values: normal, larger and largest. So Android has a solution, but it is device-specific rather than app-specific, and an app is not supposed to tamper with it. We can rely on it, and give the user instructions for how to change this setting (a bit complicated since the setting interface is different on different devices). Alternatively we could make our own solution by putting size definitions into themes, making it a choice of theme. This could be a feasible approach, although theme is usually a question of colours and images, with text size possibly varying with screen size and the system setting.

The resource system is good for what it’s made for, but whenever we need other forms of adaptability we must create it ourselves.

4.5 Screen Adaptivity

One thing Android has very good mechanisms for, is adapting the app to different screen configurations. It has been a requirement for Android, since it was designed to run on many different devices. Two key screen properties are pixel density and size. Let’s say two screens A and B have the same number of pixels, such as 1280x800. In a sense they are the same from the low-level software perspective – the frame buffer is the same size and we can draw the same amount of pixels on them. But A could be a phone while B is a tablet. B is much larger, while A has a much higher pixel density (the pixels are smaller). In this case we want to fit more content on B instead of just making everything look very big, so we want to use less pixels than on A when drawing the same element. Screen C could be the same size as A but with half the pixel density. Since they are phones of the same size we want to fit the same content, which means C must also use fewer pixels per element.

In an Android device the screen has a pixel density qualifier. We can define all dimension values, such as text sizes and layout margins, in a pixel-independent unit which is scaled automatically based on pixel density. Graphical resources will also be scaled automatically. This way Android adapts an app to different screens with minimal effort from the developer. It is also possible to provide different resources for different screen densities, mainly for images as providing them in the right resolution may give better image quality than relying on the automatic scaling.

Supporting different screen sizes requires a bit more care to do well. If we design the layouts for phones and don’t provide alternatives, it will run on tablets but it will typically not utilize the extra space well, thereby looking badly designed. Here we can use the resource qualifiers to provide different layouts for different screen sizes. However, we should strive to minimize the duplication of layout definitions, only providing different versions of what really needs to be different. It’s important

to make clever layouts that can fit on as wide a range of screen sizes as possible. It's very easy to make a layout that fits exactly to the screen of your phone, and then when the app runs on other phones with slightly different sizes or a different aspect ratio it's all wrong. We risk this problem with layouts designed to fit all its elements on the screen at once, while layouts based on scrolling are generally not a problem. So making a non-scrolling layout we need to take great care, using relative positioning of elements and dynamic gaps between them. We must also keep in mind the possible effects of text size adjustment and multiple language support (the translation may have quite a different number of characters).

Pixel density and screen size are static properties of a device, but keep in mind that the size available to the app can be halved when the keyboard shows up. There is one other important screen property which can change at any time – the orientation. A mobile device can have its screen in the vertical portrait orientation, or in the horizontal landscape orientation. The app needs a strategy for how it will handle this. One option is to only design for one of the orientations, and lock the app to this orientation so that what's on screen doesn't change if the phone is turned around. If we do let the orientation vary we can choose to provide separate versions of some of the layouts for the two orientations. Typically at least some of the layouts need this to look good and utilize screen space in both orientations, so it is more work to support both orientations. The choice of strategy depends on the type of devices we want the app to run on and the content we want it to display. For phones and smaller tablets, the portrait orientation tends to be the natural way to hold the device, except for when looking at film or photos, while a larger tablet is seldom held this way.

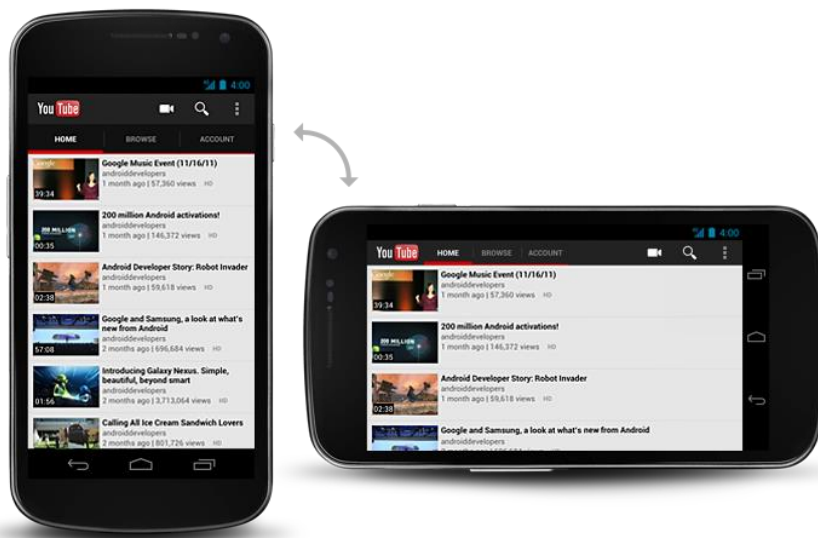


Figure 10 An Android phone in portrait and landscape orientations

For the POSEIDON pilots, the target device is a large phone (5-6 inches screen size). This means that we don't have to have multiple versions of layouts. We can focus on this limited size range and portrait orientation, at least initially, and later provide alternatives if there is a need.

4.6 POSEIDON App User Manual for pilot 1

This manual is made for the secondary user to train the person with Down syndrome. However the user of the app is called “you” in this manual.

Icon for the POSEIDON app

The **icon** on the right is for the POSEIDON app on the smart phone.

Touch this icon to start the app.

If you are asked for a username and password, use the username and password given to you by the POSEIDON team.



Start screen and app navigation

The **start screen icon** in the top left corner brings you to the main menu.

The main menu gives you the following options:

Routes – Start navigation by using planned routes or a new route.

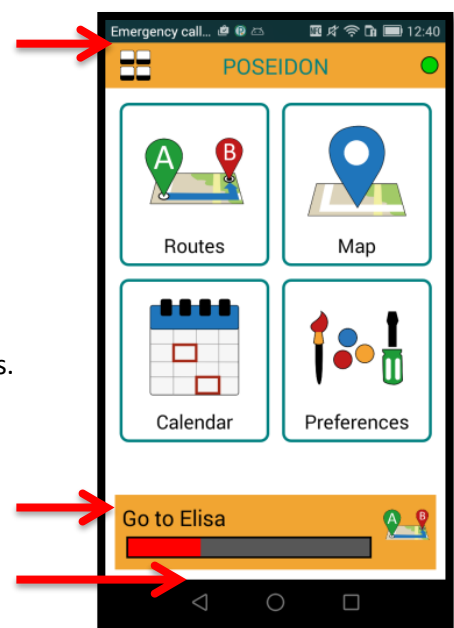
Map – View your current position on Google Maps.

Calendar – View planned events or add new events.

Preferences – Turn on/off position tracking and choose colour themes.

The **current** or **first upcoming event** of the calendar is shown below the main menu. When you touch this area, it brings up a list of upcoming events.

The **back button** of the Android phone brings you back to the previous screen.



Routes

You can navigate by using **planned routes** or by making a **new route**.

Planned routes – Select a route created for you

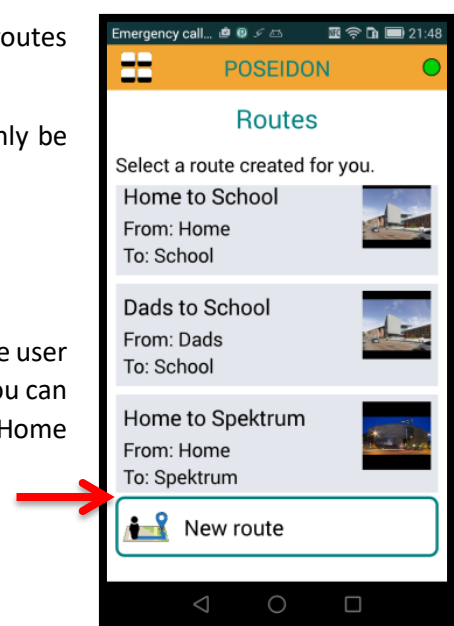
When selecting **Routes** from the main menu, a list of planned routes transferred from the Home Navigation System appears.

A planned route is a fixed route from a specific start point and can only be used when starting from the planned location.

When selecting a route, you can start navigation.

New route

When selecting **New route**, all destinations for the user will be listed. The user can navigate from his/her current position to one of the destinations. You can add destinations on the POSEIDON web under *Monitor* or in the Home Navigation System.



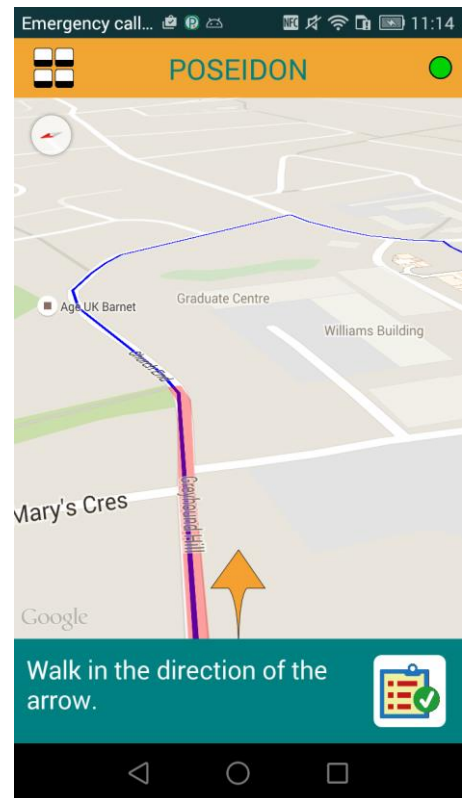
Route guidance

When selecting a route, you can start navigation. The map appears and gives you route guidance. The route is drawn in the map. Below the map there is a **guidance field** with written instructions.

The arrow is a direction indicator. It keeps track of the direction the phone is held in relation to the next point on the route. When the arrow points **straight ahead**, it means the back or top of the phone is pointing towards the next point on the route, and you should go in this direction. When it points **to the right**, it means you should turn right to follow the correct route.

The application **supports both walk and public transport.** A walk is divided into steps, where each step has a written instruction. Public transport can be broken down into steps. Each step starts with a decision point. This is a point where you should change direction.

In the map, **the current step is highlighted in red.** A step has an instruction, and it may have a photo. The instruction with a photo will pop-up when entering the step, and a voice message will be heard if text-to-speech is enabled on the phone. The pop-up can be removed if touched and re-shown by pressing the guidance field (here green).

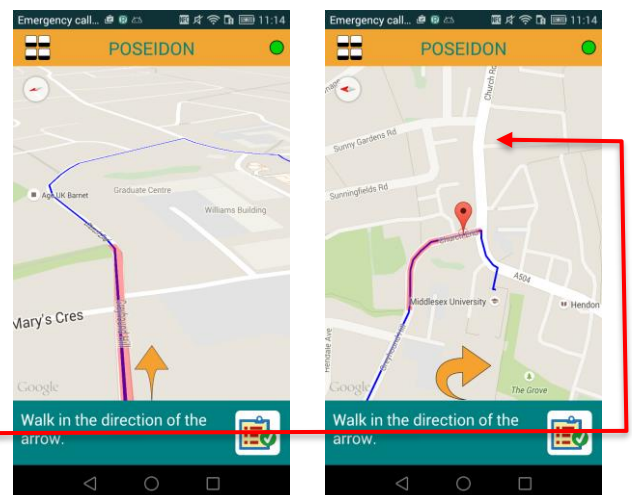


Two navigation modes

The map has two different navigation modes, depending on how the phone is held.

When the phone is held upright, it shows a 3D map from the user's point of view. It shows, at least, big buildings. The direction matches that of the phone. Turn the phone until the arrow is straight to see the next point on the route.

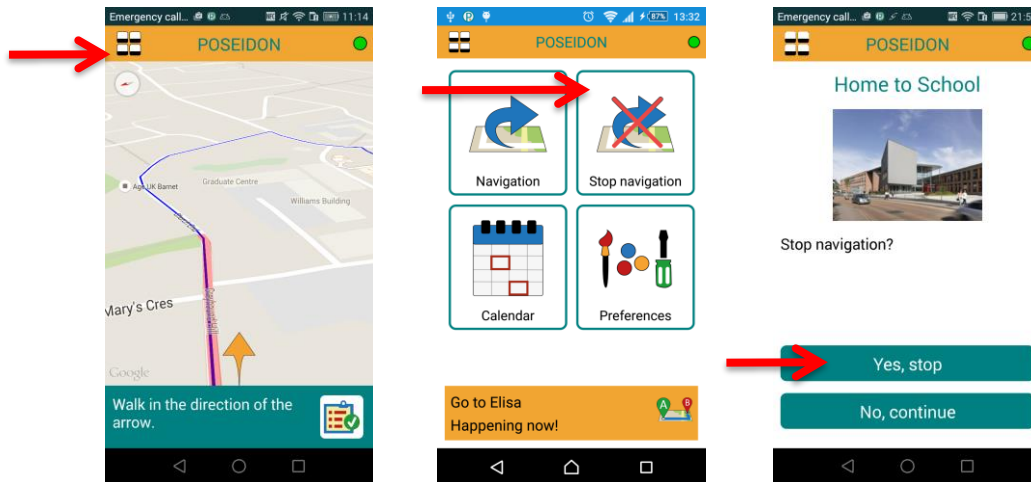
When the phone is laid down, the map is laid flat and zoomed out. The current position is shown as a red marker on the map, with an accuracy circle indicating the accuracy of the position.



Stop navigation

The navigation process stops when reaching the destination.

However, the navigation can be stopped at any point by selecting the *start screen icon* and then *stop navigation* from the main menu. You need to confirm by selecting “Yes, stop”.



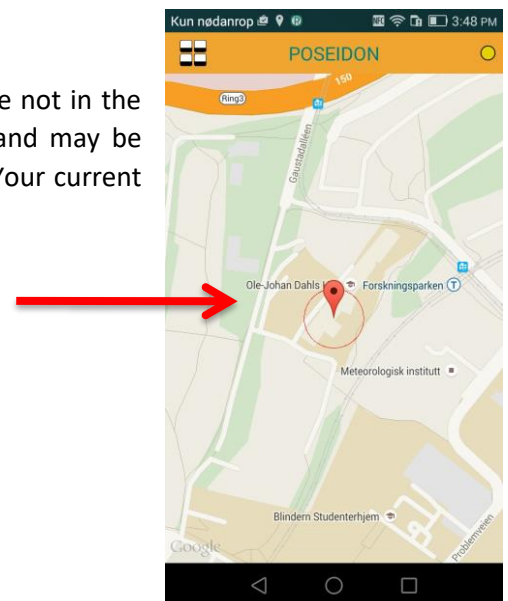
Deviation from route

If the user deviates far from the route, this will be detected, and 3 choices will be given:

1. **A new route can be produced automatically**, from the current position to the original destination.
2. **The carer can be called**, if a carer phone number has been written on the POSEIDON web under *Settings*.
3. **Navigation can be ended**.

Map

By choosing **Map** in the main menu you can see a map even if you are not in the navigation mode. The map does not rotate or follow your position and may be panned and zoomed with gestures. The map view uses Google Maps. Your current position is marked with a red icon.



Calendar

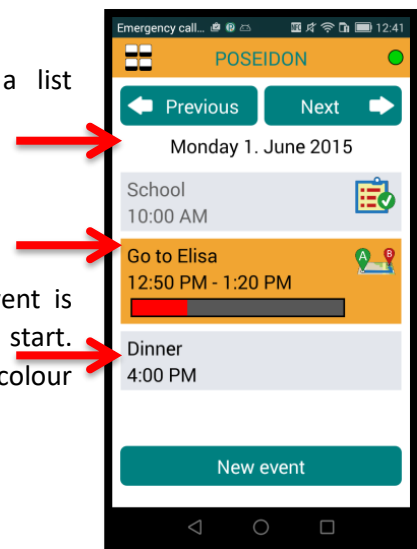
When selecting **Calendar** from the main menu, you will see a list of the events on the current day with title and time.

Previous and **Next** can be used to see the events of other days.

Passed events are “greyed out” (have text with less contrast).

Current event is highlighted. The time left until the start of an event is indicated with a coloured bar for the last half hour before the start. To give a visual indication of the time left, it is divided into 3 colour codes:

1. **Green** for the first third.
2. **Yellow** for the second third.
3. **Red** for the last third.

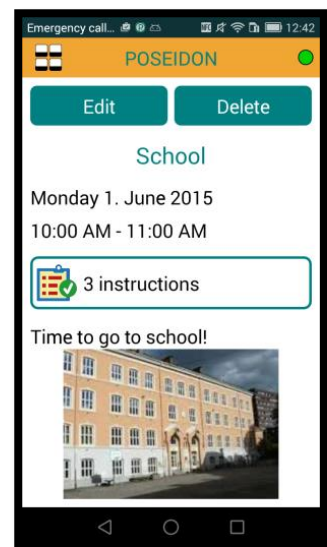


View event details

You can press an event to get a detailed view with any description entered for the event. There will also be a voice, giving the details (if text-to-speech is available).

Events can have various types of additional information:

- **Image.**
- **Instruction list** with a set of instructions. Each instruction is a short text and may also have an image and/or voice message.
- **A planned route for navigation.**
- **A recorded voice message.**



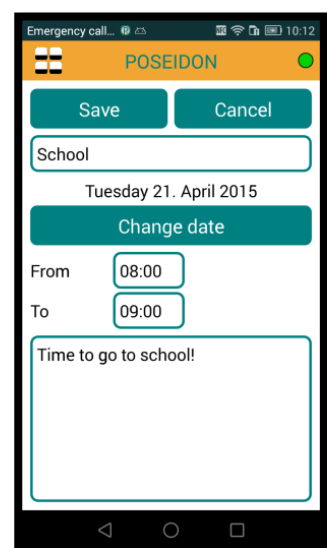
Create a new event

You can create a new event by pressing the **New event** button and entering the following information:

- Title of the event.
- Date.
- Start time and stop time.
- Description of the event.

The date is initially the date in the calendar. When pressing the **Change date** button, this may be changed. Events cannot cover more than one date.

Note that some of the more advanced features of the web calendar are not available when entering or editing events in the mobile application.



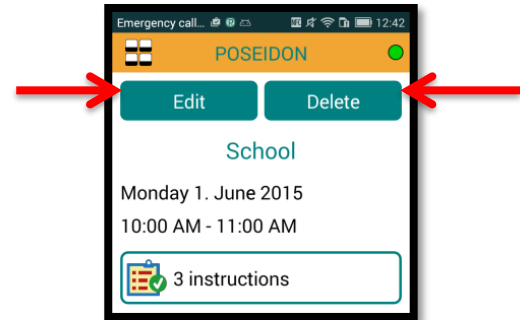
Edit or delete events

From the detail view of an event, you can **edit** or **delete** the event.

Edit leads to the same screen as “New event”.

Title, date, start time, stop time and description can be edited here.

When pressing **Delete** a confirmation box pops up. You must press “Yes” to delete the event.



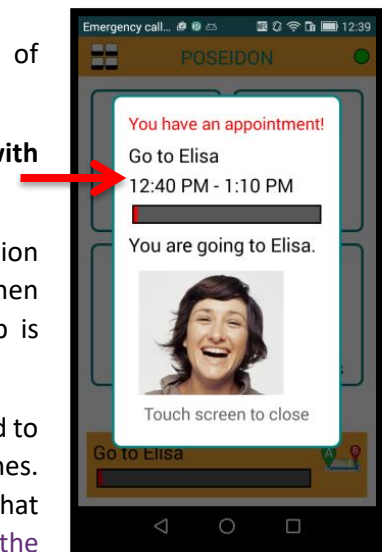
Event reminders

An event can have **reminders** at specific times prior to the start time of events. This can be added to the event on the POSEIDON web.

When it is time for the reminder, the user is given a pop-up **notification with the event details** and how long it is until the event start time.

A notification is placed in the **notification bar of the phone** if the application is not currently on screen. The full reminder is shown in the application when it is opened. The notification gives a sound and vibrates until the app is displayed.

If the event has a route for navigation, the context middleware will be used to provide a **weather based message** to remind you to wear appropriate clothes. This requires that the context middleware is installed on the phone and that the phone is able to find its position. [This message only appears if the weather requires special clothing \(rain or very cold\).](#)

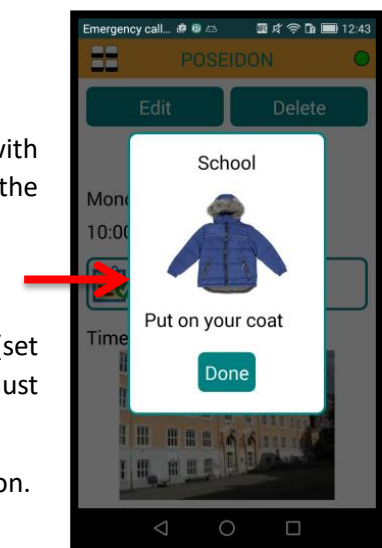


Notification at start of event

The user is notified of an event at the start time of the event. As with reminders, a notification is placed in the notification bar of the phone if the application is not currently seen on the screen. A pop-up gives the details.

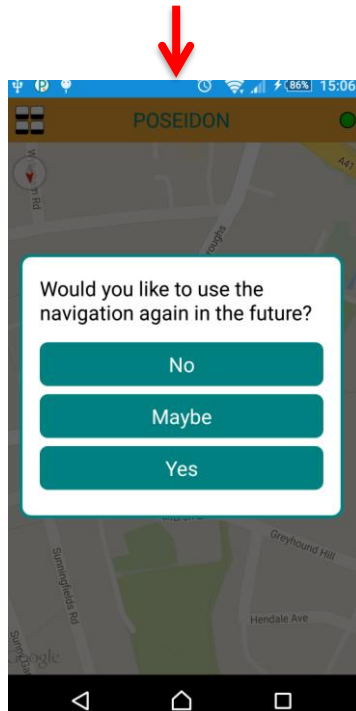
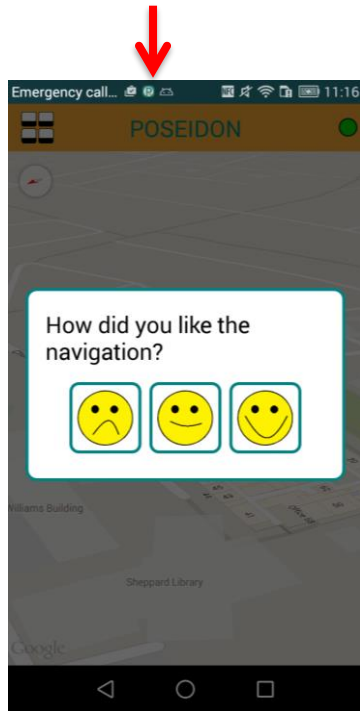
If the event has **instructions**, the button on the pop-up leads to the first (set of) instructions. Sets of instructions are shown in sequence. The user must press **Done** to continue to use the app.

If the event has a **route**, the app will ask for confirmation to start navigation.



Evaluation feedback

After finishing a route, the user will get two questions to answer:



Preferences

Tracking

The user can turn on and off the **position tracking**. When off, position tracking from the POSEIDON web will not be available for the carer.

Note that in the current version of the app position will just be tracked during navigation.

Colours

The **colour theme** can be changed in the app.

The default theme (POSEIDON) is based on the colour palette used in the project. The other theme currently available is a high-contrast theme, with yellow and white on a black background.



5 Moneyhandling App using the interactive table (CapTap)

The interactive table is placed on a stable surface in front of a monitor. For example it can be placed on a regular coffee table. The Moneyhandling App is running on the local PC, while the interactive table is connected to the local network. How to set up the interactive table is described more in detail in D5.6 - Integrated POSEIDON technology technical documentation.

The UI with the Moneyhandling App comprises of two parts, the UI of the application itself and the interactive table with its overlay. These components will be presented in the following.

5.1 The overlay

The Moneyhandling App features localized CapTap overlays that visualize the spatial distribution of interactive elements of the CapTap. For the Pilot 1 there are three overlays versions, one with Norwegian Kroner, English Pound and the Euro.



Figure 11 Overlay for the CapTap – here the Euro version

The overlay for the CapTap is divided in three regions. The upper region represents the buttons that can also be found in the application. The functions connected to the buttons are displayed at the screen and change according to the content and context of the current screen. The lower left region is the money area. Each border limits the sensitive area of the CapTap for that specific printed coin or note. The orange rectangle is the money placement area (the tray).

5.2 Using the Application

Start the application as described in D5.6.

The main menu shown in Figure 12 gives you three options:

- Quit: quit the application and return to the Desktop.
- Settings: options to change the language and the position of the button bar (Pilot 1)
- Scenarios: choose a scenario (Pilot 1 has currently one single exercise scenario)

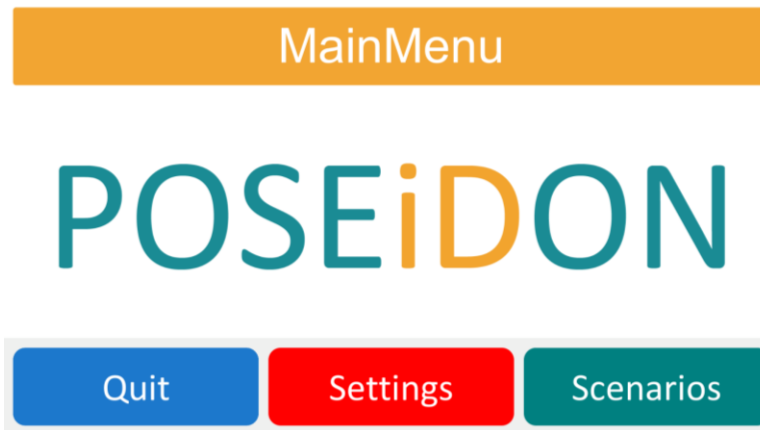


Figure 12 Start screen of the application

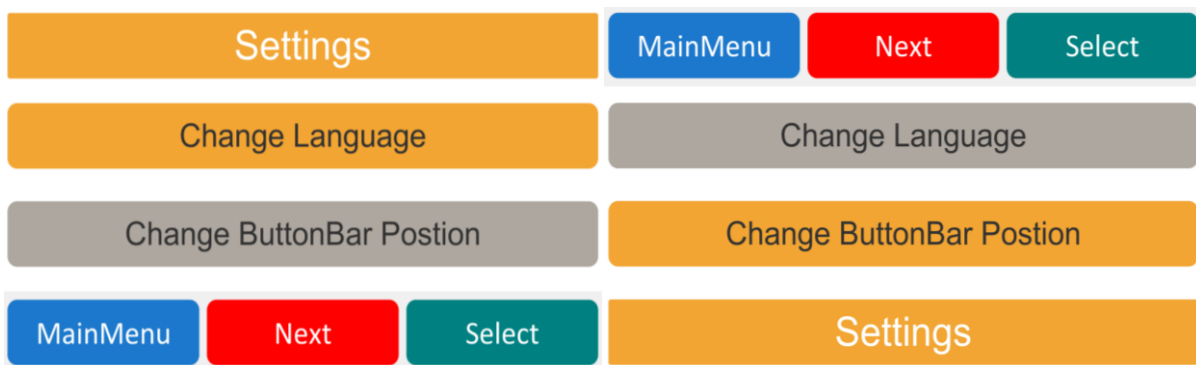


Figure 13 Setting menu: Positioning the buttons - at the bottom (l.) or at the top (r.).

Inside the menus you can navigate either by using the mouse and clicking on the buttons, or by knocking on the corresponding places on the overlay on top of the CapTap. The three buttons (blue, red and green) have analogous meaning on both, the screen and the overlay.

With that in mind you can toggle the settings options for changing the buttons position an entering the language menu by clicking or knocking the red button, which is labelled “next” in this particular menu screen.

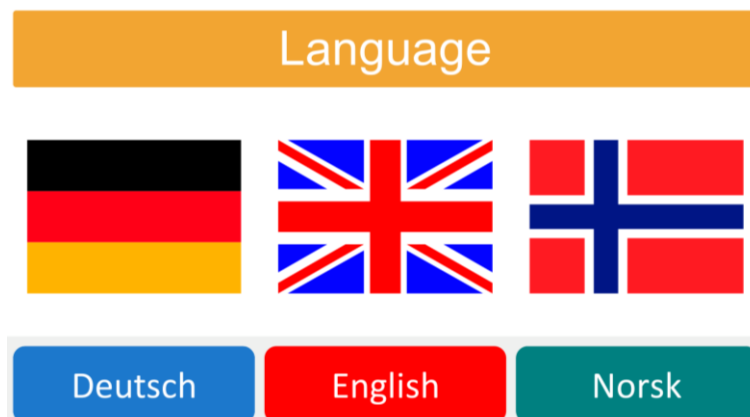


Figure 14 Localization options

From the MainMenu the scenario menu can be reached. Pilot 1 has only one scenario that can be started by clicking or knocking the green button that is labelled “play”. After selection the exercise begins. On the upper left a product is shown. Right next to it the price to pay is displayed. (Compare

Figure 14). Choose the notes and coins you need to pay the product by knocking on the note or coin and then knock on the orange tray field.

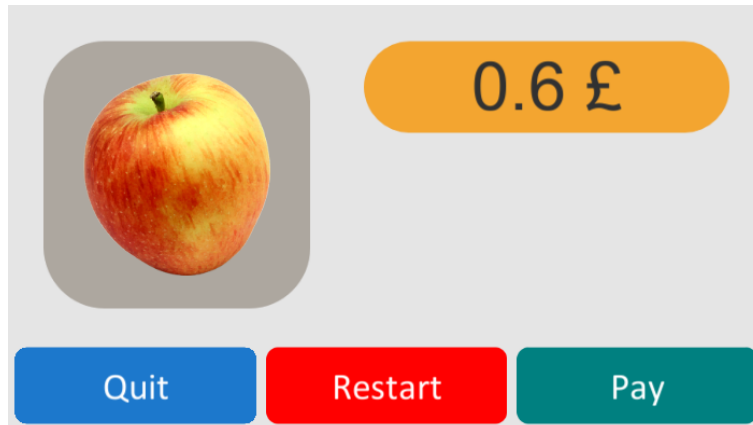


Figure 15 Example screen of a product

If you think you have picked the needed money knock or click on the green button that is labelled “pay”. Now you get a visual feedback.



Figure 16 Visual feedback for the chosen amount of money.
(left) exact choice, (middle) overpaid, (right) not enough paid.

5.3 CapTap as static display

The Moneyhandling App is build with Unity3D for Windows x86 / x64 and Mac OS X 10.10 (Yosemite) and uses the CapTap as input (HCI) device on which it heavily relies – in fact the CapTap is mandatory for using the Moneyhandling App because it “extends” the user interface from the virtual representation on the computer screen into the physical world of the user. Without the CapTap a wide area of the applications (virtual) screen-surface is not available.

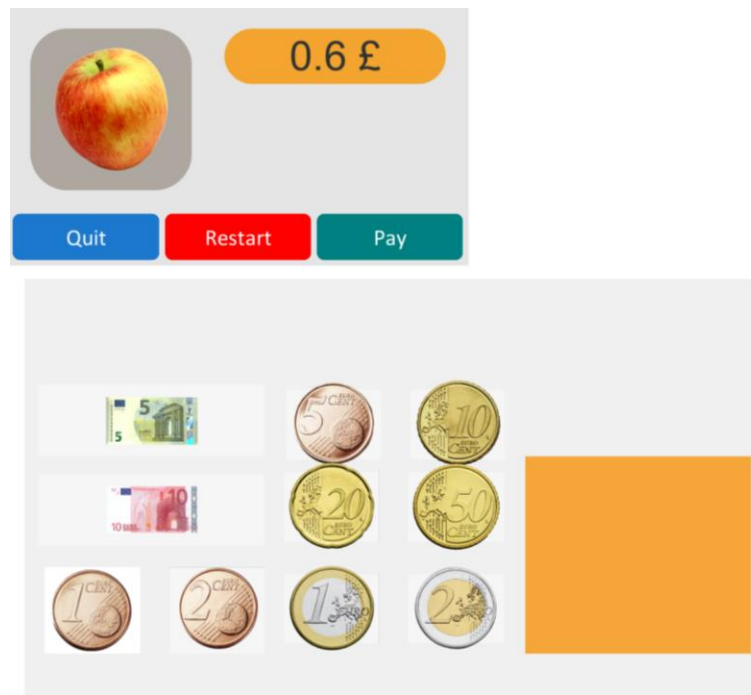


Figure 17 Developer's view of scene "ScnScenarioOne" with the actual screen on top and the virtual area on the bottom.

The technical point of view is that the CapTap represents a static display for dynamic interaction. Static display means that the content visible on the CapTap is fixed for the timespan of the usage of the application. This static display is visualized by the overlays described in 4.1.1. It is static but customizable: the user can switch between different overlay sheets available for the CapTap and the Moneyhandling App to e.g. customize the localization of the imprints (currency and language). Being a static display with capacitive touch and audio knock (tap) functionalities the content shown on the CapTaps overlays corresponds directly to the Moneyhandling App's logic and mechanics. The interaction process is described in section 4.1.2. The mentioned overlays are currently not recognized by the CapTap per se thus no automatic calibration or customization of the app's logic or settings is performed. They are a pure visual guidance for the user to recognize the spatial distribution of the different logical sensing locations. The customization has to be performed through the Moneyhandling App's settings menu, also described in section 4.1.2.

5.4 Unity3D application

For extending the Moneyhandling App the content of the software projects archive or repository has to be made available on the developer's local machine. Further the most current version of Unity3D (not lower than 5.0.1f1) is necessary to avoid problems with compatibility and feature availability. Pilot 1 has been developed with the professional version of Unity3D for that a purchased license is needed. Nevertheless the first pilot is not using any pro-features by now, so the free versions should work as well until further notice.

Please refer to the Unity3D's user manual (<http://docs.unity3d.com/Manual/index.html>) for further information on how to work with Unity3D per se.

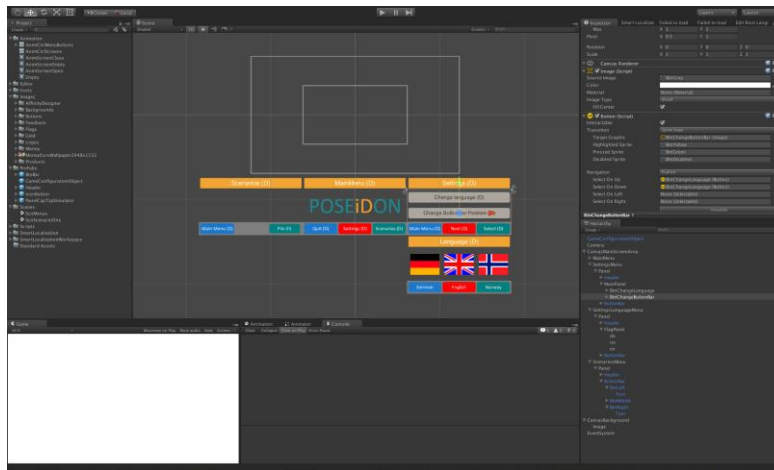


Figure 18 Unity3D project view. In this editor's configuration the project overview pane is on the left hand side.

To begin extending the Moneyhandling App the root folder of the project has to be opened with Unity3D. Unity3D scans the content of the entire folder structure and creates all necessary supplementary data. For repository and data handling convenience this generated data should be dismissed or ignored when versioning any changes because it can affect the work of another developer respectively on another machine. After importing the project into Unity3D the Scenes folder can be found on the projects overview pane. Inside this folder the so-called Scenes are located, which represents a logical entity including e.g. all menus, interactive objects and visible assets. Pilot 1 consists of two scenes that are *ScnMenus* and *ScnScenarioOne*.

- **ScnMenus** contains the entry point for the application where the user can navigate into the settings of the Moneyhandling App or start a new scenario / exercise.
- **ScnScenarioOne** contains the Pilot 1 single exercise and can be started through the Scenarios menu inside the ScnMenus scenario screen.

Either the ScnMenus' as well as the ScnScenarioOne' buttons and screens can receive input from the CapTap's *ButtonBar* shown in the figures above or the computer mouse as commonly known from WIMP systems. The main difference is that the mouse interaction is only meant for assistance purposes and cannot "solve" exercises because they rely on the interaction with the (imprinted) money and the tray on the CapTap. Nevertheless an assisting person can cancel, restart or confirm an action via a click on one of the three context related buttons on the screen's ButtonBar.

All logic interactions and scripts are written in the C# (C Sharp) language but Unity3D also supports JavaScript.

The main further development focus of the Moneyhandling App should be on the layout, the feedback provision and the perceptibility of the shown information. It is a important but not trivial to achieve a relatedness of the content and interaction to real life challenges but having enough abstraction to make a learning app available on a computer. Pilot 1 will gather feedback and experience for further knowledge especially in combination with the CapTap.

5.5 UI rationale and guidelines implementation

The Moneyhandling App implements the overall design of the POSEIDON UI guidelines. The buttons, the overlays and the App uses the colours specified in the POSEIDON interface design document V1. Some examples are given in Figure 11, Figure 12, and Figure 15 The used font throughout the application is Arial. The flat design paradigm was forced, so no outlines or 3D effects where used. According to the guidelines no decorative elements are used and no disturbing animations are

implemented in the application that disturbs or irritates the user. Only the shift of the screens is visualized with a swift animation to indicate that the screen's content has changed.

Figure 12 shows the screen design, which is divided into three parts: the button area (ButtonBar), the title area and the content area. The position of the button area and title area can be swapped in the preferences. The title area is held in the POSEIDON orange, the buttons are coloured in red, blue and POSEIDON turquoise (green), the product area is in grey and the price area in POSEIDON orange. The visual feedback icons shown in Figure 15 are coloured in the POSEIDON colours scheme as well.

5.6 Moneyhandling App User Manual for pilot 1

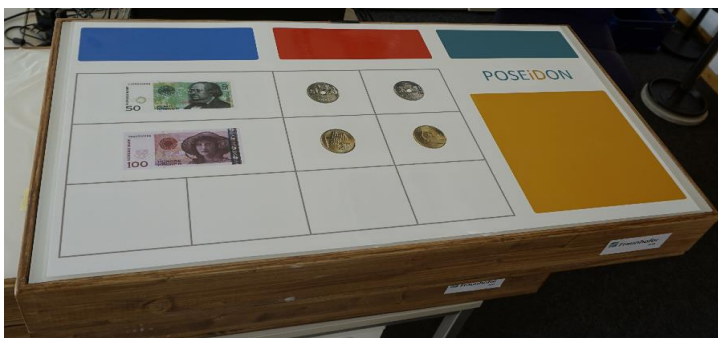
This manual is made for the Secondary User. In this manual, the person with Down's syndrome is called "The user".

Interactive table and equipment overview

The interactive table is a prototype of a new interactive device, which combines the functionalities of a touch table with gestures in the air. It is called CapTap.

Equipment delivered by the POSEIDON team:

Interactive table with a money handling overlay.



Power plug

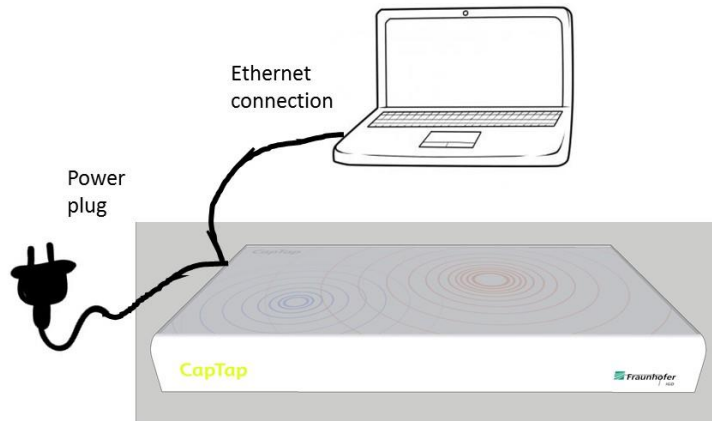


How it is all connected

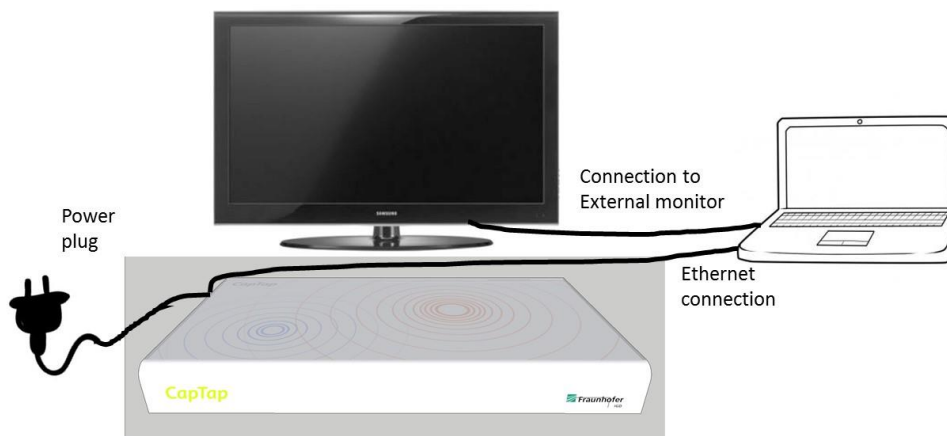
The technical team has set up and downloaded the Money handling application to your computer. As you can see on the figure below, the **Money handling software on your PC** will connect to the CapTap via the Internet. It is first connected to your **router** through WiFi or an Ethernet cable and then the router is connected to the CapTap through an Ethernet cable. **An external LCD screen, an internal laptop screen or an external TV** can be used for viewing the programme. Such a screen (external monitor) is usually connected with the PC through a HDMI or DVI cable depending on the setup of the PC and the external monitor. The POSEIDON technician has provided the necessary cables.

Setup with a Laptop

MoneyHandling



Setup with a PC and an external LCD screen or TV



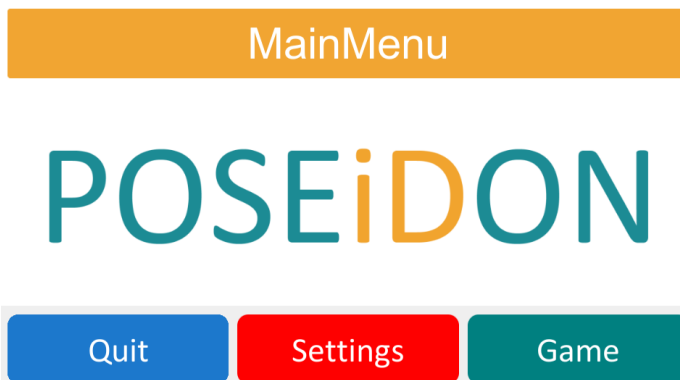
How to use the Money handling application

Ensure the power plug is connected to the CapTap. Start navigating and interacting with the application on the PC, by double clicking on the icon for the application **MoneyHandling** on the PC.

The following start screen of the application will be shown:



The first thing you have to do, is to slide your hand over the whole surface of the table. This means that you should have touched every part of the surface at least once. The main menu will be shown on the PC and give you three options:



Quit: Quit the application and return to the desktop.

Settings: Options to change the language and the position of the button bar.

Game: Starts the game with a random scenario (combination of item to buy and prices).

Pilot 1 has five different exercise scenarios.

Inside the menus you can navigate either by using the mouse connected to the PC and click on one of the three buttons, or by knocking on the corresponding places on the overlay on top of the CapTap.

The three buttons (blue, red and green) have the same meaning on both the screen and the overlay.

The overlay for the CapTap is divided into three regions:

1. The upper region represents the buttons that you can see on your PC/TV-screen or separate monitor that is connected to the interactive table.
2. The lower left region is the money area. Each border limits the sensitive area for that specific printed coin or note.
3. The orange rectangle is the money placement area where you can place your real money.



In the POSEIDON pilot we would like the user to use the interactive table.

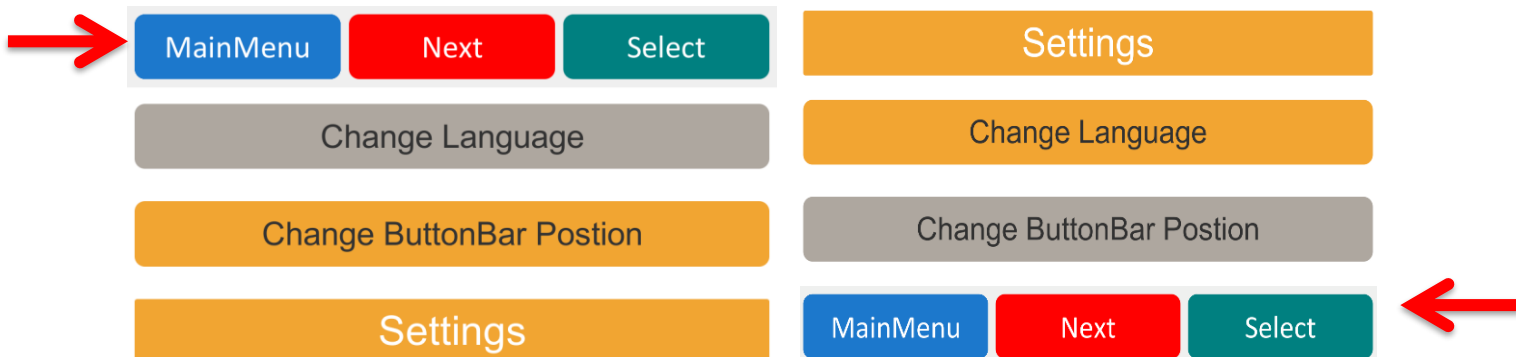
Change the language

If you want to **change the language** you have to knock on the red button on the table or the programme on the PC and go to **Settings**. The colour changes to orange when the mouse is over the button.



Change the button bar position

You can also change the position of the button bar so it will be shown either on the upper or the lower part of the screen:



Start a game (session of money training)

From the **MainMenu** you can go to the Game menu.

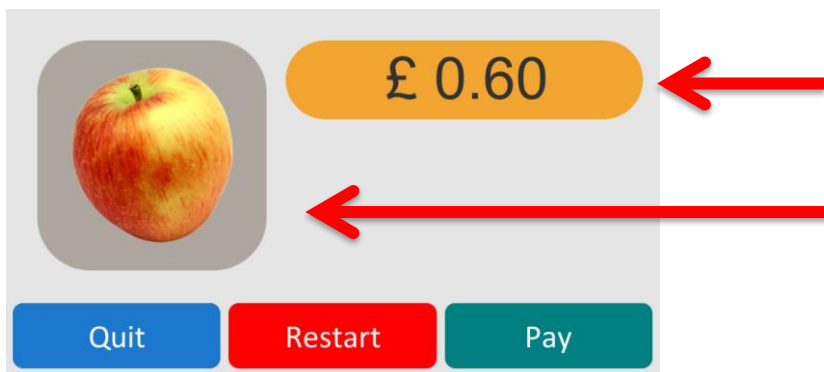


POSEiDON



Pilot 1 has only one sort of game. The game can be started by clicking (with the mouse that is connected to the PC or knocking on the field on the interactive table) the green button that is labelled **Game**.

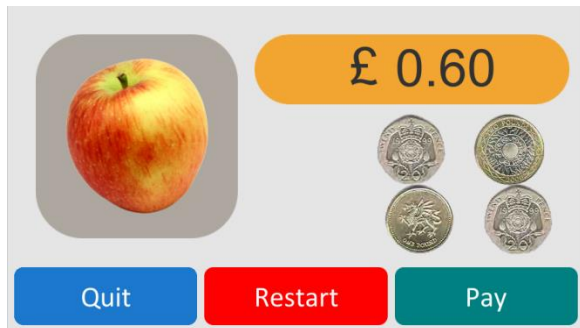
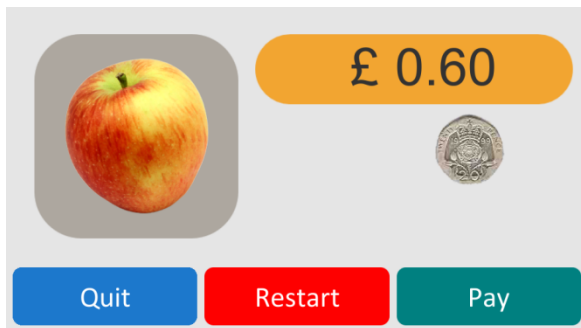
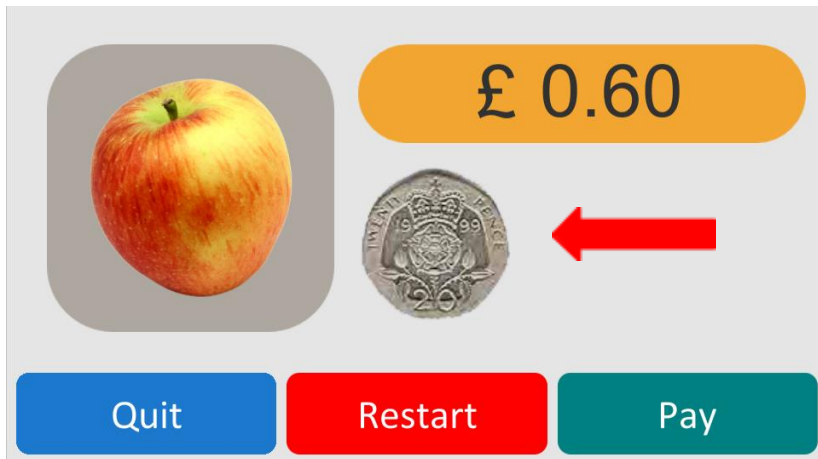
On the upper left a product is shown. Right next to it, the price to pay is displayed.



Use real money

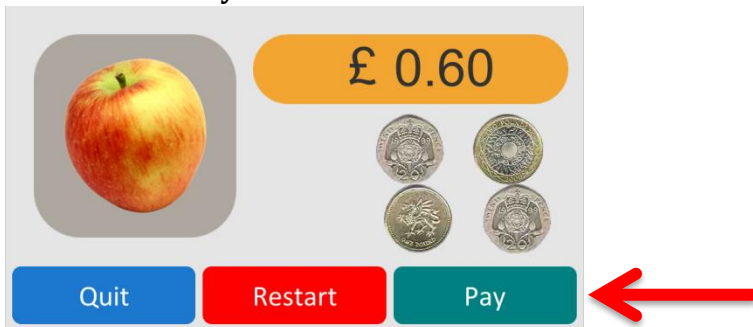
You have the option to place real money on the table and use it while playing. The user can even use the coins to knock/tap. The user should choose the notes and coins needed to pay for the product by knocking/tapping on the note or coin field and then knock/tap on the orange tray field (see red arrow below). As soon as a coin or a note has been selected, the current selection is shown to the user on the monitor screen (1). As soon as the money is put on the orange tray field (that is the user has knocked on the orange field), a history of all coins and notes already put on the field is shown to the user. (2)





(2)

When the user thinks he/she has picked the needed money, knock or click on the green button that is labelled **Pay**.



Now a visual feedback for the chosen amount of money is shown:



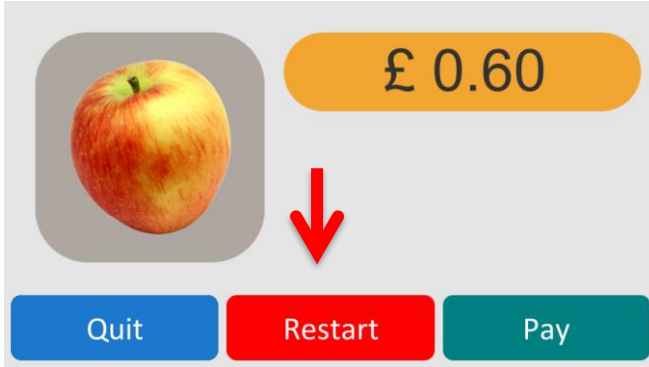
Green - exact choice

Orange - overpaid

Red - not enough paid

Restart current game

The current game can be restarted by clicking the **Restart** button on the PC or the corresponding red button on the CapTap.



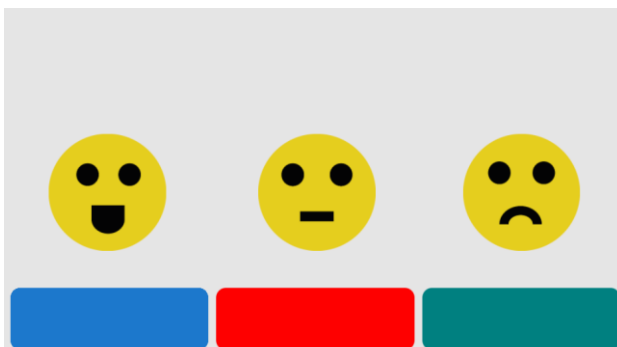
New game

If the user has finished one scenario after paying for five products, he/she can start a randomly chosen new game (scenario) by clicking on the **New Game** button. Currently there are five different scenarios available.



Quit the application

When the user decides to quit the application, he/she can do so by knocking on the blue button on the CapTap. The user should now rate his/her game experience by choosing an appropriate smiley by knocking on the corresponding coloured button on the interactive table.



Using the Money handling application interactive table without the interactive table (for testing)

The software can be used without the interactive table. You can do so by following the keyboard mapping shown below. To select the five euro/pound note, for instance, you can press the “1” key on your keyboard. The three buttons on the top can be controlled with the corresponding buttons in the software using the PC mouse or by pressing “Q”, “W” or “E” on the keyboard.



Log-File

The Application stores all game events in a log file which can be found under the path:

C:\Users\???\AppData\LocalLow\POSEIDON\MoneyHandling

5.7 CapTap – Deployment User Manual for developers – pilot 1

Before starting the first iteration (Pilot 1) of the Moneyhandling application (Moneyhandling App) you have to do some preparation. First of all connect the interactive table to PC running the application using an Ethernet cable and then plug in the power cord on the side of the table.

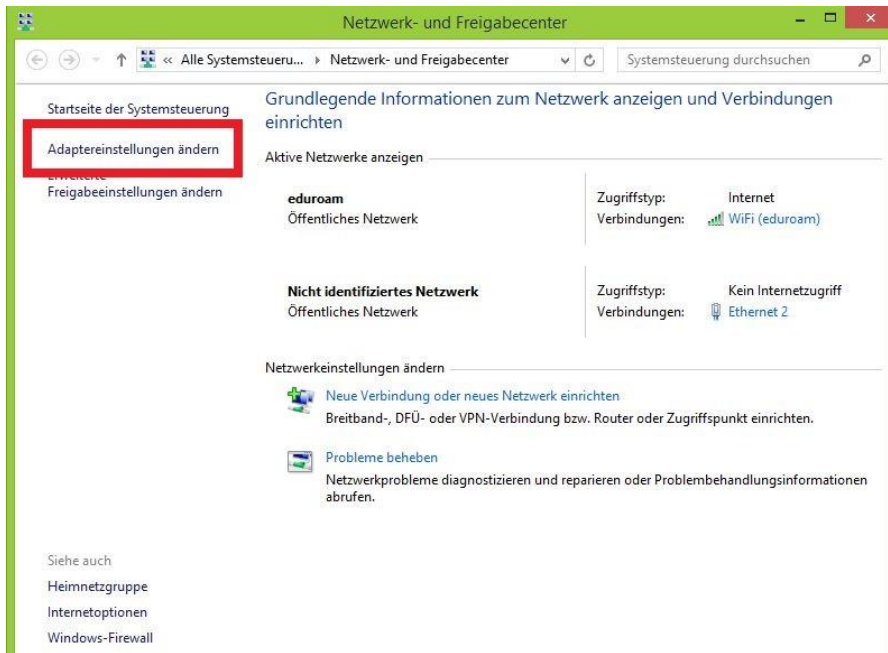
NOTE: Please check the following things to be true:

- 1x interactive table stands on a solid table
- 1x computer connected to the interactive table with Ethernet cable
- No MAC address blocking

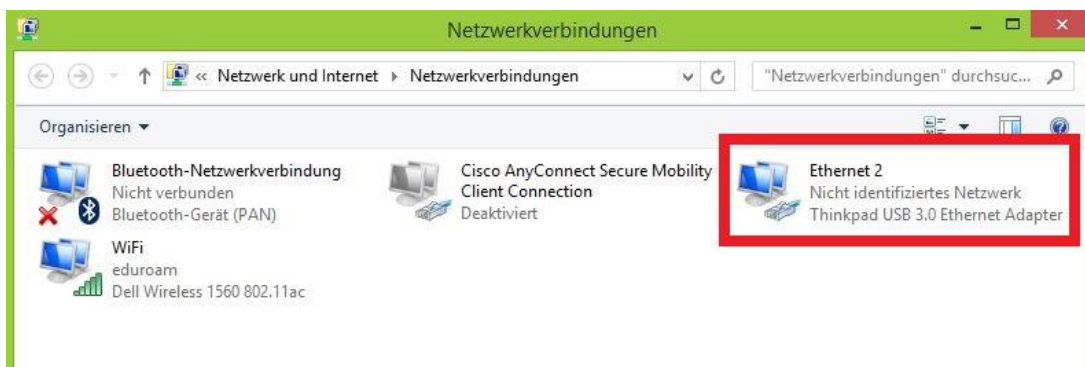
Download the most current version of the Moneyhandling App from <https://goo.gl/O95tO0> (Windows and OS X Version) and extract it to a location of your choice. In the Windows version of the *Moneyhandling* folder there is an additional folder called *MoneyHandling_Data*. Here the *config.txt* file has to be adapted. In the Mac OS version the *config.txt* file can be found in *Moneyhandling.app/Contents*. Make sure the first line of the *config.txt* document is set to the current IP address of the interactive table. The IP address needs to be 192.168.0.1.

After providing the right IP address to the application the connection between the table and the PC still needs to be set up by setting a static IP address to the Ethernet connection. A similar process is on the MAC OS.

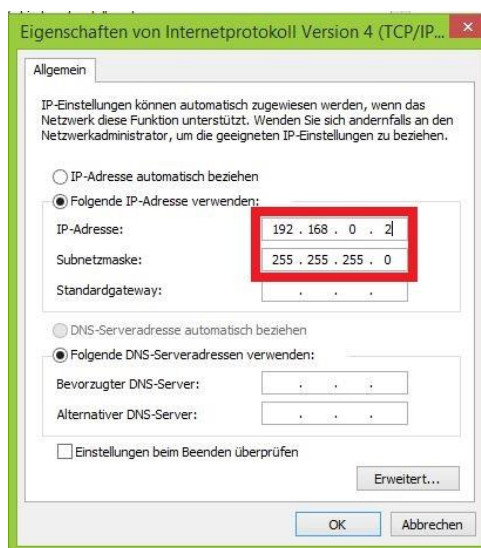
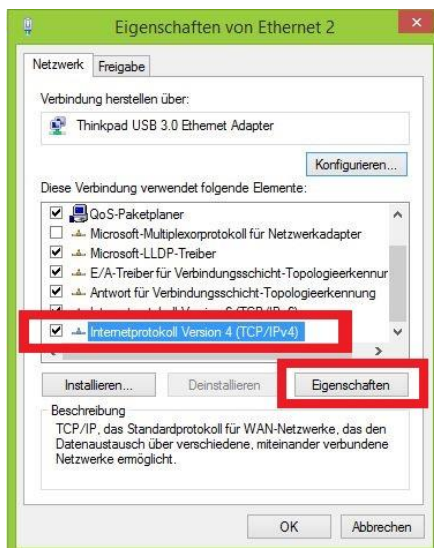
On a Windows OS right click on the network connection and then open the adapter setting on the left side.



You will see all available network connections. Look for the wired connection and right click on it. The settings will be shown.

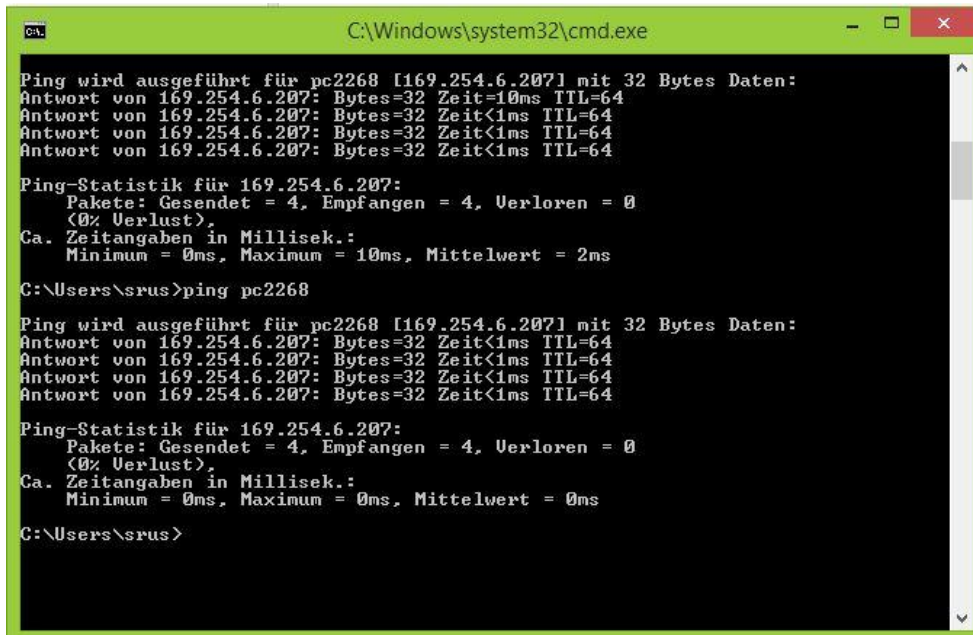


Please go the TCP/IP v4 and click on it and then on Settings.



Here you can set the IP address of your PC so that it is in the same subnet as the interactive table. For this you can write the IP of the interactive table and change the last number by 1. E.g. the IP address of the table is 192. 168. 0. 1. In this case you will write in the IP address field 192. 168. 0. 2. Then just click in the row below. The subnet mask has to be set to 255.255.255.0. Click OK to finish.

To verify the connection between the PC and the interactive table open the windows run and then type *cmd* which opens the command window. Please deactivate for this any internet connection like WiFi. Then type ping *IPAddressOfTable* like *ping 192.168.0.1*. If the test was successful you will receive an answer like shown in the following Figure where you receive multiple answering packets.



```

C:\Windows\system32\cmd.exe

Ping wird ausgeführt für pc2268 [169.254.6.207] mit 32 Bytes Daten:
Antwort von 169.254.6.207: Bytes=32 Zeit=10ms TTL=64
Antwort von 169.254.6.207: Bytes=32 Zeit<1ms TTL=64
Antwort von 169.254.6.207: Bytes=32 Zeit<1ms TTL=64
Antwort von 169.254.6.207: Bytes=32 Zeit<1ms TTL=64

Ping-Statistik für 169.254.6.207:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0
    (0% Verlust),
    Ca. Zeitangaben in Millisek.:
    Minimum = 0ms, Maximum = 10ms, Mittelwert = 2ms

C:\Users\srus>ping pc2268

Ping wird ausgeführt für pc2268 [169.254.6.207] mit 32 Bytes Daten:
Antwort von 169.254.6.207: Bytes=32 Zeit<1ms TTL=64
Antwort von 169.254.6.207: Bytes=32 Zeit<1ms TTL=64
Antwort von 169.254.6.207: Bytes=32 Zeit<1ms TTL=64
Antwort von 169.254.6.207: Bytes=32 Zeit<1ms TTL=64

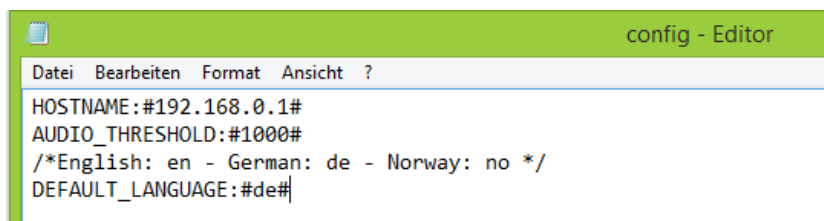
Ping-Statistik für 169.254.6.207:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0
    (0% Verlust),
    Ca. Zeitangaben in Millisek.:
    Minimum = 0ms, Maximum = 0ms, Mittelwert = 0ms

C:\Users\srus>
  
```

Once the connection is established the Moneyhandling Application can be configured and then started.

Configuration Moneyhandling Application

For this go to the *Moneyhandling* folder there is an additional folder called *MoneyHandling_Data*. Here the *config.txt* file has to be adapted. In the first line write between the #-tag the IP address of the Interactive table like shown in the Figure below.



```

config - Editor

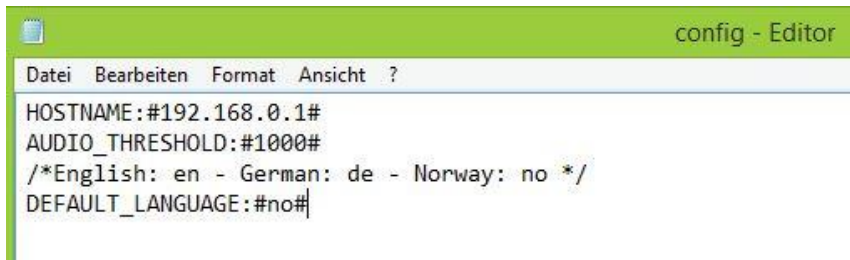
Datei Bearbeiten Format Ansicht ?
HOSTNAME:#192.168.0.1#
AUDIO_THRESHOLD:#1000#
/*English: en - German: de - Norway: no */
DEFAULT_LANGUAGE:#de#
  
```

Start the Moneyhandling Application

For this start the *Moneyhandling.exe*. It is VERY IMPORTANT to slide with your hand at the beginning over the whole surface of the table. Then you can start by touching (with a louder noise) the green (right top) button of the table to start a game. If you need to tap very hard (loud) then the threshold has to be changed.

Change the tap detection audio - threshold

For this go to the *Moneyhandling* folder there is an additional folder called *MoneyHandling_Data*. Here the *config.txt* file has to be adapted. In the second row the threshold has to be adapted. A good number would be 1000. If the table is too sensitive to all noises, you need to change the threshold to a higher number like 10000 and try it out.



```
config - Editor
Datei Bearbeiten Format Ansicht ?
HOSTNAME:#192.168.0.1#
AUDIO_THRESHOLD:#1000#
/*English: en - German: de - Norway: no */
DEFAULT_LANGUAGE:#no#
```

Change the default starting language

For this go to the *Moneyhandling* folder there is an additional folder called *MoneyHandling_Data*. Here the *config.txt* file has to be adapted. The `DEFAULT_LANGUAGE` parameter has to be set to `#no#`.



```
config - Editor
Datei Bearbeiten Format Ansicht ?
HOSTNAME:#192.168.0.1#
AUDIO_THRESHOLD:#1000#
/*English: en - German: de - Norway: no */
DEFAULT_LANGUAGE:#no#
```

Find out the IP address of the table

You can check the IP address by typing *ifconfig* to find out the IP address of the wired connection.

Set the static IP address of the table

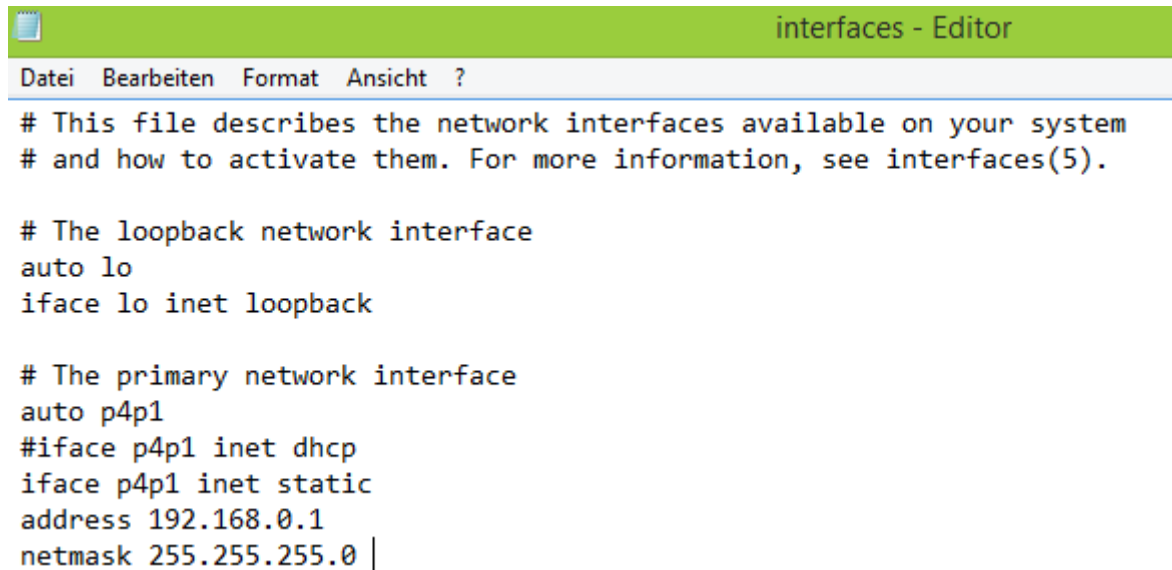
The IP address of the table needs to be statically configured and is: IP Address 192.168.0.1. For this type:

```
su – captap-admin
```

```
[Password...]
```

```
cd /etc/network
```

```
sudo nano interfaces
```



```

Datei  Bearbeiten  Format  Ansicht  ?
# This file describes the network interfaces available on your system
# and how to activate them. For more information, see interfaces(5).

# The loopback network interface
auto lo
iface lo inet loopback

# The primary network interface
auto p4p1
#iface p4p1 inet dhcp
iface p4p1 inet static
address 192.168.0.1
netmask 255.255.255.0 |

```

The Interfaces file should be changed to look like this. Then press ctrl-x, then y and then enter to save the document.

Check table functionality – GUI on table PC

If the connection is up and there is nothing happening with the application the functionality of the table has to be checked.

For this, the interactive table has to be connected to a screen/monitor through the HDMI input. Additionally a keyboard can be connected to the USB plug. The Ethernet connection to the PC has already been set up. As the last step, plug in the power plug. This triggers the start of the mini PC from inside the interactive table and also automatically starts the sensor data processing software on the PC.

Please check that it is properly working. After ~1minute the Ubuntu loading screen should appear on the monitor and you should be automatically logged in as user *captap*.

Next, we would like to check if the software processing the sensed data automatically starts. For this we search for the processes which contain the string table by typing `ps -ef | grep -i table`. The output is shown in Figure 6.



```

captap@pc2247:~$ ps -ef | grep -i table
ini-sc    1295      1  0 10:47 ?        00:00:00 /bin/sh /home/captap/table.sh
ini-sc    1299    1295 22 10:47 ?        00:00:25 java -Djava.library.path=/home/c
aptap/opencv/build/lib -jar /home/captap/table.jar
captap    2842    2721  0 10:49 pts/1    00:00:00 grep --color=auto -i table
captap@pc2247:~$ su - captap-admin
Password:
captap-admin@pc2247:~$ sudo kill 1295
captap-admin@pc2247:~$ sudo kill 1299
captap-admin@pc2247:~$ ps -ef | grep -i table
captap+   2910    2890  0 10:51 pts/1    00:00:00 grep --color=auto -i table

```

Figure 6 – check if software of the interactive table started

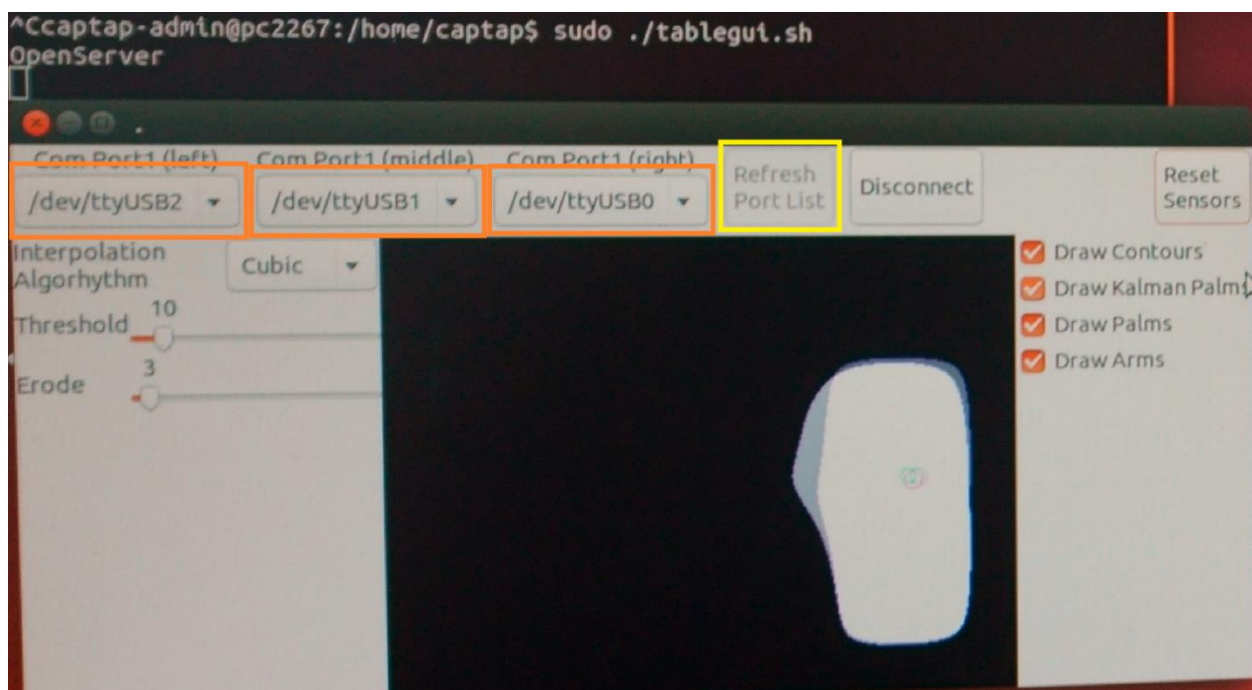
Generally three processes appear to be found. This means that the software has successfully started. In the yellow box in Figure 6 the process IDs are highlighted.

To test the interactive table locally, another program with a graphical interface has to be started. But first, the already running processes have to be terminated. To gain the rights to terminate processes one needs to log in as admin user `captap-admin` by typing `su - captap-admin`. Then the password is typed in, which is disseminated to the technical partners on demand. By typing `sudo kill [processID]` the first two processes need to be terminated. The third one does not need to be terminated. By typing `ps -ef | grep -i table`, one can see that the processes does not exist anymore.

To start the software using a graphical user interface go to the folder `captap` by typing `cd /home/captap`. Now type `sudo ./tablegui.sh`. This command starts the graphical interface shown in Figure 7.

IT IS IMPORTANT that everything is closed on the PC of the Moneyhandling and on the PC of the table. Then start the `tablegui.sh`. If you use it with the PC then start the `Monehandling.exe`.

Now start the Moneyhandling Application on the PC insuring that other sessions before are closed. Then if the graphical interface is appearing, like shown in the Figure below, slide your hand on top of the table.



The graphical interface will turn black one by one. This shows that the connection with the PC is up.

To exit this view press `Alt+F4` and then change to the terminal and press `Ctrl+C` to stop the process.

Now an exception might appear. In case it appears, please take a picture of the error and send it to the developers.

You can also check the table independently of the PC.

You can start the `tablegui.sh` like described before. Then by pressing the button “Refresh Port List”, highlighted in yellow, the available ports appear in the drop down menus of the areas highlighted in orange. Please set these areas to `ttyUSB2`, then `ttyUSB1` and `ttyUSB0`. This ensures that the boards are attributed to the right area of the graphic which appears by pressing the button “Connect”. An irregularly moving white surface appears. This shows the initial state of the sensors. Please pass with the flat hand over the entire surface of the table until there is no white area left after lifting your hand.

Now you can place your hand on the top or near the top of the table and a white area will show where the hand has been detected. If nothing happens you could check the audio settings of the microphone, if something has been recognized.

In case there is nothing on the screen connected to the table

If this doesn't happen, please open the lid of the table and take a look at the front of the PC, next to the power on button, like shown in Figure 3, there should be a green light, not red, nor blue.



Figure 3 – mini PC from inside the interactive table in power on mode.

A red light means that the power is on but the PC didn't automatically start. This happens if there is a USB hub connected to the USB plug of the interactive table with multiple USB devices plugged to it. Because the PC doesn't have enough power to power all the USB ports, the PC doesn't start. You can solve this by attaching an actively powered USB hub. However, with a single keyboard connected to the interactive table the mini PC started.

An additional check for the functionality of the table by looking under the lid is to check if there is a pulsing light on each of the boards, like shown in Figure 4. If it is pulsing, the boards are successfully communicating with each other, exchanging data. If ever the LED should not pulse, then go to the board marked with a blue sticker and a 0 written on it and plug out the mini USB next to the label and plug it in again. This triggers the communication between the boards to start again.

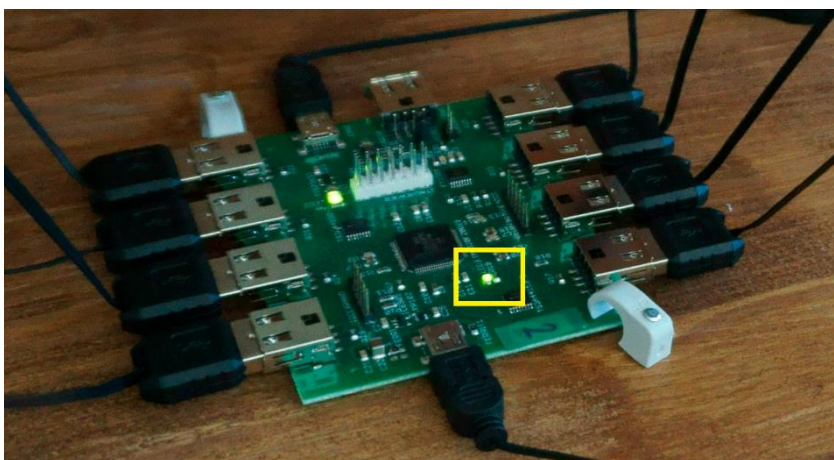


Figure 4 – Check pulsing LED on boards inside the interactive table.

For even more extensive problems the developers are happy to assist, so please contact them.

6 Home Navigation training system using Virtual Reality (VR)

The navigation training system is addressed to two personas: caregiver and person with Down Syndrome. Each user can interact with the system through dedicated interfaces that allow them to accomplish a set of actions.

6.1 Language and role selection

The users are asked to select their language and their role, and based on this selection, the specific screens and functionalities are displayed (Figure 1).

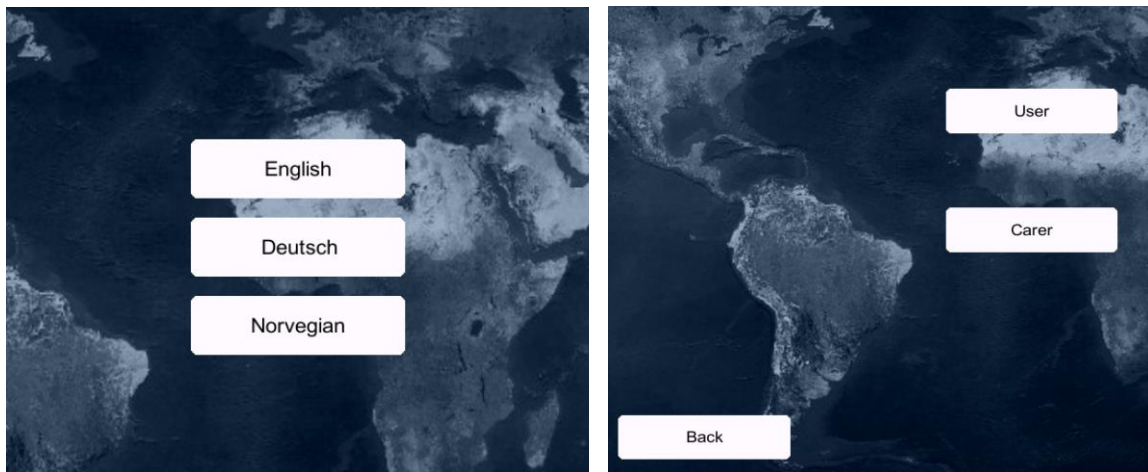


Figure1 Language and Role selection

6.2 Caregiver side

After language and role selection, the caregiver is asked to configure details for routes: points of interest, start and end addresses, customised information about every step (Figure 2).

Once the addresses composing the route are described, the carer configures the details for each step.

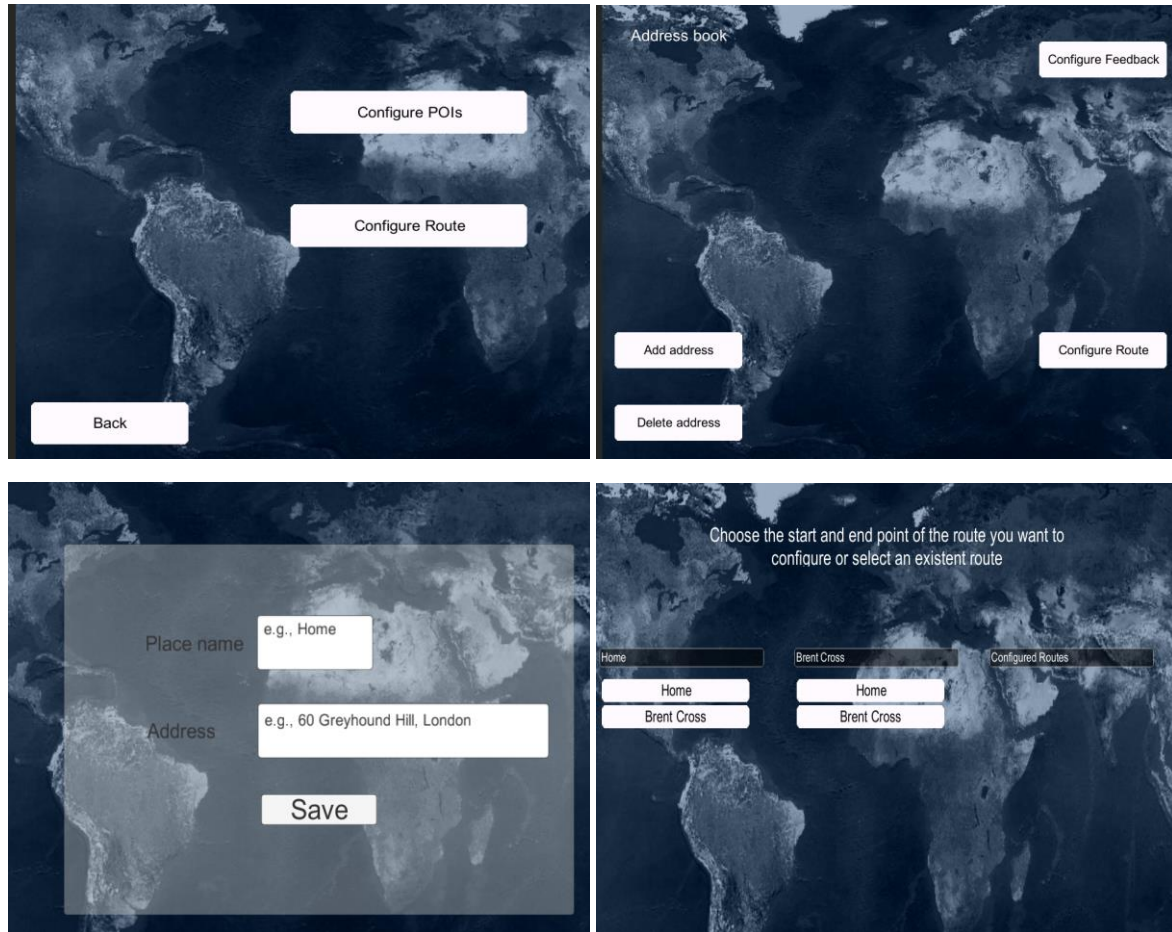


Figure 2 Addresses of interest and Routes configuration

Caregivers can customise routes step by step by orientating the heading in a certain direction, give written indications, choose representative photos and enable or disable types of automatic feedback (maps, audio, Google directions).

Images added as visual feedback can be taken from sources like Google Places or Panoramio, or uploaded from the hard disk (Figure 3).



Figure 2 Addresses of interest and Routes configuration

6.3 Home Navigation training User Manual for pilot 1

The Home Navigation application aims at helping people with Down's Syndrome to learn how to walk a route.

Functionalities

Carer

- Configure an Address Book with the addresses to be used for routes
- Configure routes described by a start and an end address
- Add traffic information or directions from Google
- Customize the steps of a journey by adding photos and/or text

User

- Rehearse a route made by the carer
- Confirm knowledge about:

- The correct direction to head towards
- The correct photos associated to each step

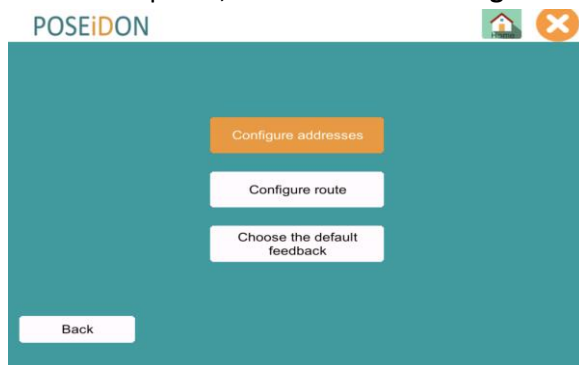
Initial setup of the system by the carer

After opening the programme on your PC, Click “Carer”.



Carer Mode

In the first phase, the carer must **configure an Address book** with addresses that will be used for configuring (making) routes.



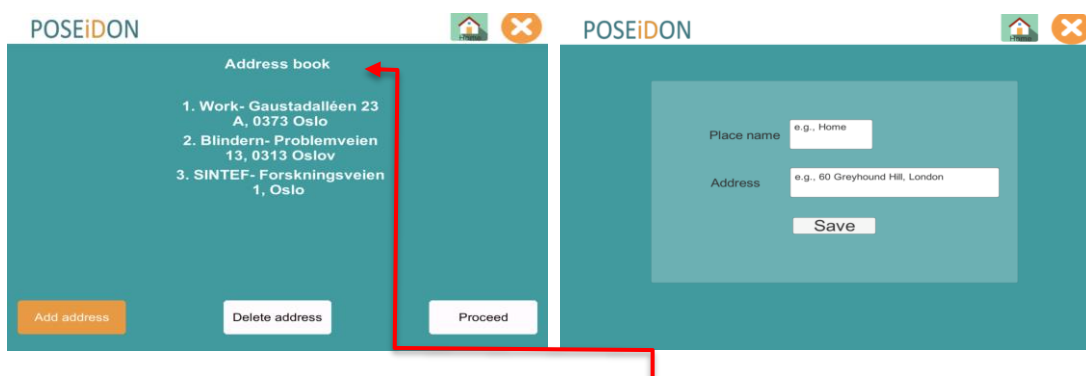
Next, the carer must **configure (define start and end point) and customize a route** by adding text and photos for each step. The data describing a route must then be saved and uploaded on the server.

When the users start the Home navigation play or the navigation part of the POSEIDON app, they will be able to see the information the carers have

uploaded for them.

Configure addresses

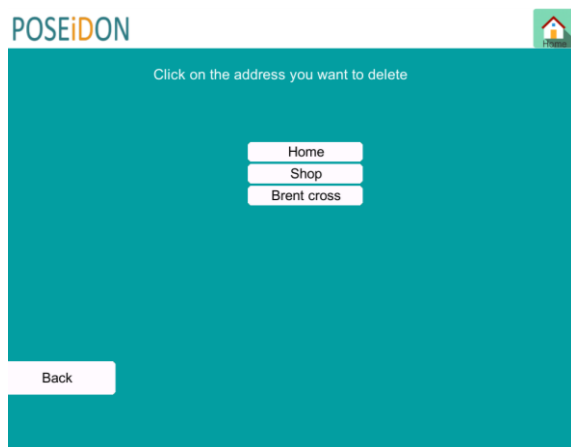
1. Choose **Configure addresses** and then choose **Add address**.
2. Add **Place name** and **Address** and click **Save**. Make sure you have written the address correctly before you save.



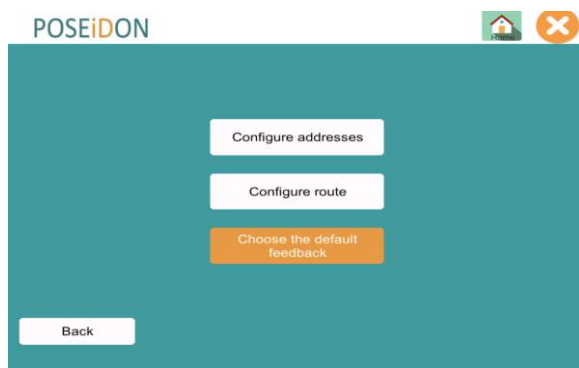
When the address is saved, you can see it in the **Address Book** menu. Here you can **Add address** or **Delete address**.

Delete address:

When an address is **clicked**, it is **deleted** from the Address Book.



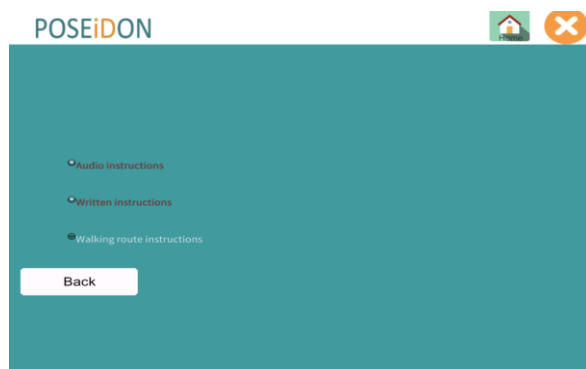
Configure feedback



Click the “Home-icon” and then “Carer” before, clicking “Choose the default feedback”.

You can choose **3 types of help for the user**:

1. Audio instructions (automatic instructions provided by Google – see photo below) – only available for Macs and with synthetic speech.
2. Written instructions (automatic instructions provided by Google – see image below). The written instructions provided by Google have a small font size and are perhaps not very useful for the primary users.
3. **Walking mode** – to select for routes where the user will **not** use public transport.

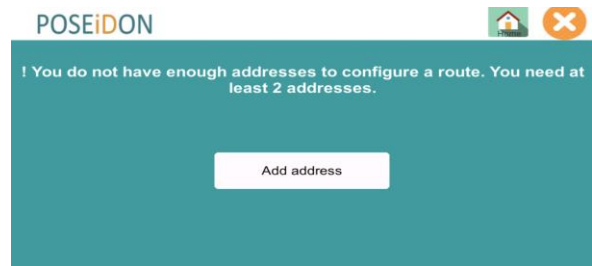


After you have done this, click “Back” and you will come to “Configure route”

Configure routes

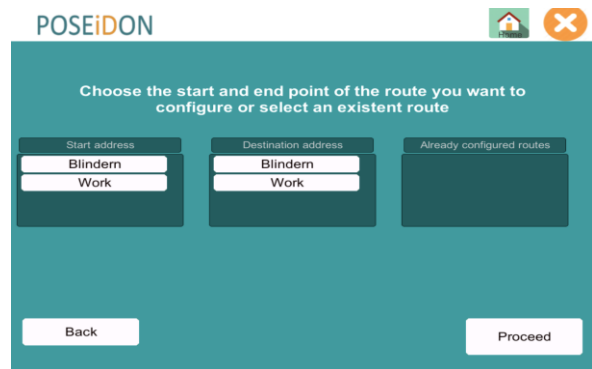
A carer should configure a route based on the places in the Address Book.

You must have at least two places saved in the Address Book in order to configure a route. If not, you will be notified about this and directed to **Add address**.



If you have two or more places in the Address Book, you will be directed to the **Configure Route** menu. There you can make a new route or choose an **already configured route**.

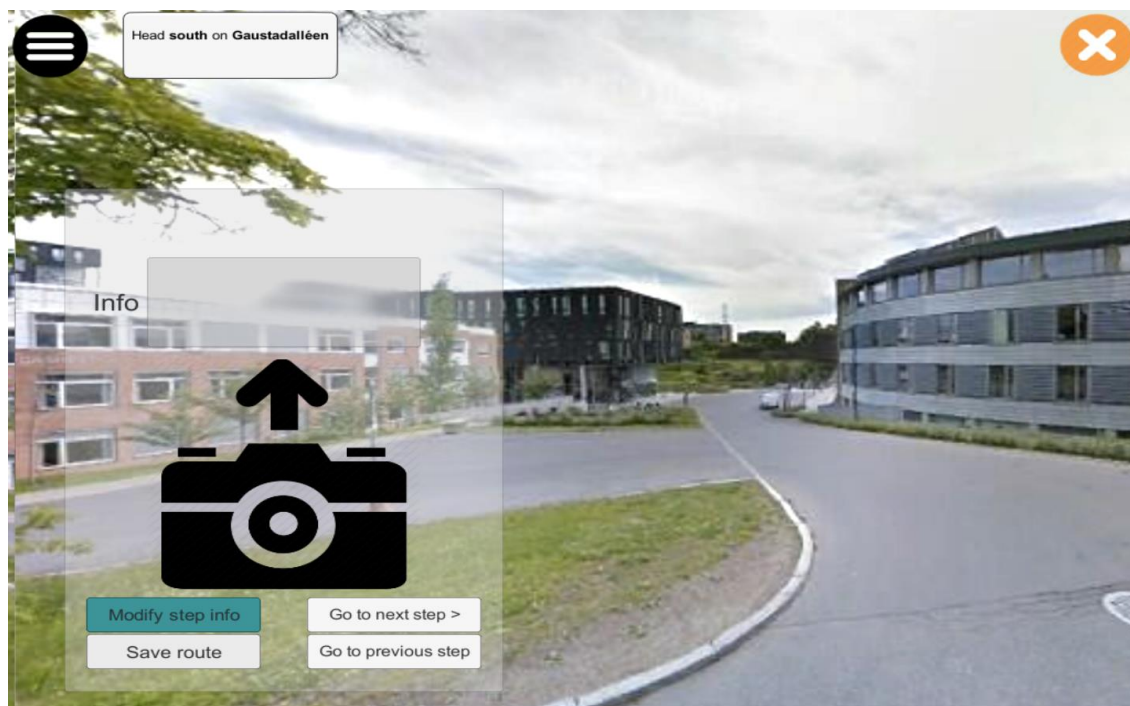
To make a new route, choose **Start address** and **Destination address** by clicking the destination you would like. Then click on **Proceed**.



Customize navigation

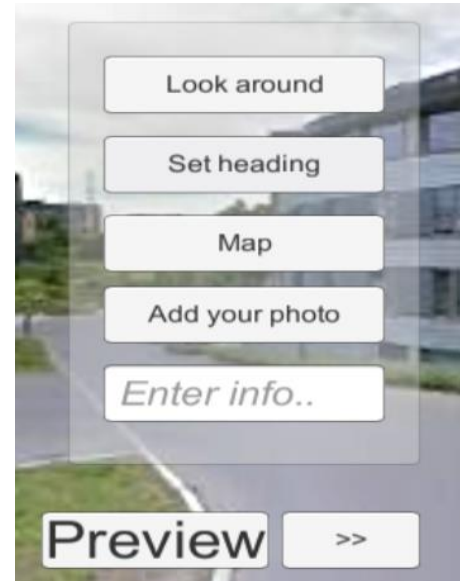
Carers will be able to **navigate in a Street View** mode and **customize (add information to) different steps** of a journey.

There are two main panels to use: **Preview Panel** and **Modify step info Panel** (see next page). From Preview Panel you can choose Modify Step info. To go back, press Preview.



Modify Step info Panel

- **Look around:** Move around with the mouse to view the panoramic image. When finished, click **Done**.
- **Set heading:** Move around with the mouse to modify the direction where the user should head towards. When the direction is correct click **Done**.
- **Map:** Here you can see a map of the route and all the route-steps (decision points).
- **Decision points:** Each decision points represents where the user is supposed to make a decision when taking the route.
- **Add photo:** You can add a personal photo or add a suggested photo.
- When choosing **Add your photo**, you can upload a photo from your computer. Here it is **important** that you have resized the photo file to a small size (kb) and make sure it is a .jpg-file.
- When choosing **Add suggested photo**, you can see a set of selected photos that match the geographical coordinates.
- After uploading (or selecting) a photo, press **Done**.
- **Enter info...:** Here you can enter an information text.
- When you have entered photo and/or text, press **Preview** to visualize the added information.
- Press “Save” when you have inserted new information (see more information next page)
- Press >> to go to the next point where you can insert photo and/or text.



Add photo option is illustrated above. You can choose between:

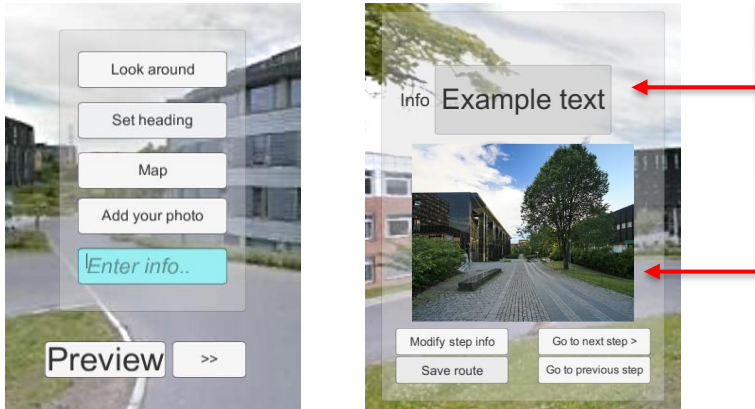
Adding a photo from your computer (left image) – select the photo and click Select.

- The photos must be in a folder on your desktop (make a “picture-folder” in the “Home navigation system”- folder).
- Adding a suggested photo (photos taken from Panoramio) – select the photo, then click Done



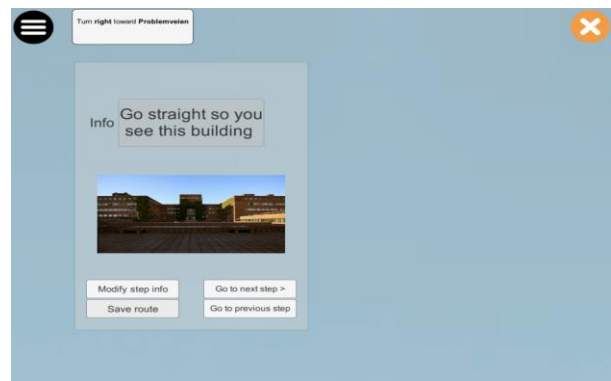
Add text option:

- The text should be inserted in **Enter info...** field. Press **Enter** on the keyboard after you finish. After clicking “Preview” you will see the text and photo.



If no Street View

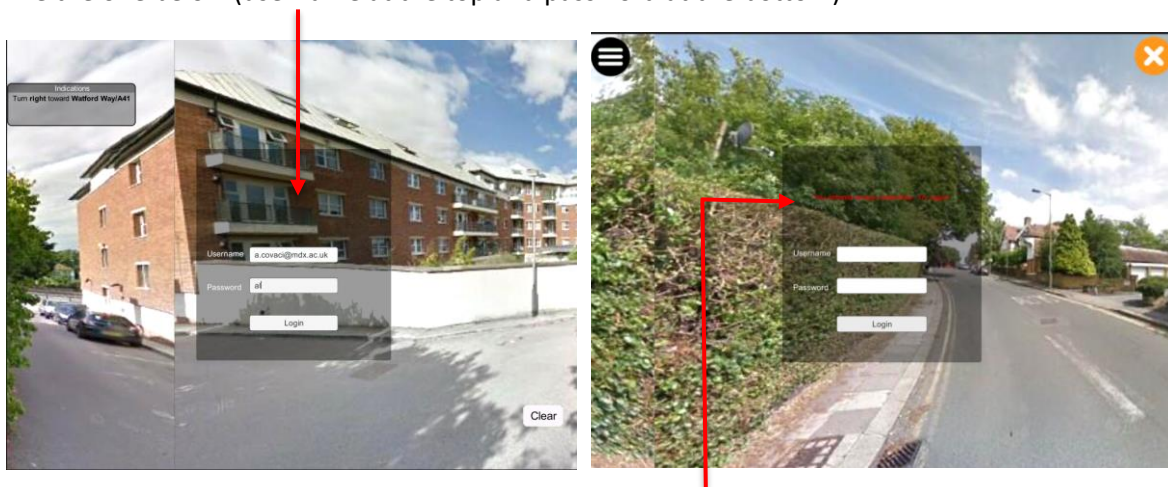
If there is no Street View available in one of the steps, you will only see a blue background. Here it is very important that you add a photo and enter text.



Save the route option

In order to have the route configured also on the mobile, this has to be uploaded by clicking “Save route” button.

The first time when you run the application, after you press “Save route”, you will see a login window like the one below (username at the top and password at the bottom).



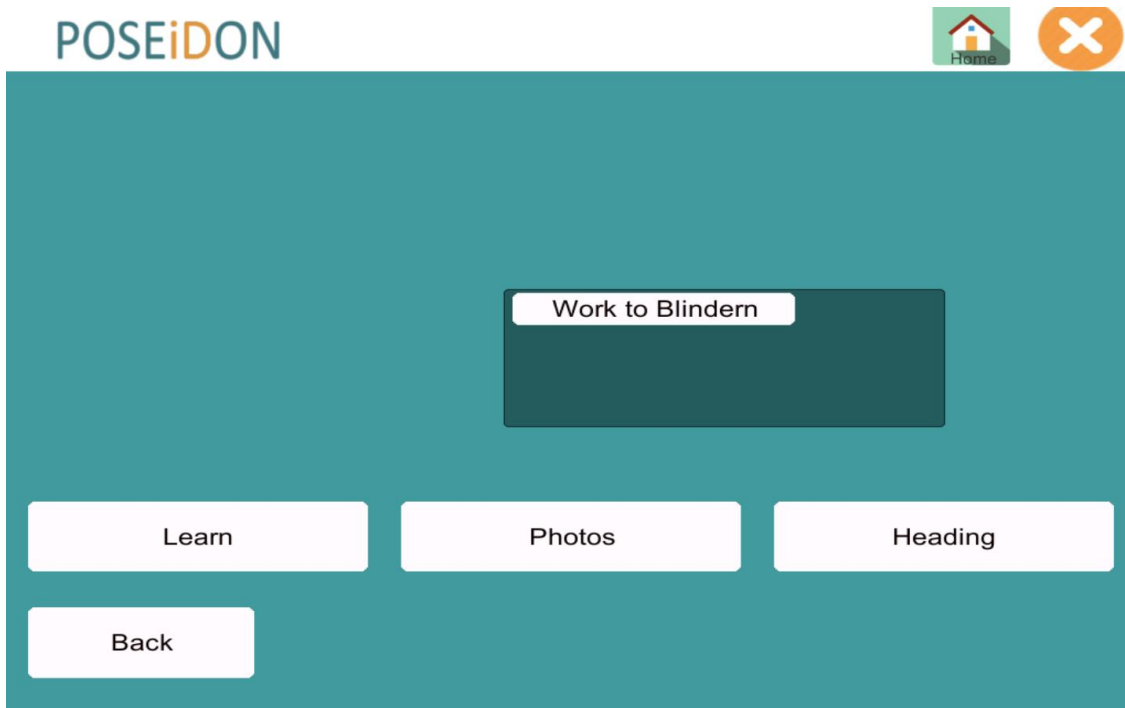
If the credentials are wrong, a red message will be displayed (above).

When a route is uploaded successfully, the user can see the blue message in the photo bellow “Route has been uploaded”.



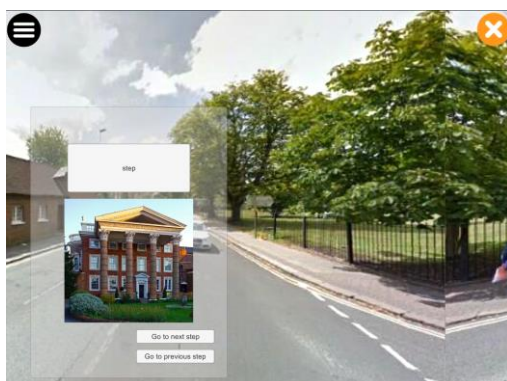
User mode

The person with Down Syndrome will have the following options:



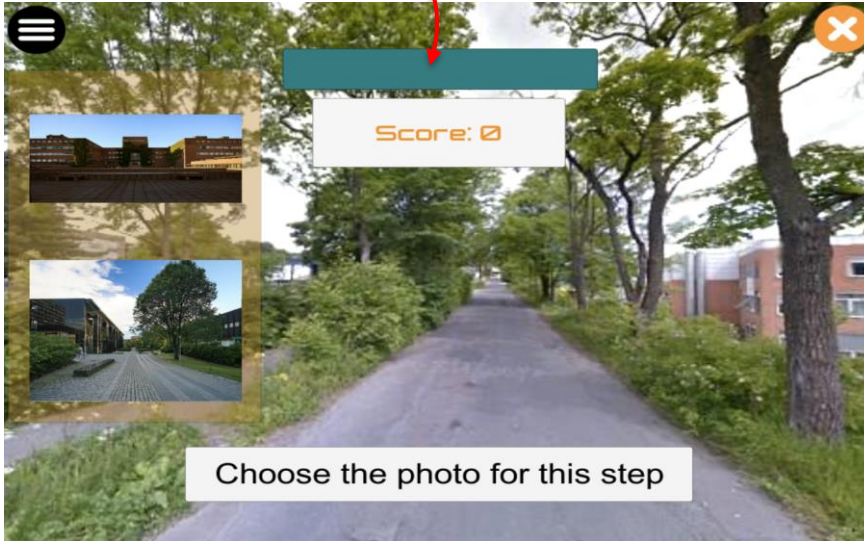
Learn

The user should first **visualize the route** as configured by the carer.



Photos

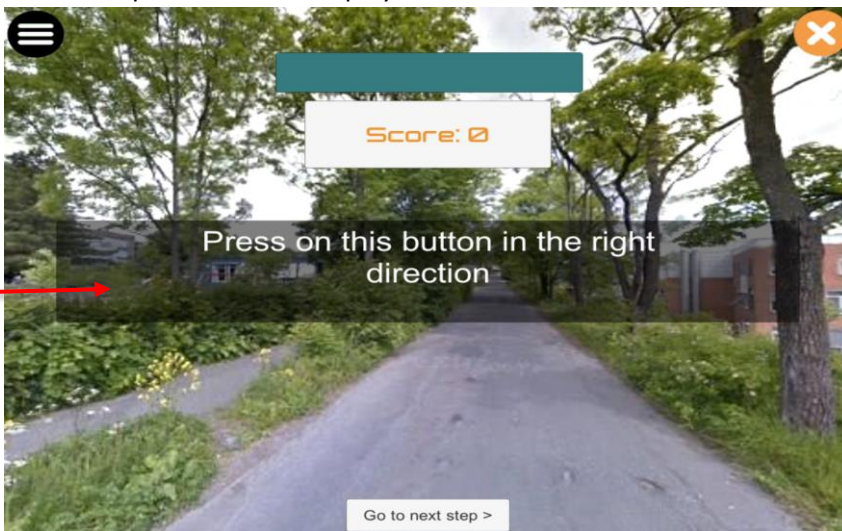
The user is asked to **identify the correct photo for a step** among a set of 2 photos. A Bar limiting the number of tries and a Score are also displayed. Sound is played for correct and wrong answers.



Heading

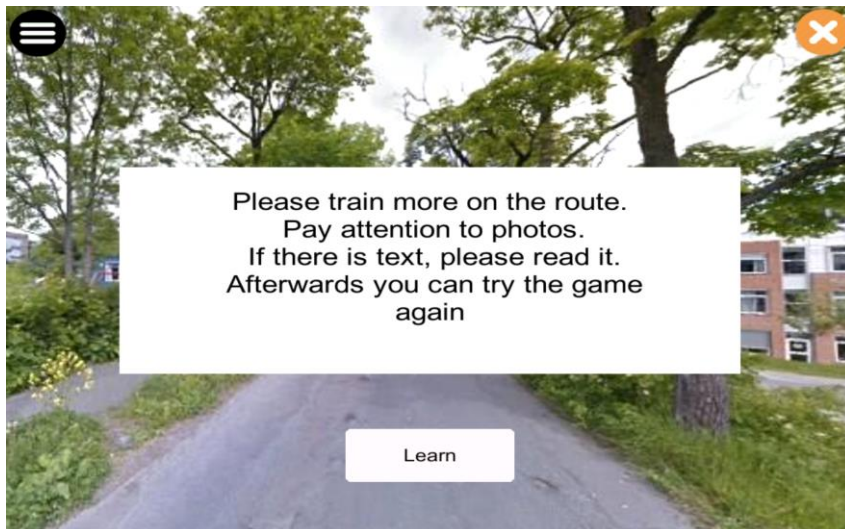
The user will be asked to **identify the direction** where they should head for every step. Use the mouse to drag to the left or right to find correct direction. You don't have to hold the mouse down or do this in one movement. When you have the correct direction – press the button in the middle.

A score and informational messages are displayed. For every correct selection, score is increased by 1. A correspondent sound is played.



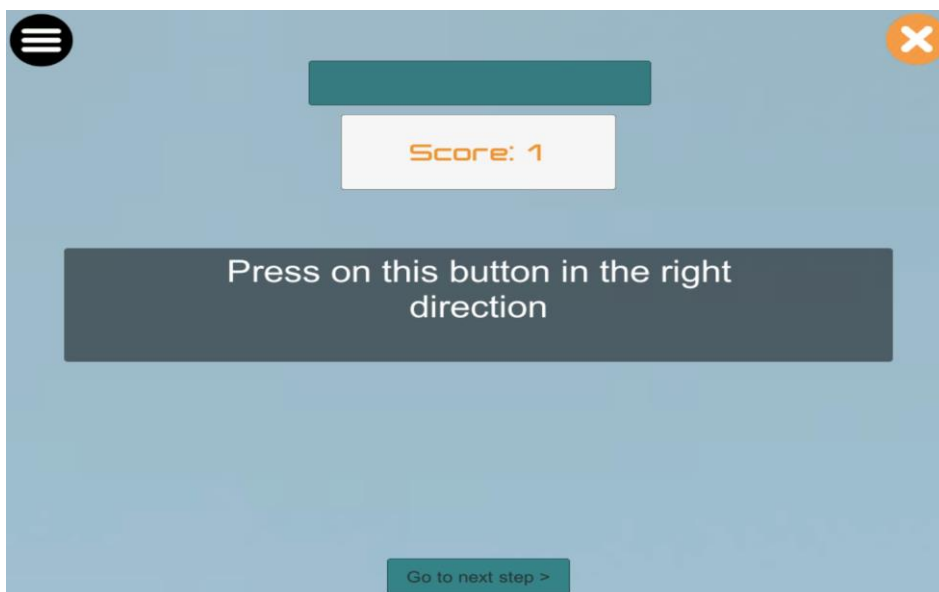
Each user can make 10 mistakes/steps. The score will not change, but the green bar will decrease and it will become more and more red.

When the user does more than 10 mistakes per step, he is asked to repeat the Learning process (see picture on next page).



No street view available

If there is no Street View available, the user will only see a blue background. The user must then click on the button "Go to next step" at the bottom of the page.



The application can be stopped by clicking



The menu can be seen by clicking



7 Pilot 2 – HCI components

The number of four HCI components of the POSEIDON system for pilot 1 have been extended to six highly integrated components:

- POSEIDON Web – web interface where calendar, video training, tracking and shopping functionality are defined as well as general settings.
- POSEIDON App – smartphone application offering calendar and navigation functionality, instructive videos, general settings, money handling training and shopping assistance
- POSEIDON Route Creator App – smartphone app assisting in creating the routes for the navigation functionality of the navigation function in the POSEIDON app.
- POSEIDON Context Settings – smartphone app where one can set thresholds for the different rules used to interpret the identified context
- POSEIDON Home Navigation System – PC application where the routes created with the help of the route creator app are trained at home
- POSEIDON Social Network and Ecosystem – web interface where the POSEIDON ecosystem with information gathering, forum and social network functionality

7.1 User manuals for pilot 2

D6.3 Results of Pilot 1 describes the quantitative and qualitative feedback from pilot 1. Regarding user manuals, the deliverable mentions: “A lot of families mentioned, that they experienced a great support from our team during the pilot, especially when problems occurred and that the user manuals were a good help too.” This is good feedback. From this observation we conclude, that user manuals are also useful for the next pilot and are thus planned to be delivered in addition to the software.

However, from observations of the POSEIDON team which assisted the families, very few of the families read the user manuals. Thus, we offer more support on the system by creating instruction videos which show the basic functionality of the POSEIDON components. The following table shows an overview of the POSEIDON components and the available materials in terms of user manuals and instruction videos. These materials are available at: <http://www.POSEIDON-project.org/product/demos/>

	User manual	Instruction video
POSEIDON Web – Monitor, Video, Settings	X	X
POSEIDON App – Calendar	X	X
POSEIDON App – Navigation	X	X
POSEIDON App – Shopping	X	X
POSEIDON App – Moneyhandling Training	X	–
POSEIDON App – Shopping	X	–
POSEIDON Route Creator App	X	–
POSEIDON Context Settings	X	–
POSEIDON Home Navigation System	X	X
POSEIDON Social Network	X	–

Chapters 8 - 15 of this deliverable will include all available user manuals from pilot 2.

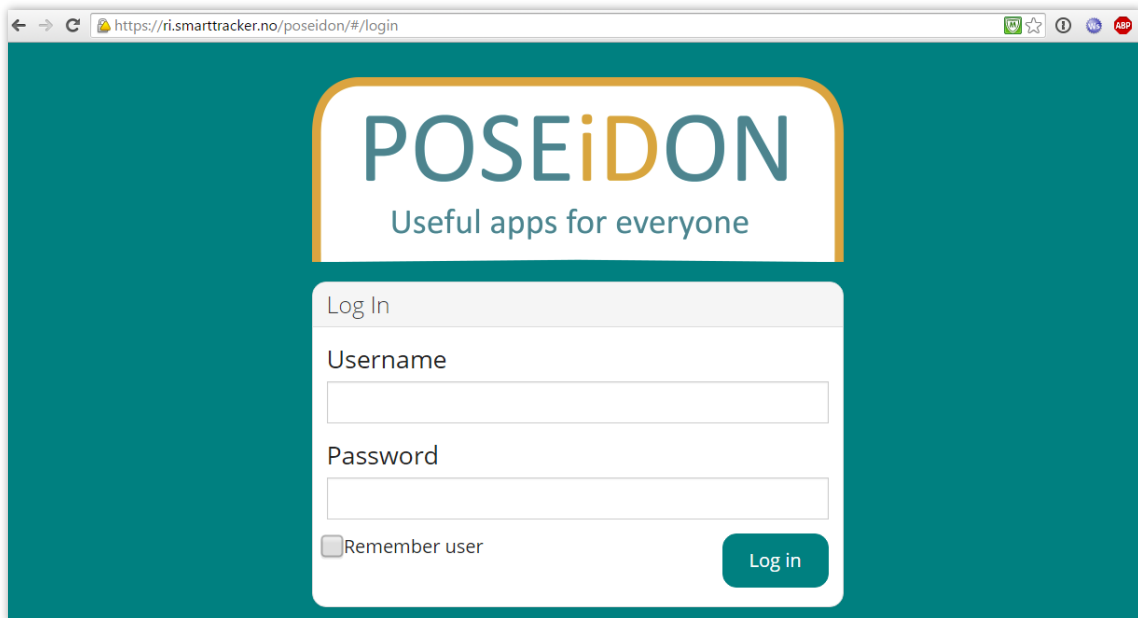
8 POSEIDON Web User Manual for pilot 2

8.1 Login

Open the POSEIDON web by clicking this link: <https://ri.smartracker.no/POSEIDON>.

The best browser to use is Google Chrome. Make sure you have the latest version.

Use the distributed username and password to log in.

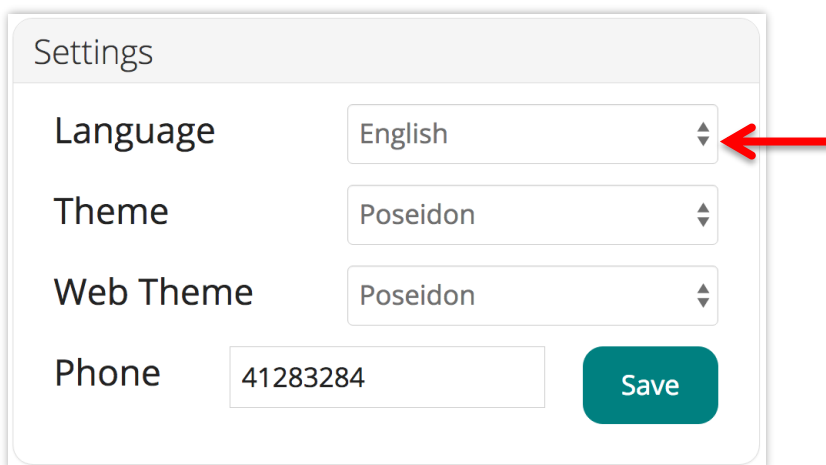


8.2 Change language

You can change the language in Settings. Select **Settings** from the top menu.



Choose the preferred language and press **Save**.



8.3 Calendar

Select **Calendar** from the top menu.



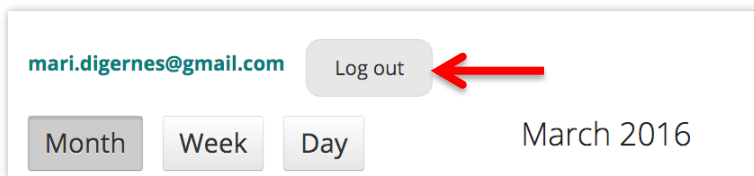
8.4 Connect to Google Account

The calendar must be connected to a Google Account. Click on **Connect to Google calendar**.

Connect to Google calendar

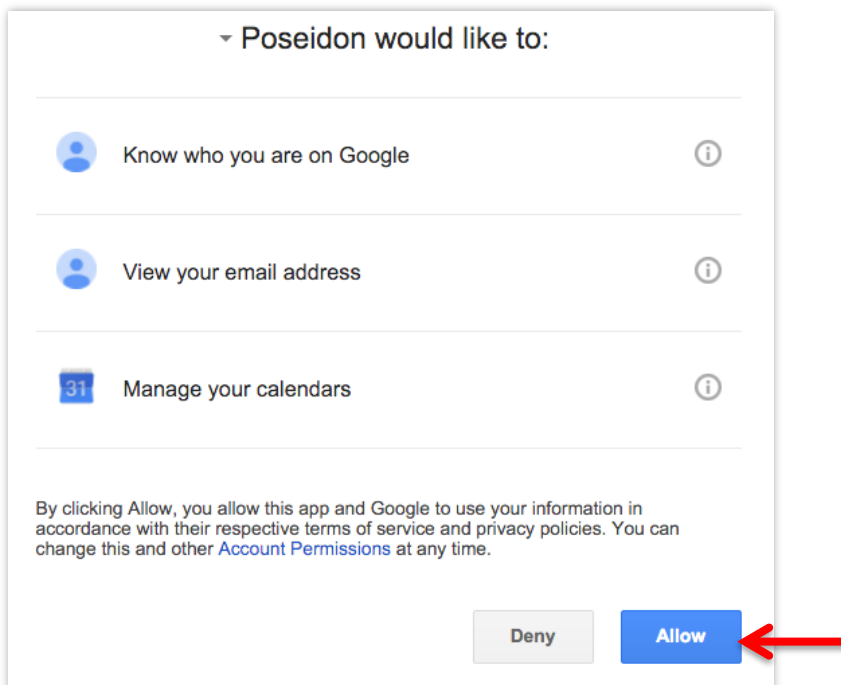
8.5 Change Google Account

In the top left corner you can see which Google account that is being used. If you want to change to another Google account, click **Log out**. Then you can log in to another Google account.



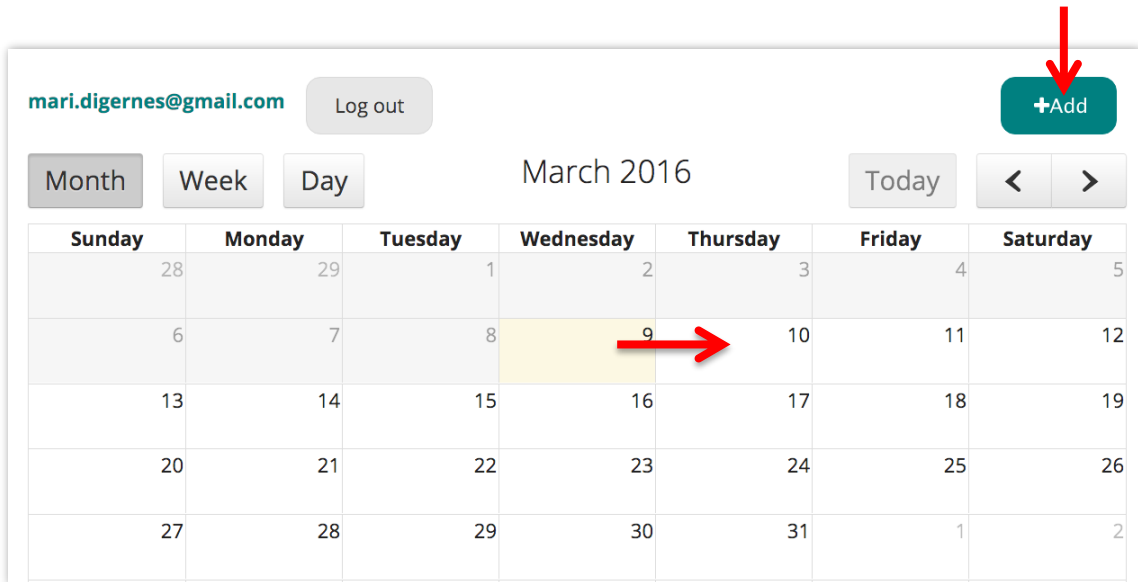
8.6 Accept that a Google account is used for POSEIDON

When the POSEIDON web tries to connect to a Google account for the first time, a pop-up window might appear. There you must allow that the Google account is used for POSEIDON. Press **Allow**.



8.7 Add a new Calendar event

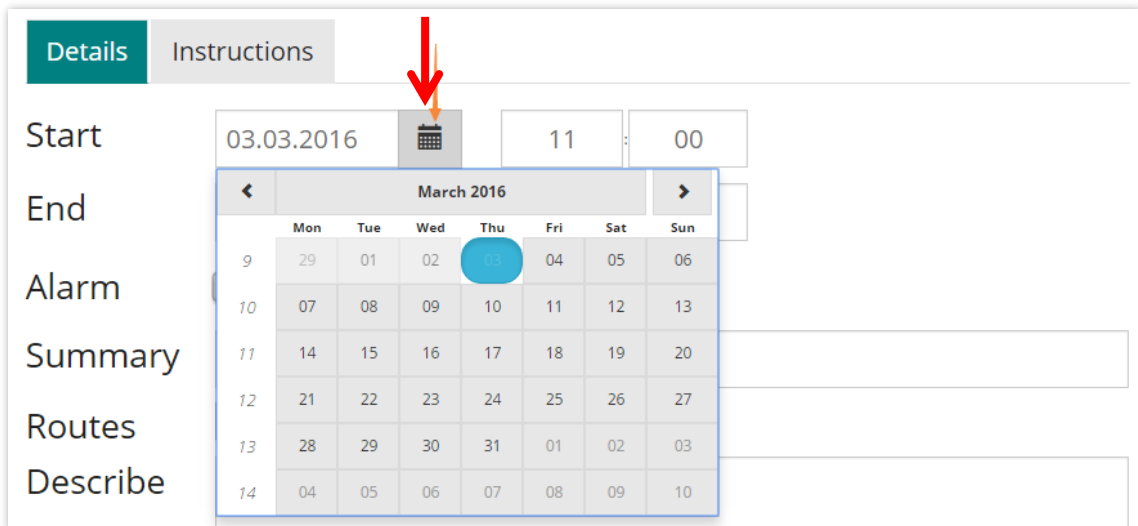
To add an event, click directly on one of the calendar days or press **Add**.



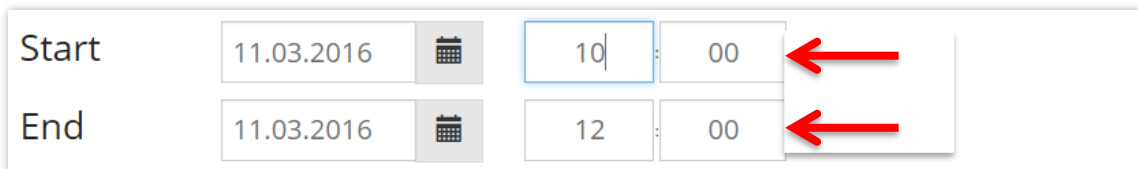
Choose date and time

You must choose date and time for when the event will start and end.

To select a date, click on the **calendar icon** to open all of the dates. Then click on the date.



To select time (hour and minutes) you can enter the numbers directly or navigate with the up- and down-arrows on your keyboard.



Add an alarm

To add an alarm, click the **Alarm** check box. Specify how many minutes, hours or days before the event the alarm will ring. Enter the numbers directly or use the up- and down-arrows on the screen.

If you want to add several alarms, click the **plus-button** and do the same as described above.

Add summary, route and description

In the **Summary** box, write a title for the event. This is mandatory. E.g. "Go to school".

Routes contain a list of the routes created with the Home Navigation app. If you want a specific route to be connected to this event, you can select it in the list. This is optional.

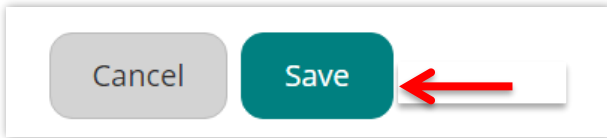
In the **Describe** box you can describe the event in more detail. E.g. "You need to get ready for school now". This is optional.

Add image and video

Drag and drop an image or a video to the grey field or click the field to get access to the files on your computer. The image or video will then be uploaded and added to the event. For videos, another choice is to insert a YouTube link in the video input field. Insert the link and press **Add YouTube link**.

Save event

To save the event to your calendar, click **Save** at the bottom of the page.



Now the event is saved in the calendar, and will appear in the POSEIDON app on the user’s mobile device shortly after.

Edit or delete event

Click on the event.

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
28	29	1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31	1	2
3	4	5	6	7	8	9

The event '8a Go to school' is highlighted in a teal box on Tuesday, 15th, with a red arrow pointing to it from the right.

If you want to delete the event, click **Delete**.

To edit the event, click **Edit**.

Go to school ×

Starts: 2016-03-15 08:00

Ends: 2016-03-15 09:00

Alarm: No alarm

Description: Go to school

Route: No Route

1 Bring your lunch box.

2 Pack your schoolbag.

Delete

Cancel

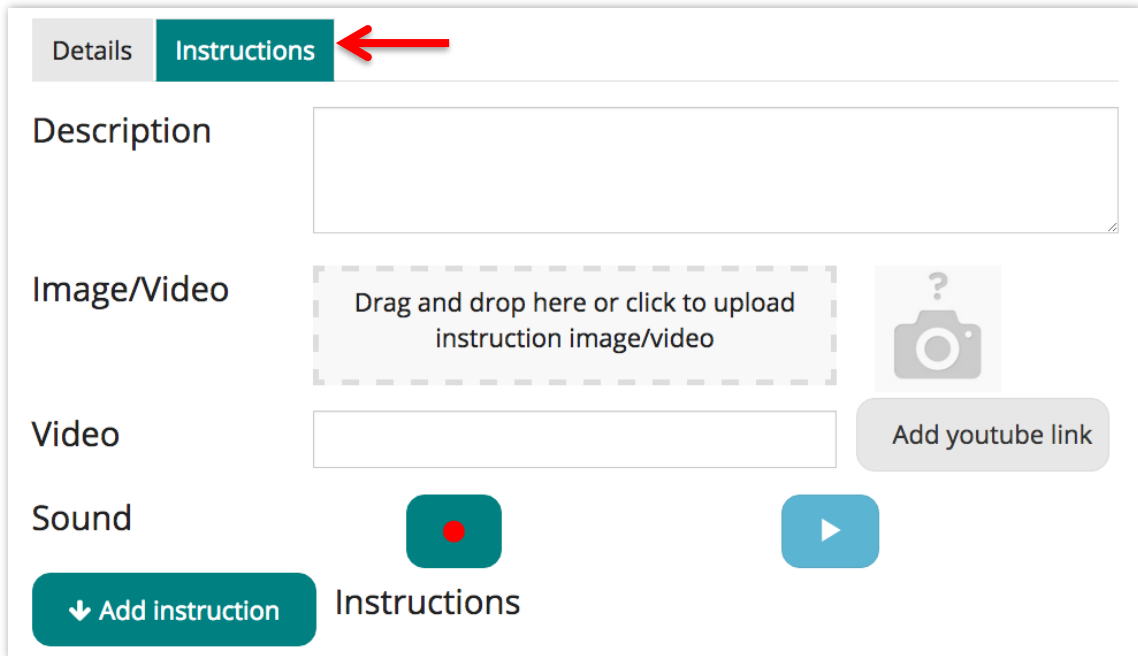
Edit

Red arrows point to the 'Delete' and 'Edit' buttons.

Add instructions

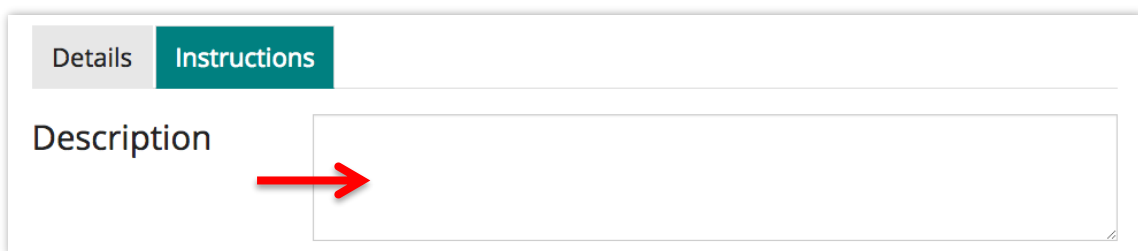
You can add instructions to an event. The instruction will be shown as a pop-up message on the user’s mobile device.

To add instructions, click **Instructions**.

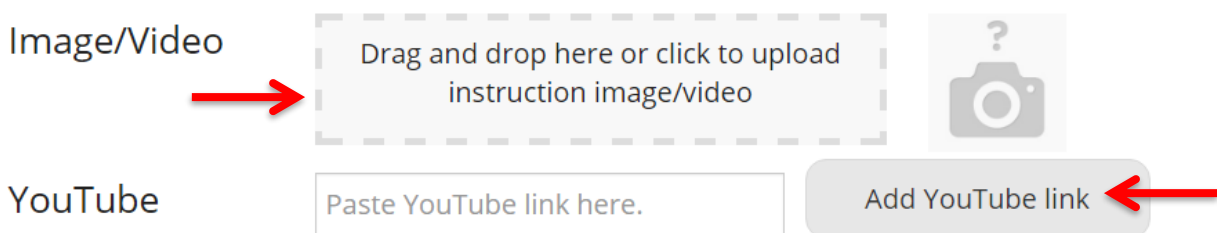


You can make instructions by writing **text**, adding an **image**, adding a **video** and recording **speech**. The speech function works only in most updated chrome browsers. It will not work on mobile devices. Written instruction is mandatory while image and speech are optional. You can add several instructions to one event.

Write the instructions in the open text field.



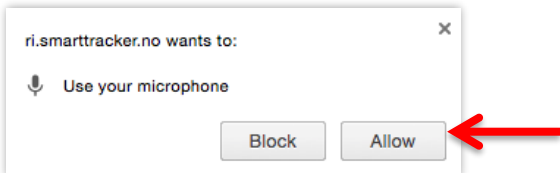
Drop an **image** or a **video** to the grey field or click on the field to upload the image or video file from your computer. You can only add one image/video per instruction.



Record speech by clicking on the **recording**-button.



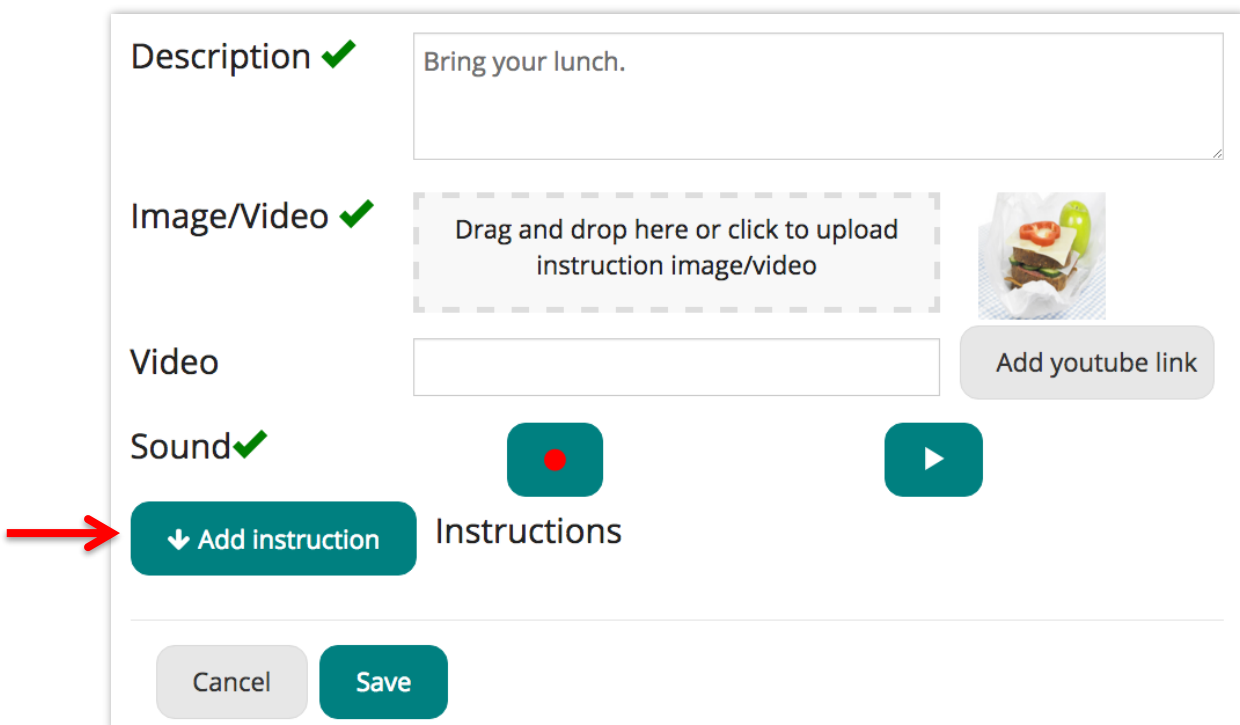
If this message pops up, choose **Allow**.



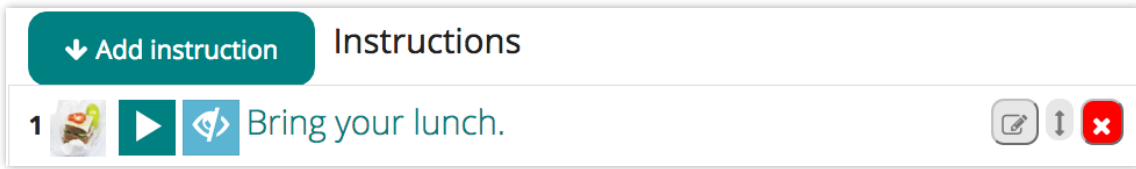
When you want to stop the recording, click on the **stop**-button.
To listen to the speech you have recorded, press the **play**-button.




When you have written the description, and if wanted, added image or video and recorded speech, click **Add instruction**.





Now the instruction is added. You can add several instructions to the same event.



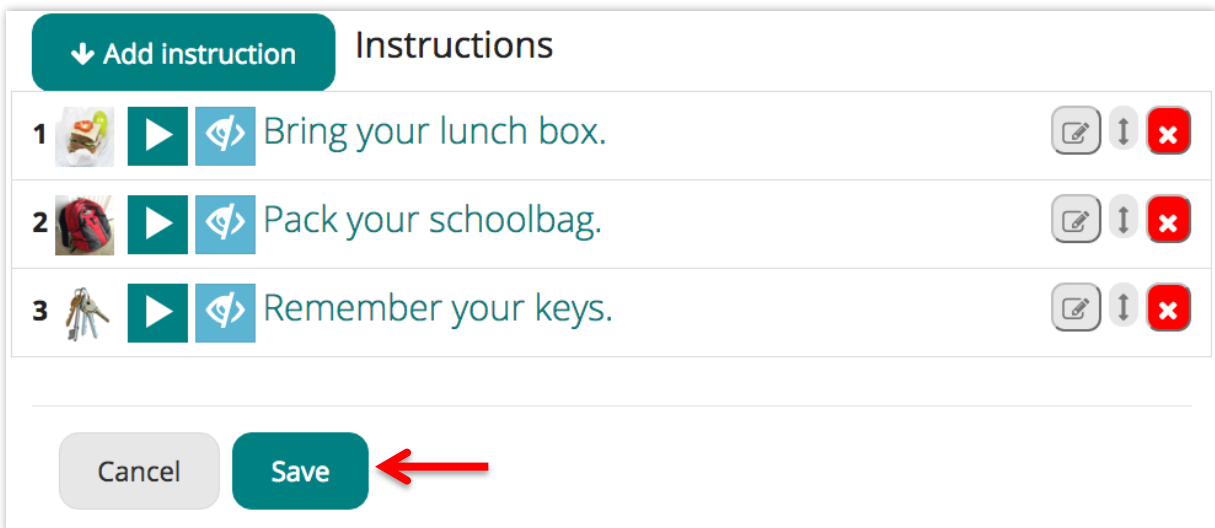
You can **edit** instructions, **change the order of the instructions** and **delete** instructions.

To edit an instruction, click this button: 

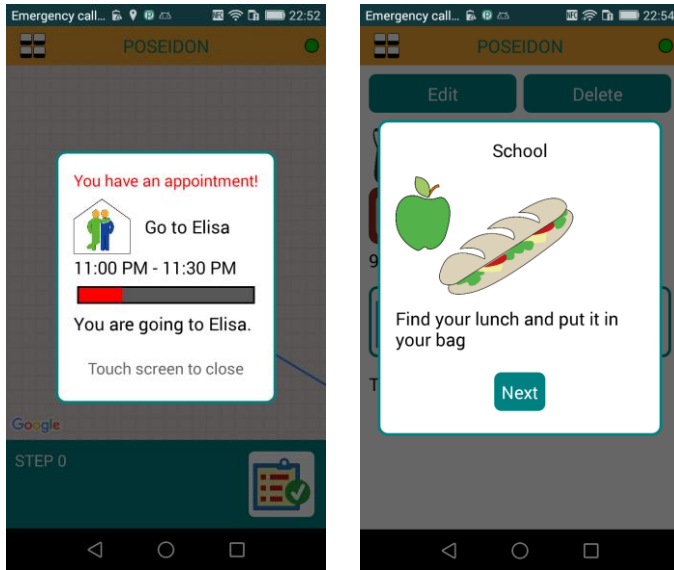
To change the order of instructions, use this arrow-button: 
 Click and hold the button while you drag the instruction up or down.

To delete an instruction, click this button: 

When you are satisfied, click **Save**.



When you click **Save**, the changes you have done will be saved to the server and transferred to the mobile app. Below are some screenshots of the mobile app.



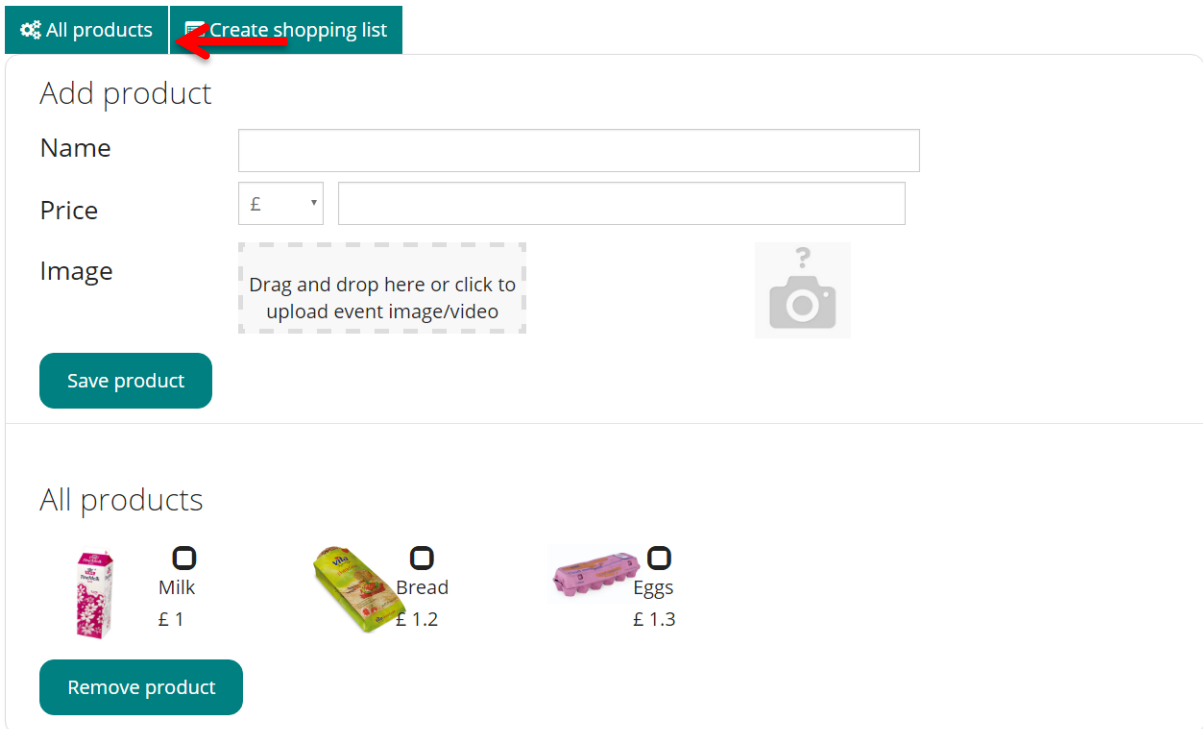
8.8 Shopping

Carers can make shopping lists that will show up on the user's mobile device. Select **Shopping** from the top menu.



In order to make a shopping list, you must upload products, i.e. images of groceries that you want to add to the list. To add a new product to the library, click **All products**.

Add products



Type the **name** of the product and the **price** (here in British pounds £).
 Upload an **image** of the product.
 When you are done, click **Save product**. Repeat to add more products.

⚙️ All products
📋 Create shopping list


Add product ←

Name ←

Price £ ▾ ←

Image

Drag and drop here or click to upload event image/video





Save product ←


View all products

Click **All products** to view all of your uploaded products.

All products ←


 Milk
 £ 1


 Bread
 £ 1.2


 Eggs
 £ 1.3

Remove product

Create shopping list

When you have uploaded all of the products that you want the user to buy, you can create a shopping list. Click **Create shopping list**.

⚙️ All products
📋 Create shopping list ←

Milk
 £ 1

Bread
 £ 1.2

Eggs
 £ 1.3

List name

Total cost

£

Create shopping list

Select the products that you want to add to the shopping list. You can increase the number of selected items by giving a number on the input field **Number**.

The screenshot shows a web interface for creating a shopping list. At the top, there are two tabs: 'All products' and 'Create shopping list'. Below the tabs, there are three product cards: 'Milk' (price £1, quantity 1), 'Bread' (price £1.2, quantity 1), and 'Eggs' (price £1.3, quantity 1). Each card has a checkbox and a quantity input field. A red arrow points to the quantity input field for Milk. Below the product cards, there is a 'List name' field containing 'Monday shoppin', a 'Total cost' field showing '£ 3.5', and a 'Create shopping list' button. Red arrows point to the 'Total cost' field and the 'Create shopping list' button.

Type the **name** of the list, e.g. “Monday shopping”.

The total price of the selected products will be calculated automatically (here £ 3.5).

Finally, click **Create shopping list**.

The shopping list will be saved and made available on the user’s mobile device through the Money Handling Assistance app (see screenshot of the app below).



Create a reminder

When you click **Create shopping list**, the web suggests that you create a calendar reminder for the shopping trip, including how much money the user must bring. You have three choices:

1. **Create a reminder with the exact amount**, i.e. the calculated amount (here £ 3.5).
2. Type the desired amount in the box and click **Create reminder with extra amount**.
3. Do not create a reminder. Click **Cancel**.

Shopping list is saved.

All products Create shopping list

Create Calendar reminder

Create reminder with exact amount

Create reminder with extra amount

£ 3.5

Cancel

If you choose to create a reminder, the web will take you to "Edit event". A predefined text appears in Summary including the price that you have selected. This text can be changed as desired.

Choose date and time, and other options that you want to add to the calendar event. When you are done, click **Save**. The reminder will then appear on the user's mobile device.

Edit event

Details Instructions

Start 16.05.2016 22 : 00

End 16.05.2016 23 : 00

Alarm

Summary Shopping! and don't forget to take £3.5 with you! ←

Describe

Image/ Video Drag and drop here or click to upload event image/video

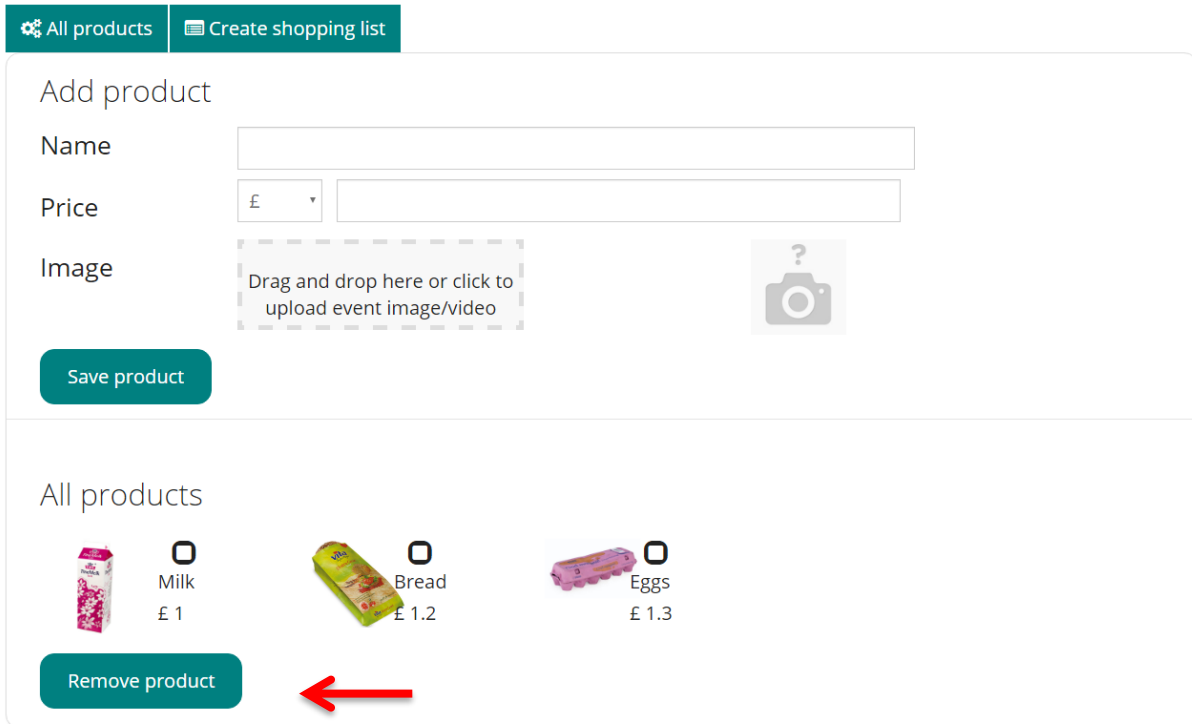
YouTube Paste YouTube link here. Add YouTube link

Repeated

Cancel Save ←

Remove products

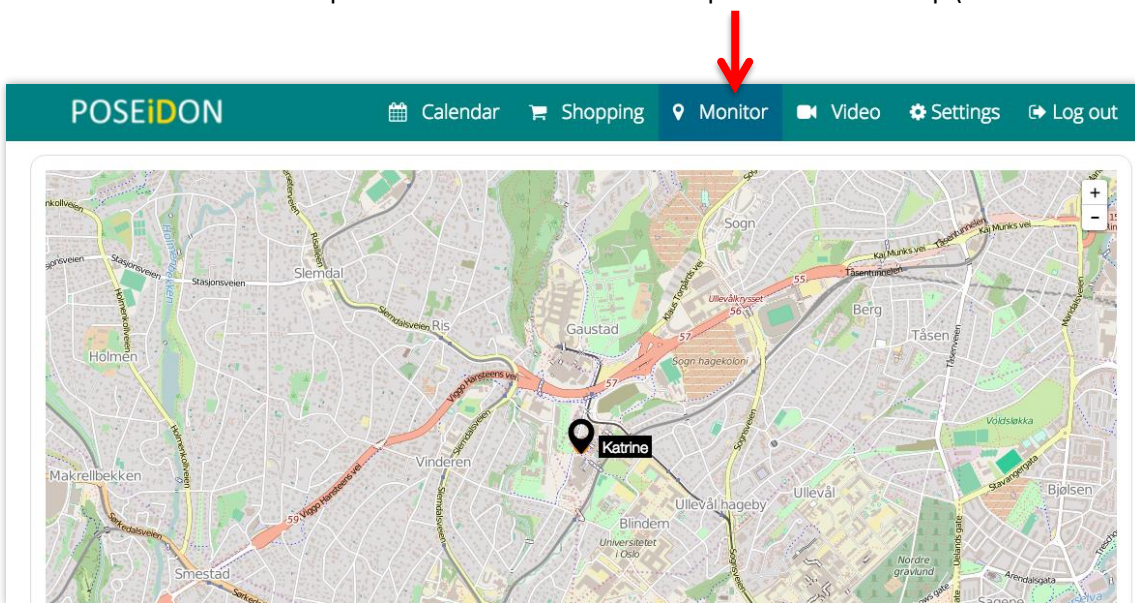
Select **All products**. Choose the products that you want to remove and click **Remove product**.



8.9 Monitor

The monitor can be used to view the position of the user, i.e. where the user is when using the POSEIDON mobile app. It only works if this option is switched *on* in the mobile app.

Choose **Monitor** from the top menu. You can see the user's position on the map (here "Katrine").

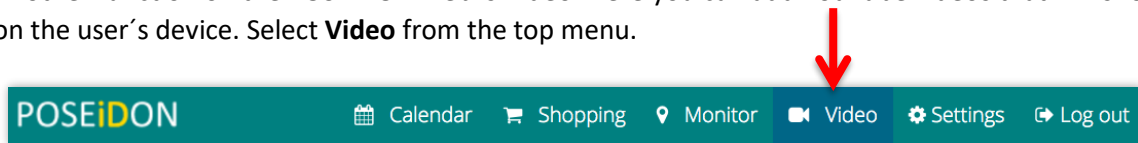


On the bottom of the page, you can find information about the user's position described in text. You can also see how much battery is left on the user's mobile device.

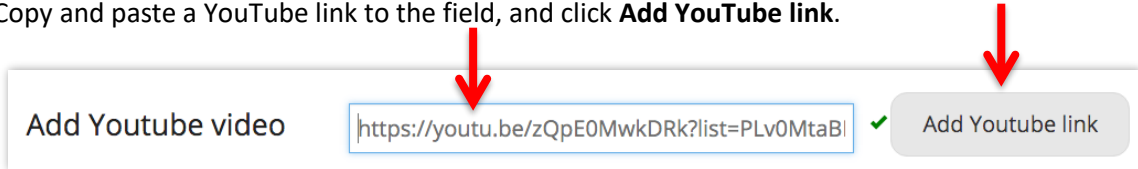
Name	Katrine
Tracked	Enabled
Position	Gaustadalléen, Gaustad, Oslo, 0349, no
Time	Today, 16:25:44
Speed	Not available
Accuracy	32.612 meters
Devices	Katrine phone PoseidonApp
Battery	80%

8.10 Video

Another function on the POSEIDON web is Video. Here you can add YouTube videos that will show up on the user’s device. Select **Video** from the top menu.

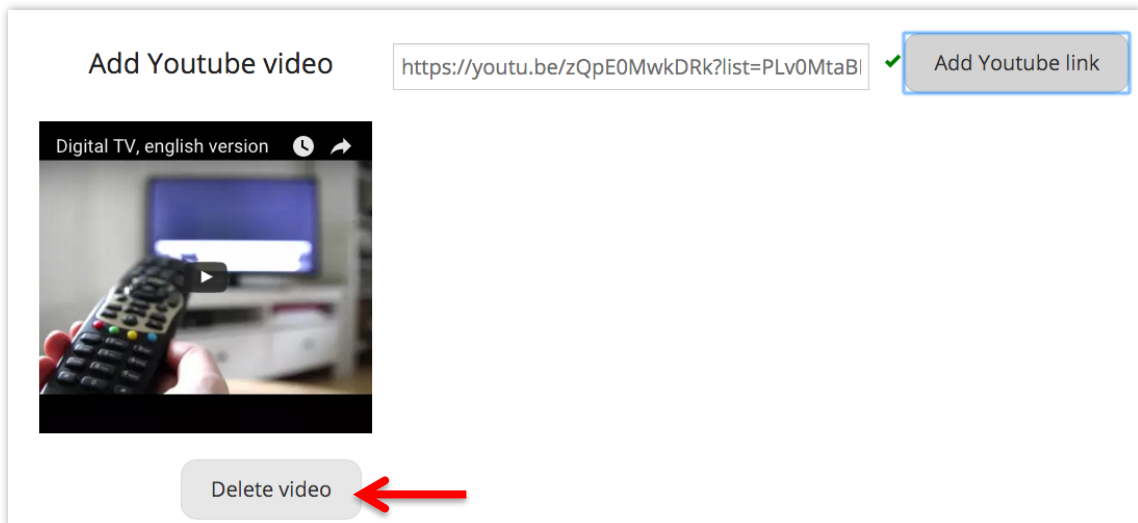


Copy and paste a YouTube link to the field, and click **Add YouTube link**.

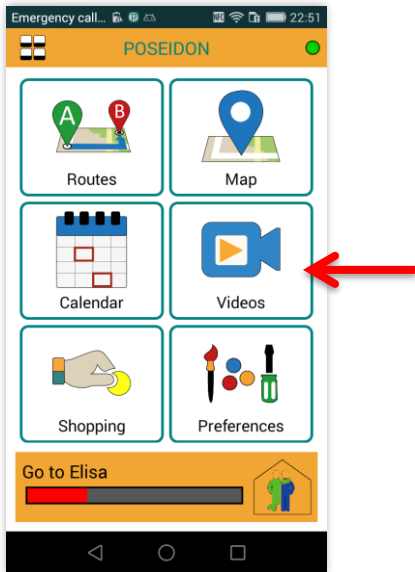


Now the video is saved.

If you want to delete a video, click **Delete video**.



The YouTube videos will appear in **Videos** in the POSEIDON mobile app.



8.11 POSEIDON web developer manual

The POSEIDON web is part of the POSEIDON project and system. This system is to consist of services and applications to support people with Down’s syndrome and, to some extent, also those who interact with them on a daily basis. The POSEIDON web is composed of open source software components. In this manual we will give a rough view of the techniques used for supporting the HCI interface and system. More details of POSEIDON system development and integration can be found in [1].

Composition

POSEIDON web is supported by the SmartTracker platform provided by TellU AS [2], SmartTracker platform is an intelligent Internet of Things cloud-based service that gathers data from GPS- and other devices. Data is processed by rules and other mechanisms designed to meet the different needs of industries, partners and individual customers. In addition to this platform, we integrated Google Calendar service and third party open source code to POSEIDON web. Figure 12 shows an iconized platform architecture of POSEIDON web.



Figure 12 – POSEIDON web supporting architecture

The POSEIDON web is mainly developed by HTML5, angularJS and JQuery, and also integrated some third party open-source code to develop new component. In the following we will introduce two parts of integrated code and what developer can do if they want to study and apply it to the system:

Open authorization for public calendar service: In POSEIDON web, we choose to use the Google calendar as the calendar publishing provider, this involves the integration of Google service authorization to POSEIDON system. We applied the Google Open Authorization 2 (OAuth2) to connect POSEIDON web to Google Calendar server. In contrary to tradition authorization methods, the OAuth uses an access token issued by the service provide instead of directly using user name and password to authorize usage of services for third party software. Figure 13 shows the authorization sequence of OAuth using a UML sequence diagram [3].

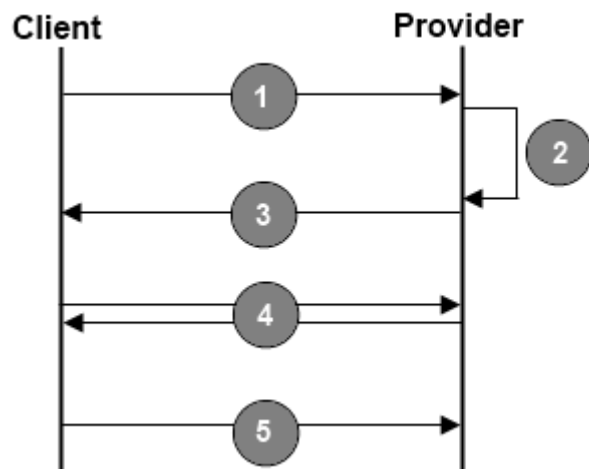


Figure 13 – OAuth credential application flow

The OAuth credential application as shown in Figure 13 can be described as follows:

- The client redirects the user to a login dialog at the provider.
- The user authorizes the client.
- The provider redirects the user back to the client, additionally returning an access_token.
- The client validates the access token.
- The access token allows the client to access a protected resource at the provider.

Calendar component: The calendar component on POSEIDON web is based on JQuery FullCalendar, and encapsulated in an angularJS directive. The FullCalendar API is available on web.

Open source API

We list the open source APIs in the table below for developers who are interested in extending the POSEIDON web system.

API	Link
OAuth 2	https://developers.google.com/identity/protocols/OAuth2
FullCalendar	http://fullcalendar.io/docs/

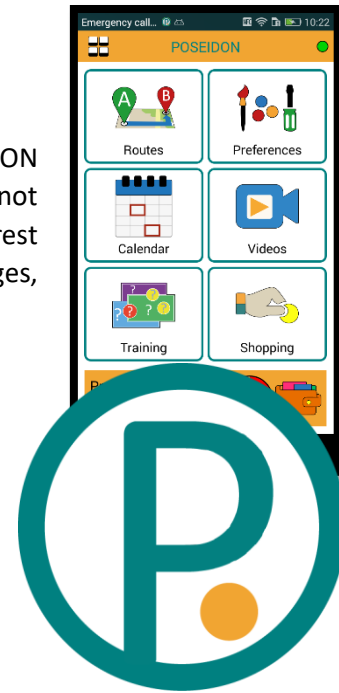
Google Calendar API	https://developers.google.com/google-apps/calendar/v3/reference/events
A FullCalendar AngularJS directive	http://angular-ui.github.io/ui-calendar/

9 POSEIDON app technical user manual

Application version: 0.88

This is documentation for the prototype 3 iteration of the main POSEIDON mobile app. It is meant as a comprehensive, technical documentation, not primarily targeted at end users and including information mainly of interest to technical personnel. End user guides, translated to all project languages, is made by extracting the relevant information.

The prototype mobile application offers navigation, tracking and calendar functionality, and connects to the context awareness middleware, which should also be installed on the device. The moneyhandling applications for training and shopping are additional POSEIDON apps which are installed separately but can be started from the main app. The POSEIDON app will run on any Android device with Android version 4.0 and up² and phone functionality (SIM card), although the user interface is designed primarily for the screen size range 5-7 inches, held in the vertical (portrait) orientation. The primary target devices are those used in the pilot trial – the Huawei Ascend G7 and Honor 5X.



The application is distributed via Google Play. Direct link:

<https://play.google.com/store/apps/details?id=no.tellu.POSEIDON>

To find it by search in Google Play, use “POSEIDON tellu” to get a good match.

Make sure to enable automatic updates in Google Play, so that new versions of the application are installed automatically. Also make sure GPS positioning is enabled on the device. The project deployment documentation describes how the phone should be configured for optimal use of the POSEIDON apps.

9.1 Starting and modes

A starting screen for logging in is shown the first time the application is started. The connection to an account can be remembered, so this screen is only needed for the initial setup, and doesn't need to be seen again by the primary user. Logging in requires a correctly configured account in the POSEIDON SmartTracker service. User name and password are used for the authentication with this service. Tick “Remember login” to log in automatically the next time the application is started, bypassing this screen. If the login is successful, user data is retrieved from SmartTracker, and the tracking part of the application can send sensor and context observations there, making them available to other POSEIDON applications. A connection is established with the POSEIDON file server, synchronising media files from the cloud to local storage for quick access. The application will also connect to the calendar of the phone, which in turn should be set up to synchronise with Google Calendar.



The application can also be run in a demo, offline mode. This allows testing and demonstration of the application without the need for setting up an account or connecting to online services. The application

² The context awareness middleware requires version 4.1 and up

will run as normal, but will not send data to SmartTracker, connect to the file server or use a real calendar. Instead you get a fixed set of demo content. The application will work without an internet connection, but the map is downloaded from Google, so without an internet connection the map may not be drawn, depending on what map tiles have previously been cached in the device.

Once a real or demo session has been established, the start screen with main menu is shown. The application is not meant to be “turned off” when in real use. When leaving the application with the phone’s home button, the POSEIDON icon stays in the notification bar, to show its presence. It will perform occasional background tasks, such as checking for new files on the file server and reporting the current position.

There is a status indicator icon in the top right of the screen. This is green when everything is functioning optimally. If it is yellow, this indicates a temporary problem or delay, such as a network connection not currently being available. If it is red, this indicates a more serious problem. A more detailed breakdown of the status is available from a system screen. Completely turning off the application can be done from the system screen (see System screen section below).

9.2 Start screen and app navigation

The start screen has the main menu for selecting app functions. The first four of these are built into the app, and each has a section in this manual. The last two are for the additional money handling applications – *Training* for the training app and *Shopping* for the shopping assistance app. These must be installed separately, and you will get a message if the app is not installed on the phone.

When in navigation mode, the two top elements of the menu changes. *Routes* becomes *Navigation* (getting back to the navigation screen) and *Preferences* is replaced by *Stop navigation* (turn off navigation).

Below the main menu, the current or first upcoming event of the calendar is shown. Pressing it brings up a complete, scrollable list of upcoming events.

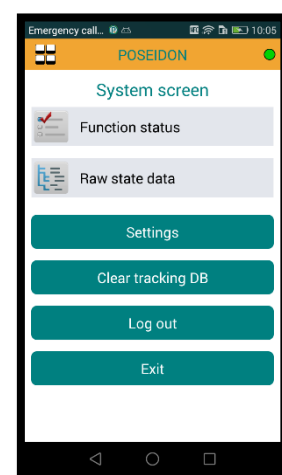
Navigating between the screens of the application, the back button of the Android system, at the bottom of the screen, can be used to backtrack to the previous screen. At the far left on the top bar in the application, there is a start screen icon which will always take you back to the start screen.

9.3 System screen

The application has a system screen with detailed status information and other functions of a technical nature. The end users will not normally need to enter this screen, but it has status useful for diagnostics and local settings such as for GPS simulation. To enter this screen you need to press and hold the start screen icon on the top left for about a second (do a long-press), and then quickly press the status indicator. The status indicator may be hard to hit, but you can try a few times before it deactivates and you need to long-press the start screen icon to activate it again.

Items on the main system screen:

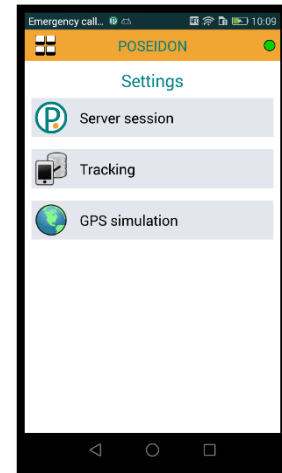
- **Function status:** The function status screen, described below, gives detailed status information.
- **Raw state data:** Shows a dump of the application’s state data. This is only for technicians, with the function status screen giving a more user-friendly output of the most relevant data.
- **Settings:** Access to local settings (see setting section below).



- Clear tracking DB: Deletes tracking data which is stored locally. This data is automatically deleted once it is sent to the server, so this function is only for technical personnel.
- Log out: Exit to the login screen, logging out of the account.
- Exit: Shuts down the application completely (if the login is remembered, this is not lost).

Function status

This screen shows detailed status information about the application, broken down into different functions. Each function has a green/yellow/red light (grey if the function is off). The status icon always visible in the top right is the sum of all of these function statuses. If the application status is not green, the function status screen shows where there is an issue. It also gives some technical information useful to diagnosing the problem. If reporting a bug about a function, the function status screen should be consulted, and the information found there about the function in question should be included in the bug report.



Functions:

Server session: The logged in session, with synchronisation of user profile. An error here indicates there is a problem with the server connection (usually a network problem). Note that the app version number can be found here.

Calendar: Connection to device calendar. Possible errors are a lack of device calendar account, or calendar sync being disabled in device setting.

Media files: Synchronisation of media files from cloud to local storage. If there are media not showing up, check here if there are files waiting or in error.

Route files: Synchronisation of route files from cloud to local storage, and parsing of the route data.

Position provider: Position tracking, with information about the last position fix. A yellow status indicates that the device is currently not able to get a good enough position fix. If status is red, make sure detailed positioning is enabled in the device settings. Note that if GPS simulation is on, this function is regarded as off (grey light), but still shows the position data produced.

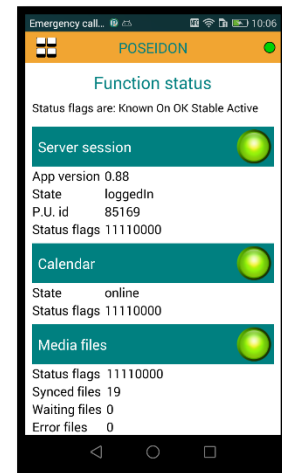
Tracker connection: Sending observations to the SmartTracker server. This will be in error if there is a problem reaching the server. If red, there may be a problem with the user profile.

Navigation: Only on when navigation is in progress. This shows state information for navigation, for debugging.

Context middleware: Connection to the context reasoner middleware. If red, there is a problem connecting to the middleware. The last received context value of each relevant context is listed, with the time it was received from the middleware.

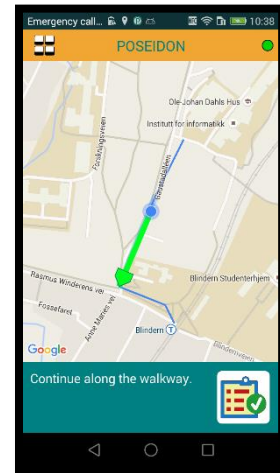
Settings and GPS simulation

Some technical settings are available from the system screen. These are being used in the development process and testing, and not something end users should ever change.



Server session has the address of the SmartPlatform server instance. *Tracking* shows the settings for position tracking and data transfer. This is now read-only, so it is only for checking/debugging this functionality.

The most interesting category for testing and demonstration is *GPS simulation*. As it would be very difficult to test route navigation if we actually had to travel the route each time, we have implemented a GPS simulation module, which can be used in place of the real positioning. This can be enabled in the settings, in which case positions will be produced to match the route when navigation is activated. *Simulation speed* is a speed multiplier for the simulation, to go through the route faster than real time. The simulation includes a variable inaccuracy in the values of the position. In addition, based on the *Deviation chance* setting, the simulated movement can deviate from the route. It will then move randomly, and can also switch back to trying to get back to the route. Note that GPS simulation is independent of the online/demo modes – both real and simulated positioning can be used with both modes, and SmartTracker won't know if a position is real or simulated.

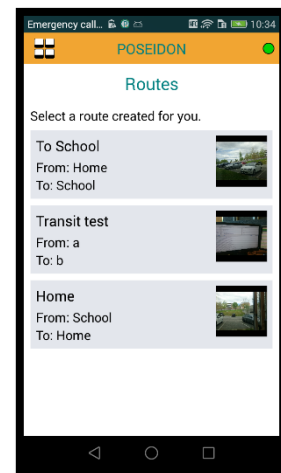


9.4 Routes and navigation

The POSEIDON application offers navigation using routes created by the carer. Route data is synchronised to the device from the cloud storage of the POSEIDON infrastructure. The prototype Route Creator and Home Navigation System applications can be used to set up the routes, making sure they are personalised with instructions and photos. Note that such a route has a fixed starting point, and so can only be used when starting from the planned location.

Starting a route

Navigation is started in two ways. A calendar event can specify a route, in which case the app will ask to start navigation at the start time of the event. All routes are listed when selecting *Routes* from the main menu. Selecting one, you can start navigation, being reminded that you need to be at the planned starting point.

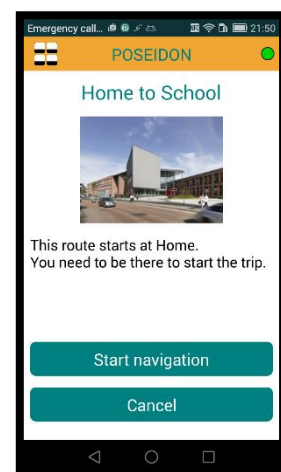


If the context middleware is installed on the phone, it will check if the user is indoors or outdoors, and wait until outdoors to start navigation. When entering navigation mode, the navigation map view is shown.

Navigation and map

The navigation view draws the route on a map. The current position (latest position observation) is shown as a blue marker on the map, with an accuracy circle indicating the accuracy of the position. The map is kept centred on the position, but can be zoomed in and out with two fingers. Below the map there is a guidance field, showing the current instruction.

A route is comprised of steps, where each step starts at a point and has an instruction to reach the next step. A green arrow is drawn on the map, from the current position to the next point on the route. When starting a step, a



popup shows the instruction for this step. This is a photo and text. There may be an audio recording, which is played, otherwise the text instruction is read with text-to-speech. The popup is removed if touched and re-shown by pressing the guidance field.

The steps can be organized in legs, for different modes of transport. The application supports both walk legs and transit legs (public transport). Walk legs typically have quite detailed steps, while a transit leg needs far less steps, as the user is a passenger. How to structure the route is up to the person creating it.

The navigation algorithm searches forward through the route to find the corresponding place in the route for each position observation. This makes possible finding the correct step even if the start position is located in the middle of the route.

The user should not be staring at the screen when walking around outside. A headset may be used to hear the audio instructions. Consult the screen when reaching a decision point, such as a crossroads. Check from time to time that the position is on the route, otherwise try to move closer to it.

The navigation process stops when reaching the destination. However, the navigation can be stopped at any point from the main menu. If the user deviates far from the route, this is detected and choices are given. If a carer phone number has been defined, the carer can be called. Or navigation can be ended.

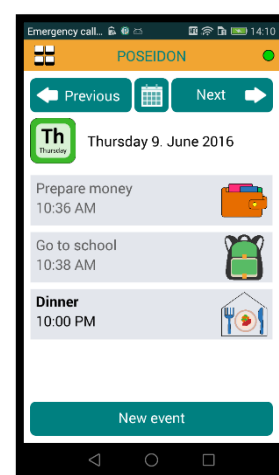
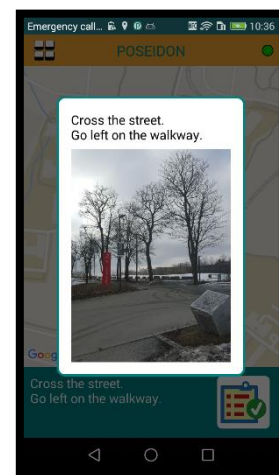
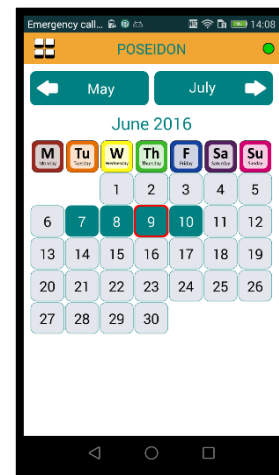
9.5 Calendar and events

The POSEIDON application is also a calendar application. It connects to the calendar data provider in the phone, which in turn has access to the calendars of accounts entered in the phone, such as Google Calendar for a Google account. For the intended usage, linked with other POSEIDON applications, the phone should have a single Google account with a single calendar, and events should only be entered through other POSEIDON applications (such as the web).

The events in the calendar can be accessed with the *Calendar* function on the main menu. This lists the events of the current day, with title, icon and time. Finished events are “greyed out” (text with less contrast), while any current event is highlighted. The buttons at the top can be used to change the date, to see the events of other days. There are *Previous* and *Next* arrows to go day by day, and the small calendar button between them brings up a month view, showing a month at a time. Marked days have events – press one to see the event list for this day.

Press an event to get a detailed view, with any description entered for the event. The event text will also be read aloud (if text-to-speech is available).

The most “current” event – started or next to start – is shown on the start screen, below the main menu. This can be pressed for an alternative listing of events, with all upcoming events for several days in a scrollable list.



The POSEIDON calendar uses special icons to indicate the days of the week. These are language-specific, and has a colour-coding of the weekdays which is unique for each country.

The time left until the start of an event is indicated with a gradually filling red circle for the last hour before the start, to give a visual indication of the time left. It starts empty one hour before the start, and then fills up during the last hour.

Events can have various types of additional information, entered through the POSEIDON web. All information is available in the detail view.

- **Icon:** An event can have an image, meant to be an icon representing the event. It is usually shown along with the title.
- **Video:** If the event has a video, there will be a button to play this in the event detail view.
- **Instruction list:** An event can have a set of instructions. Each can have a short text, an image, audio or video. These are shown sequentially at the start of an event, and can also be shown from the event detail screen. They are also read aloud, unless there is audio to play. If the event doesn't have an icon, a list icon is shown with its title.
- **Route for navigation:** An event can include a planned route. At the starting time of the event, the user will be informed. If the user confirms that the app is to provide navigation, it enters navigation mode. If the event doesn't have an icon, a route icon is shown with its title.

Entering events

The calendar has a button for creating a new event. A title and start time must be entered. An end time can be entered; otherwise the event has no duration. Press a time field to bring up a time screen, where hours and minutes can be selected with touch input. The date is initially that of the date in the calendar when pressing the *New event* button, but may be changed using a date picker. Events cannot cover multiple dates. A description can be entered to give information about the event.

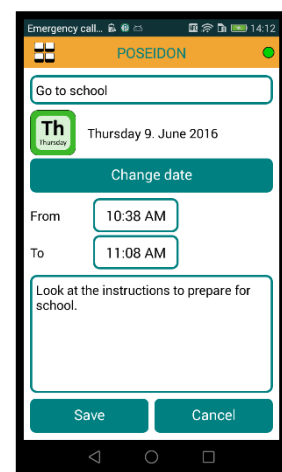
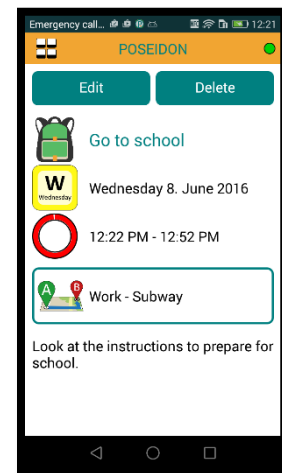
Note that some of the more advanced features of the web calendar are not available when entering or editing events in the mobile application. It can't be used to enter a recurring event, and an image, route or instruction list can't be added.

Editing and deleting events

From the detail view of an event, edit and delete actions are available. Edit has the same user interface as for a new event. Title, date, start and end time and description can be edited. Note that it's not possible to edit or delete recurring events. These are events which repeat according to some pattern, and must be managed through a more complex user interface such as that of the POSEIDON web.

Event reminders

An event can have reminders at specific times prior to the start time of the event. This is added to the event in the web interface, and works much like



in other calendar applications. The user is given a notification at the reminder time, with the event details and how long it is until the event start time. A notification is placed in the notification bar of the phone if the application is not currently on screen, and the full reminder is shown in the application when it is opened. The notification plays sound and vibrates the phone.

If the event has a route for navigation, the context middleware will be used to provide a weather-based message to the user, to remind them to wear appropriate clothes. This requires that the context middleware is installed on the phone and that the phone has an internet connection. There is only a message if the weather is categorised as needing attention, such as hot, cold or rainy.

Notification at event start

The user can be notified of any event at the start time of the event. Whether to get a notification with sound and vibration on event start or not is controlled by a setting, available in the web application. A popup in the app gives the details in any case. If the event has instructions, the button on the popup leads to the first instruction, and these are shown in sequence with presses on the button. The rest of the app is unavailable until the notification and instruction dialogs are acknowledged with the button. If the event has a route, the dialog will finally ask for confirmation to start navigation.

9.6 Video lists

A POSEIDON account can have a list of videos as part of its content. This list is configured in the web application. Two types of videos are supported. Personal video files can be uploaded through the web, and will then automatically be downloaded and stored on the device. This is meant for relatively short, instructional videos. Since these are played from local store, no network connection is used for playback. The other type is videos on YouTube. Links can be entered for any videos on YouTube. Such videos are streamed from YouTube when played, so an internet connection is needed. A setting in the user profile allows restricting video streaming to Wi-Fi connections, to save on costly data usage.

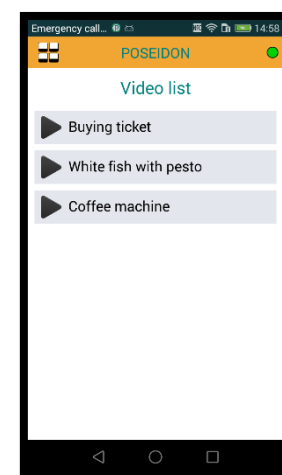
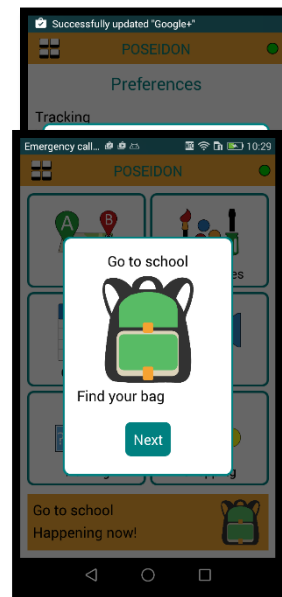
Selecting *Videos* from the main menu, the videos are listed. Just press one to play. YouTube videos are played by a YouTube player. Turn the screen to landscape mode to use all screen space.

9.7 End user preferences

There are some application and service settings stored as part of the POSEIDON account. Most of these can be edited from the POSEIDON web application. The colour theme can also be changed in the app, to make this personalisation option easily available to the primary user. In addition, the application has its own privacy setting, controlling whether or not position tracking is sent to SmartTracker (making it available to secondary users).

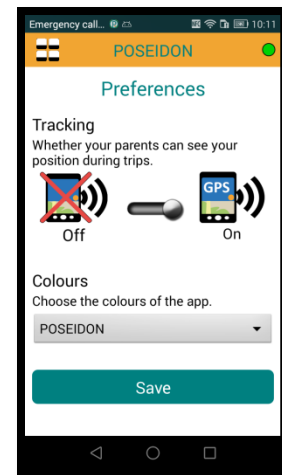
The Preferences screen has the personalisation settings which are available in the app.

- Tracking: When off, position data is not sent to SmartTracker. Any location tracking done will then not be stored or processed on the server, so it won't be available for any researcher or



carer to see or for any server-side service logic. Note that while earlier versions of the application (prototype 2) only tracked position during navigation, it now does so occasionally at all times, if tracking is on.

- Colors: This is the theme of the user interface – the colors. The default theme (POSEIDON) is based on the color palette used in the project. The other theme currently available is a high-contrast theme, with yellow and white on a black background. The color theme is part of the user account and can be changed from the web.



10 Moneyhandling Training App - User Manual for pilot 2

This app is not provided like the other POSEIDON Apps in the Google Playstore. The installation file is provided on the POSEIDON project website at following link:

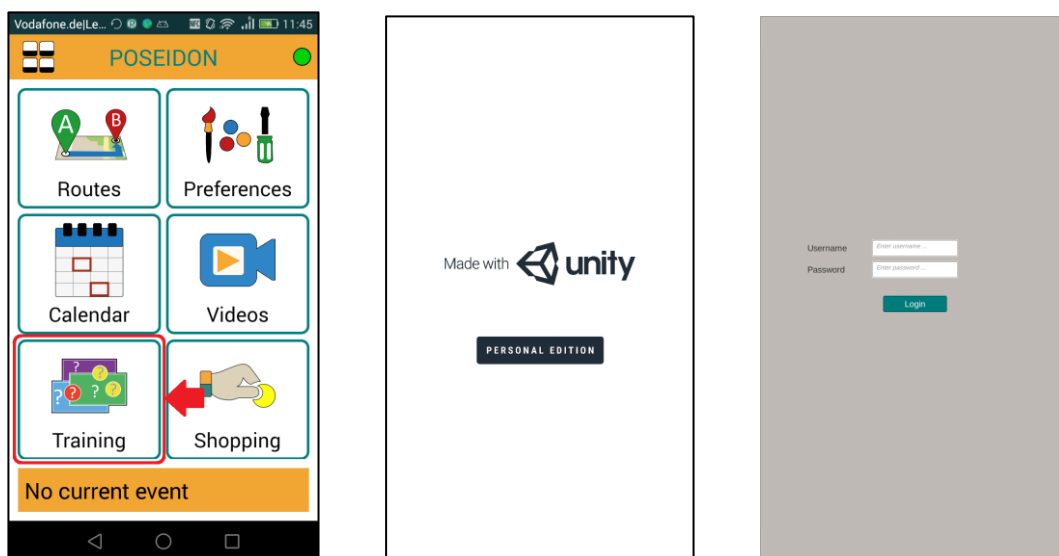
<http://www.POSEIDON-project.org/developers/code/>

App installation

From here, download the Moneyhandling Training Smartphone App installation file. It is called MoneyhandlingTrainingApp.apk. If you download the file on the PC, connect the phone through USB and copy the installation file to e.g. the folder "Downloads". By clicking on it, you start the installation process.

Open App

Start the app through the POSEIDON app, by clicking on the lower left tile called "Training". The app might take some time to start. The first screen you will see is white with the unity logo. The second screen is a login screen which you will shortly see, but you don't need to add any login data since the app is doing this automatically for you.

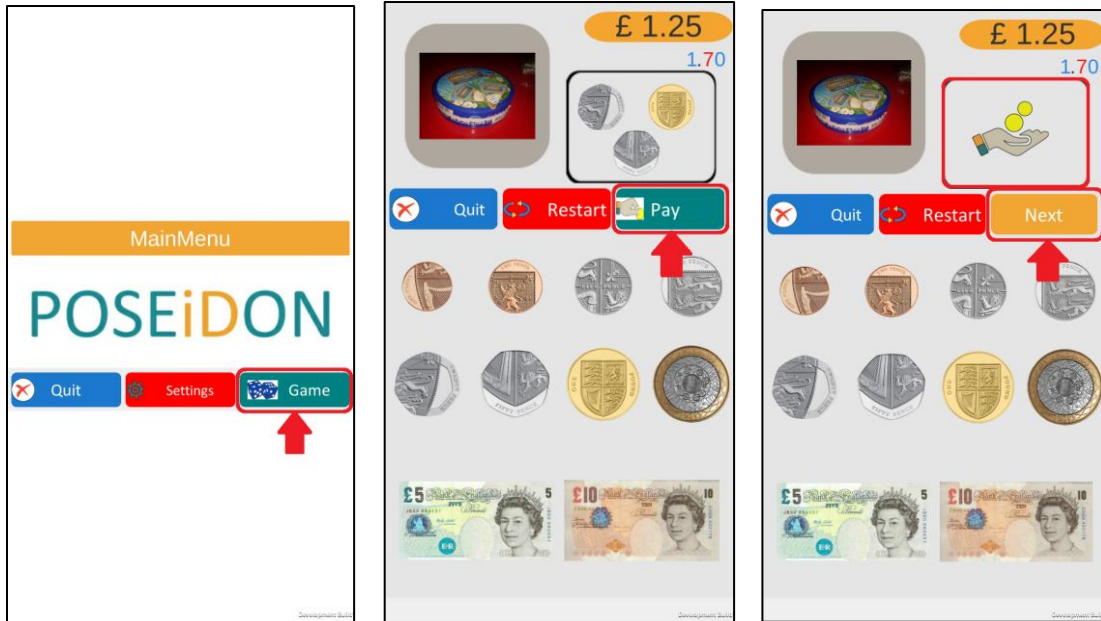


Training

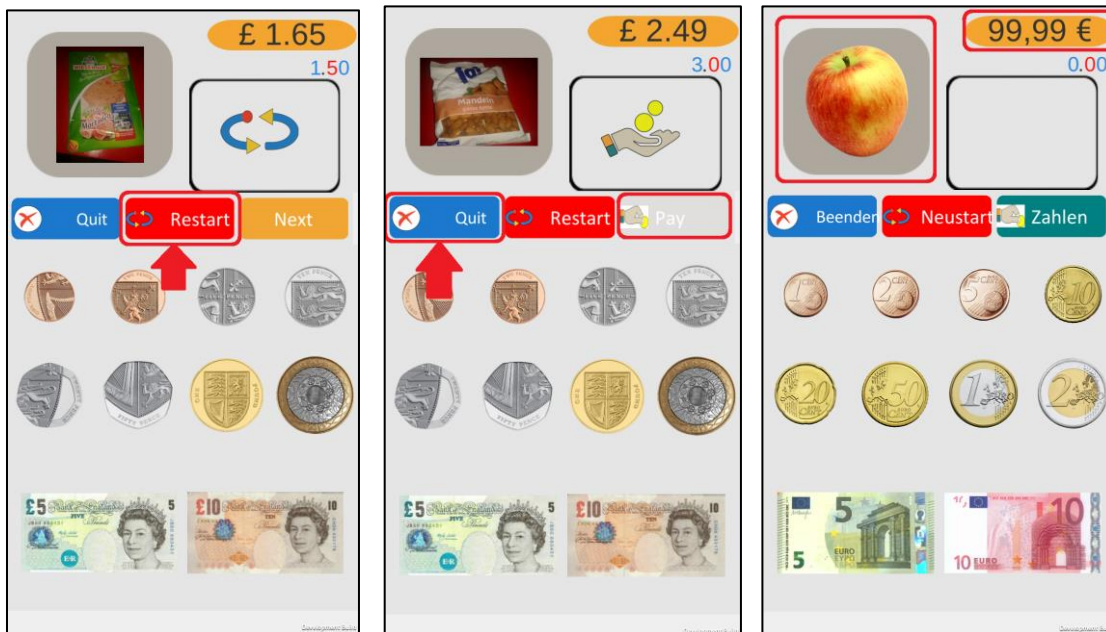
On the first screen of the app you have three buttons: one for terminating the app, one for setting the language and the different difficulty levels and a third button for starting the training.

Starting the game might take a bit of time

In case you see image of a product you have configured, you can see in the dark yellow area the price tag. By touching the displayed coins in the area underneath, you select the coins with which to pay. In the area underneath the price tag a colored number is displayed showing the amount of money you have selected. If you want to pay, just press the button on the right which says "Pay". If you get change you will see the symbol of getting change back displayed.



There is no way of putting a coin back, but you can repeat paying for this product by pressing on the button in the middle which says “Repeat”. At the end of the shopping list you have to press the button “quit” which takes you back to the main screen. If you want to repeat the game you can start again by pressing the button “Game”.



If first product is unexpectedly an apple

If you see an apple as the first product image with the price of 99,99 €, and you have not configured your shopping list with this image, this could mean the two following things:

- you haven't configured a shopping list yet using the POSEIDON web. In this case consult the user manual of the POSEIDON web, section shopping, see Chapter 8.8.

- The main POSEIDON app has not yet finished to download all the data from the server (including the shopping list you have configured on the POSEIDON web). In this case please try again later.

11 POSEIDON shopping app user manual for pilot 2

Create shopping list using the POSEIDON Web

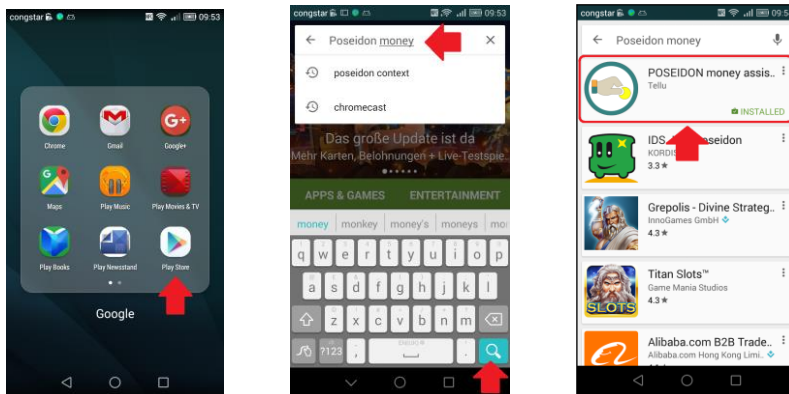
How to create a shopping list is described in the POSEIDON Web user manual under the section “Shopping”. The necessary steps can be summarized as following:

Add products with price and image

Create shopping list. Only one shopping list is available at the moment. If you wish, add a calendar appointment to remind to add money to the wallet.

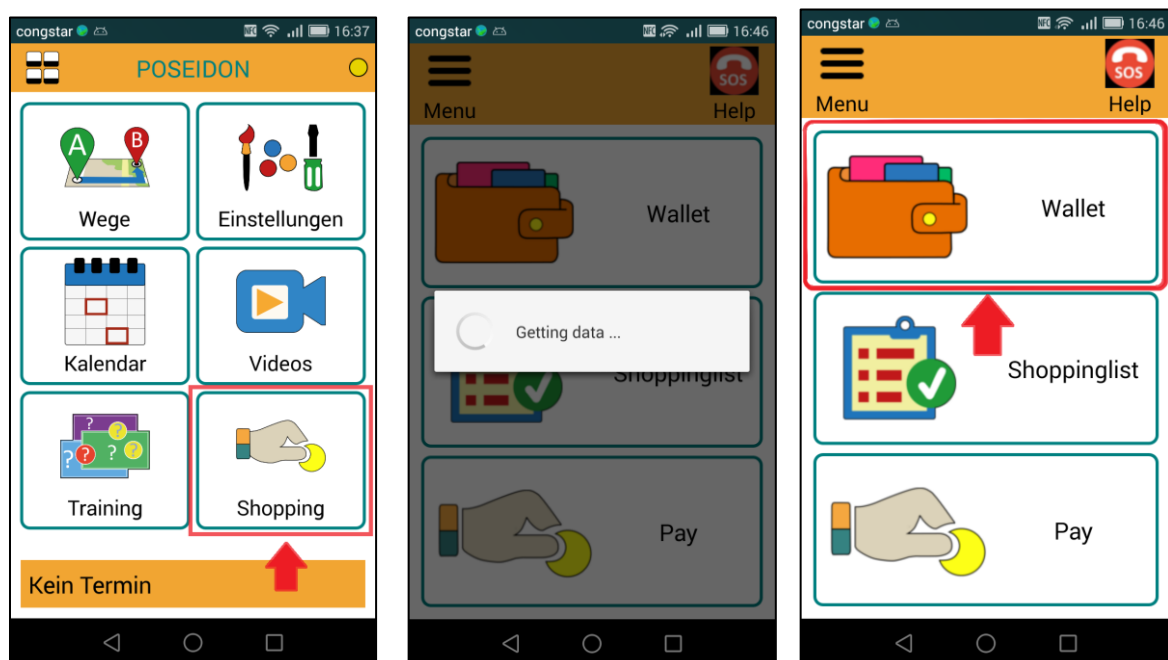
Install shopping app

Open the Google Play Store on your phone and search for the term “POSEIDON tellu”. The POSEIDON money assistance app appears. Click on it and follow the installation steps. Do not open it, since it is a component of the POSEIDON app and will be opened from there.

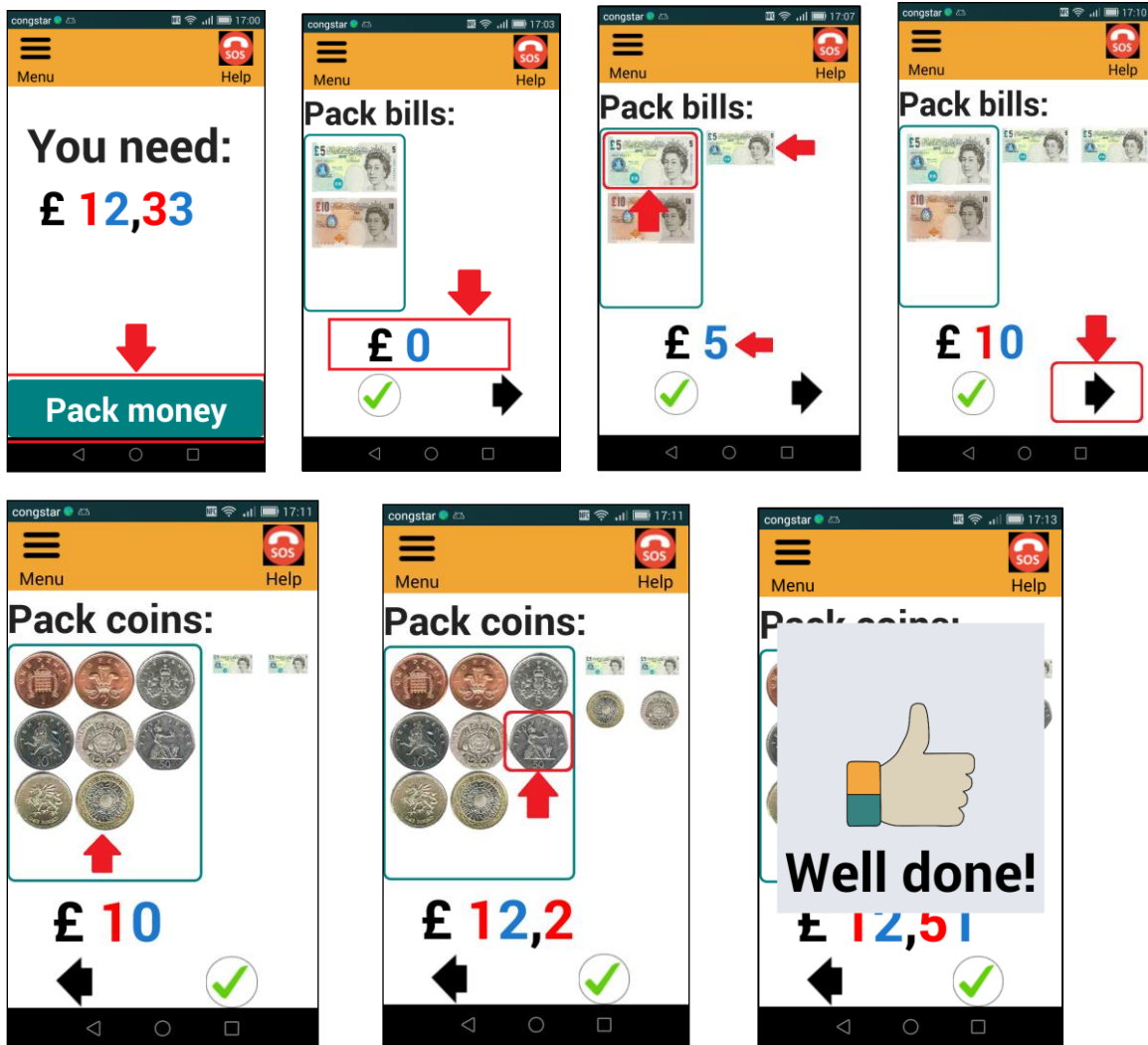


Open shopping app

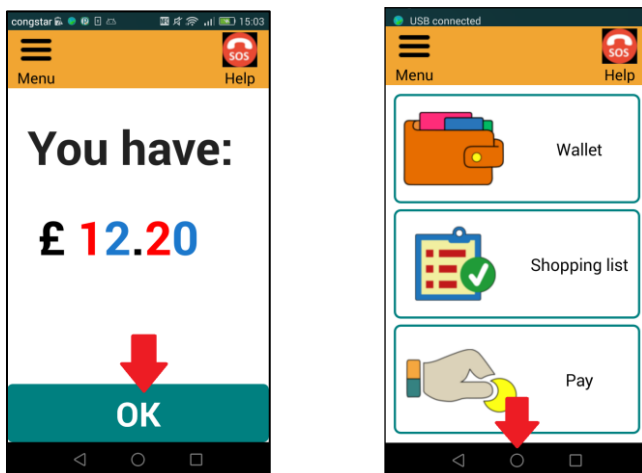
Open the POSEIDON app on the phone. Then, you will see information telling you that the shopping list created on the POSEIDON web is downloaded.



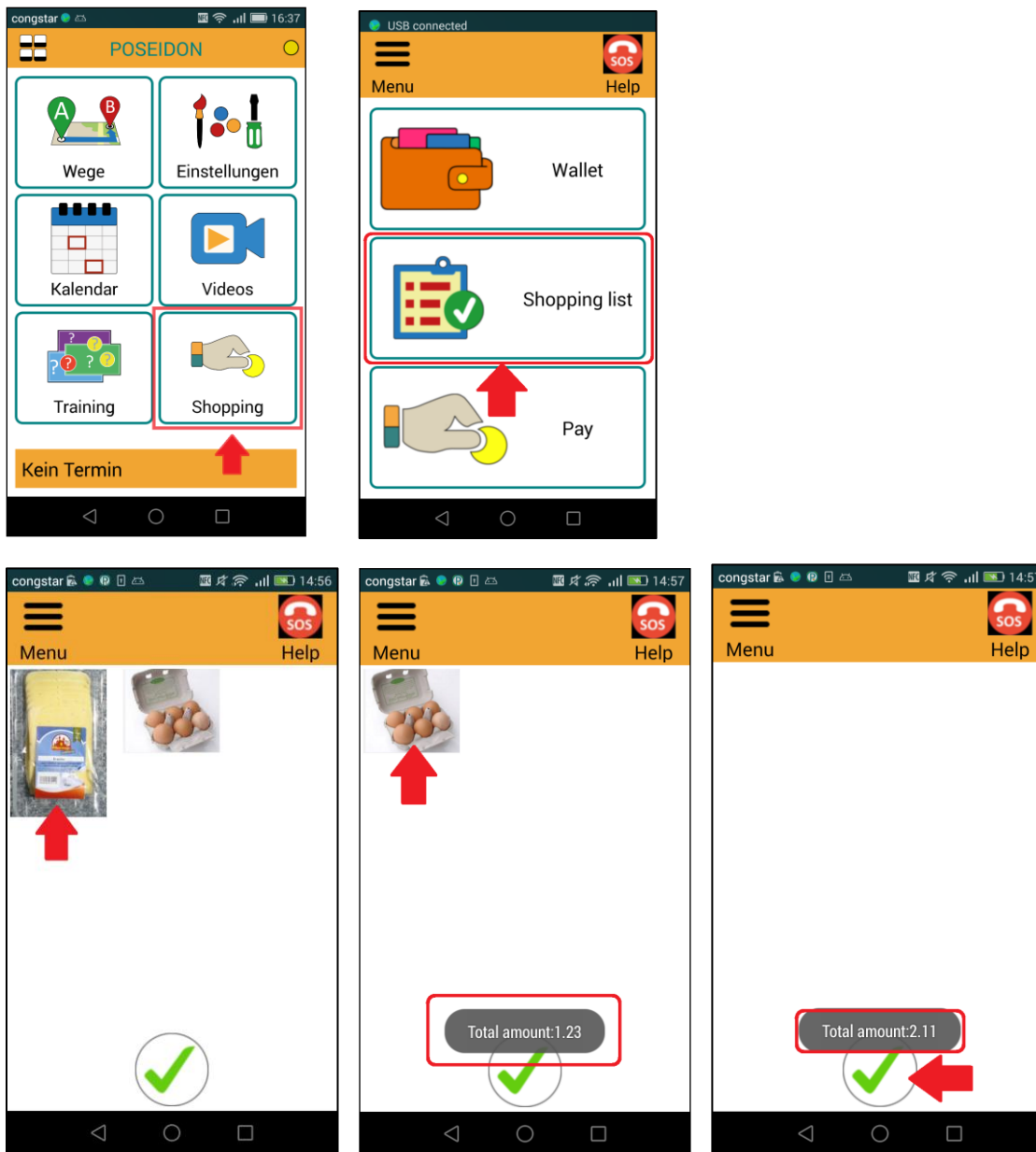
Then **select the Wallet**. The amount needed to pay for the current shopping list is displayed. Then you can add to the app the bills and coins you have in your wallet. The app lets you know once you have enough to pay the shopping list.



If you have a calendar event in the morning to fill the money with the required amount, it would be good **not to close the app** afterwards, just go to the home screen by pressing the circle button on the bottom button bar.



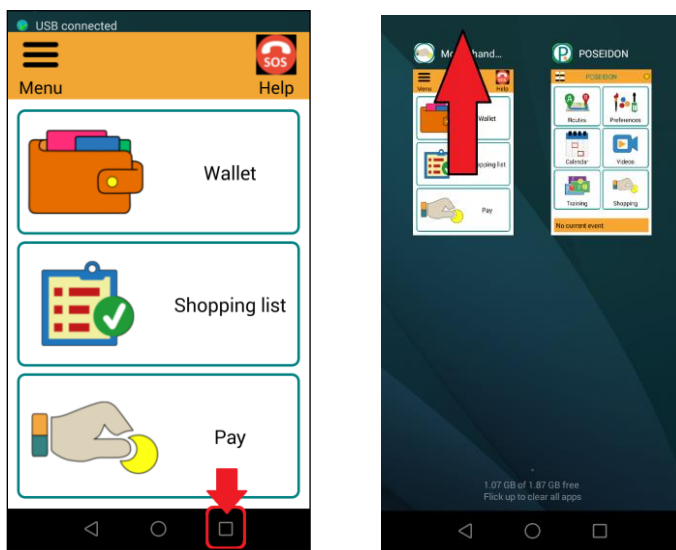
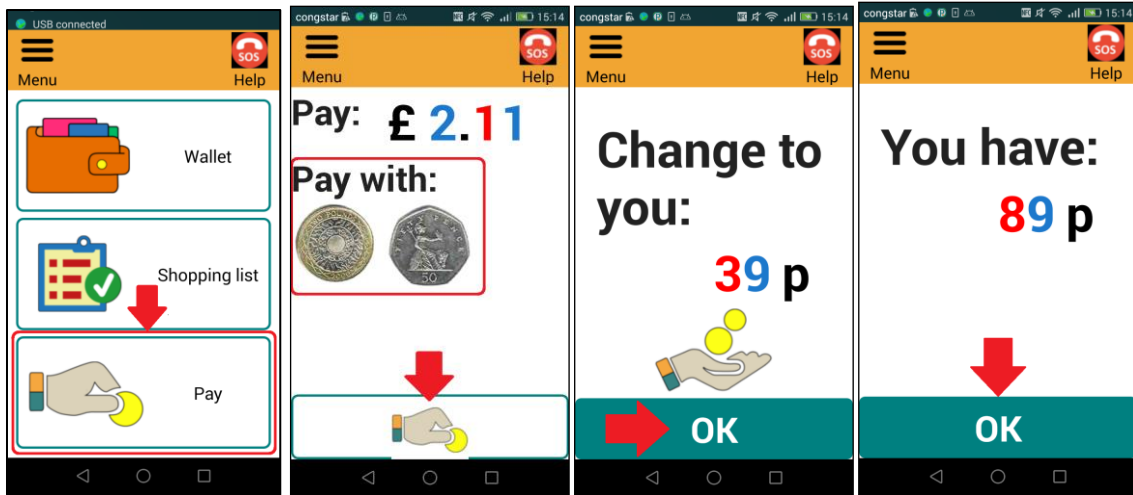
When you are in the shop, you can access the app again through the POSEIDON app. Now you can press the **shopping list**. The configured shopping list from the web portal will be shown. If more than one item of the products are bought, multiple products appear. By tapping on the products the price gets added up and the product disappears from the view.



Once shopping is finished press the «check» button.

Once one is at the paying counter, one could prepare the money for the shopping. For this, press the «Pay» button on the main screen. After pressing the button you get a suggestion of which coins and bills to use in order to pay the required amount. Only the coins and bills available in your wallet which you filled at the first steps are considered. Further on, the expected change and the amount of money remaining in your wallet are displayed.

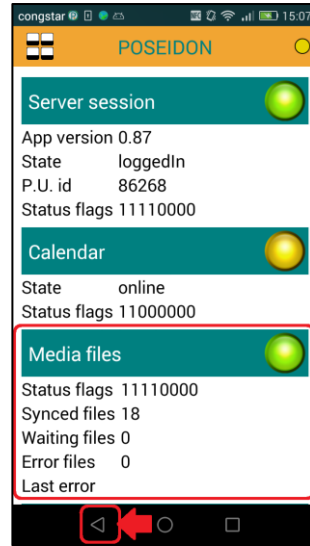
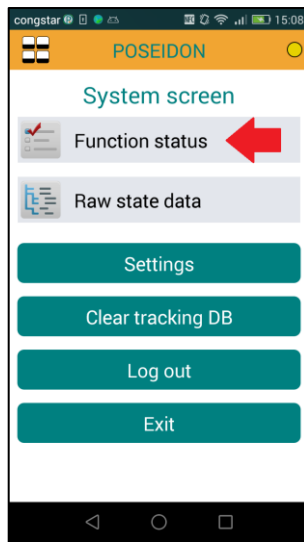
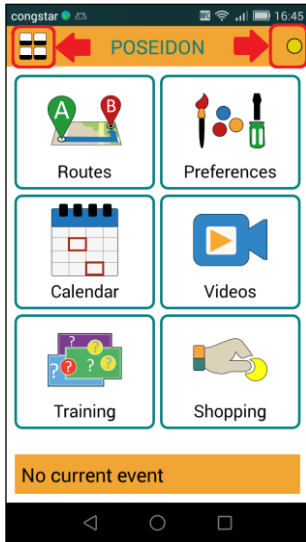
You can end the application by pressing the square button on the bottom button bar. A screen with all running apps appear. Swiping the Shopping App towards the top of the screen closes the application.



In case the shopping list is not shown

If the shopping list is not shown. Then make sure you have a valid shopping list created on the POSEIDON Web. Also make sure, that you are using the same account.

If the wallet already shows the correct required amount, it means that the images have not been downloaded or synchronized yet by the POSEIDON app. To check synchronization status, one presses the Main Menu icon and the light sign on the top of the POSEIDON app. Hold both button pressed for some time, and then release. This opens the «System screen» view of the app. Pressing the «Function status» one can check the media file synchronization. One can see if it is in process, or if files have been synchronized.



12 POSEIDON Route Creator app user manual

This is a user manual for the POSEIDON Route Creator Android application, used to create routes for navigation. It will run on any Android device with Android version 4.0 and up, although the user interface is designed for phones.



The application is distributed via Google Play. Direct link:

<https://play.google.com/store/apps/details?id=no.tellu.POSEIDON.routecreator>

To find it by search in Google Play, use “POSEIDON tellu” to get a good match.

Make sure to enable automatic updates in Google Play, so that new versions of the application are installed automatically. Also make sure GPS positioning is enabled on the device.

12.1 Connecting to a POSEIDON account

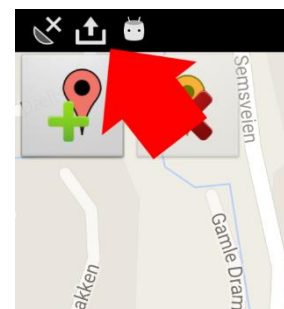
Use of the application requires a POSEIDON account. Routes are stored on the POSEIDON cloud storage also used by other POSEIDON applications, so that the same routes are available here, in the home navigation system and in the navigation application.

A starting screen for logging in is shown the first time the application is started. Enter your POSEIDON username and password. Tick “Remember login” to log in automatically the next time the application is started, bypassing this screen. The phone must be connected to the internet to connect to the POSEIDON service, but once it is running it can be used without a constant connection.



Once the application is connected to the POSEIDON service, it will show the main menu, which is a list of any existing routes as well as the option to create a new one. Should you ever need to disconnect from the account (to use the app with another account), press the button with the cog wheel (settings) and choose *Log out*.

The application downloads any existing routes, images and audio from the POSEIDON cloud storage when it is initially connected to the account (it may take a little time for all images to be available if you already have routes in your account before using the Route Creator). When editing a route, it will always try to synchronise any changes back to the cloud storage, so that new routes will be available in all applications. This requires an internet connection, but if one is not available at the time, it will keep trying. Whenever synchronisation of changes is in progress, an upload icon is shown in the notification bar at the top of the screen (see screenshot). If this icon does not go away shortly after the change to the route was made, it means the application is having trouble uploading to the cloud storage, probably because of a bad or missing internet connection. The icon will stay until all uploading is successful, retrying even if you leave the application. Note that you will not be able to edit another route until all changes have been synchronised. It is possible to shut down the application completely in the settings (*Turn off app*), but any changes not yet uploaded will then be lost.



12.2 Working with routes

Once logged in, you will see a list of existing routes, and the option to create a new route. This screen also has access to settings (cog wheel in top right), where you can log out of the account.

Note that if you have made changes to a route which have not yet been uploaded to the POSEIDON cloud, this route will be marked orange in the list. You will not be able to edit another route while there are changes yet to be uploaded, but you can continue to work on this route.

Route information

A route is identified by a route name as well as names of the starting location and destination. Each route can also have an image, which is chosen from the decision points of the route. The route name and image is used to represent the route in lists. The user of the navigation app will have such a list to choose from if they want to manually start navigation.

The names of the route, start and destination can be filled in when creating a new route. For selecting an image to represent the route, you must first add some decision points. You are then presented with the images of the decision points, and can choose one. The route information can be edited at any time. Start by filling in what you know when you first create the route, and then go back once the route is complete to set an image.

Route operations

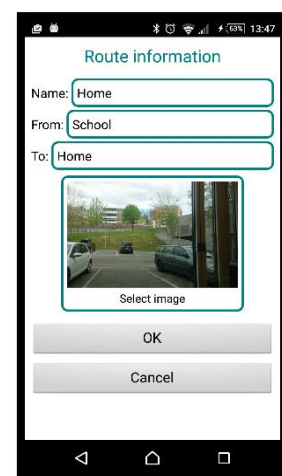
Selecting an existing route from the list, and you have the following options:

- Edit information: The Route information screen described above.
- Edit route: Takes you to the map screen, where you can see the route on a map and set decision points.
- Make a copy: Creates a new route containing the same decision points as the selected route.
- Delete: Delete the route (you will be asked to confirm).

The copy option is useful if you want to make a new route which reuses a part of an existing route. For instance, you may want to make several routes from home to the local bus stop, branching out from there. Since the first leg is the same, you want to reuse that. You then copy an existing route which starts with this leg, give it a new name, and then edit the route, deleting the rest of the decision points and creating new ones.

12.3 Contents of a route

The purpose of a route is to aid someone in getting from A to B. To make a route that works well in navigation it is important to understand how the route will be used for providing the navigation. A route is defined by a series of decision points. Each decision point should give the user instructions needed to reach the next decision point (except for the last one, which should tell the user that the destination has been reached, and possibly say something about what to do next).



The instructions come in the form of written text and/or recorded audio, and an image. The image should be a photo taken on the spot, in the direction the user should go next. It serves to indicate the direction to go as well as confirming to the user that they are in the right place. The audio recording should be a familiar voice explaining where to go next. If no audio recording is provided, the navigation application will read aloud the written text using synthetic speech. If an audio recording is provided, it is a good idea to provide a short written text to summarise the instruction, as this will be visible in the navigation application during and after the audio plays.

A decision point should be placed where there is a change in direction. The route will be drawn on maps as lines connecting the decision points, and the line between two points gives the general direction of travel between those points, so one is needed where there is an abrupt change in direction, such as taking a left or right at a junction. It is also a good idea to put a decision point at other places where a decision may be needed, such as to keep going straight at a big intersection, or to cross to the other side of the street.

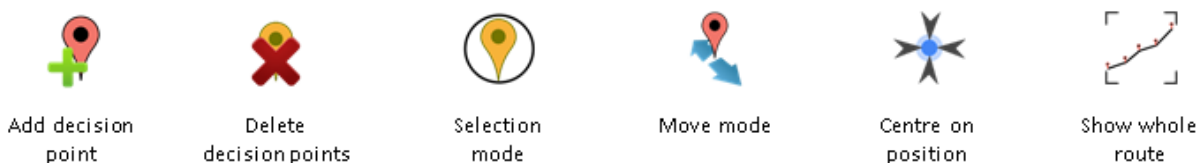
You should be careful not to create too many decision points, both to keep the route creation process manageable and because there needs to be some distance between them. GPS accuracy has its limits, and the navigation may become confused if the wrong decision point is selected based on a GPS fix with low accuracy. A minimum distance of at least 30 meters is recommended between points, more if GPS coverage may be limited, such as between tall buildings. If there are several decisions to be made in a short space, describe them all in one decision point. The application will warn you if you try to create points very close together or very far apart.

Comments so far pertains to providing instructions for walking. A route may also include public transport. A route can consist of multiple legs, with a leg being in either walking or transit mode. The distinction is important for the navigation, because transit mode is a passive mode where the user rides some form of transportation, and does not need to be warned when not going the right way. The Route Creator lets you specify a switch in mode when creating a decision point, and transit legs are drawn in a different colour.

A route typically starts with a walk leg, to get to a bus stop for instance. There will then be a decision point at the bus stop, saying what bus to take, and this is where we need to change to transit mode. At the destination point of the bus trip, there will be a decision point switching back to walk mode, if you want to provide further instructions. In between these, there can be additional decision points as part of the bus trip, if you want to provide instructions while on the bus, but note that these should be positioned approximately on the route of the bus, and the triggering of these instructions in navigation depends on GPS coverage being available. For above-ground public transport, it is recommended to put in one decision point reached a short time before the destination, to instruct the user to disembark at the next stop. Such a decision point can be positioned by using the map, and the image could for instance show something to look out for when approaching the stop.

12.4 Editing the route

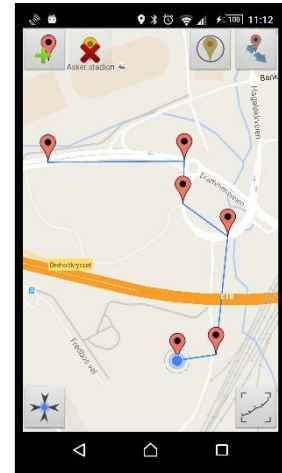
When working on the route, it is shown on a map. The map view has buttons for editing the route at the top and map controls at the bottom. The editing and map control functions are shown below.



A route is defined by a series of decision points, each represented by a red marker on the map, connected by lines. You can place decision points either by being at the desired location, or by touching the map in the desired location. It is possible to edit a route without being on location, but you must take a photo when creating a new decision point, so to create a proper decision point for navigation you need to be on location.

Map

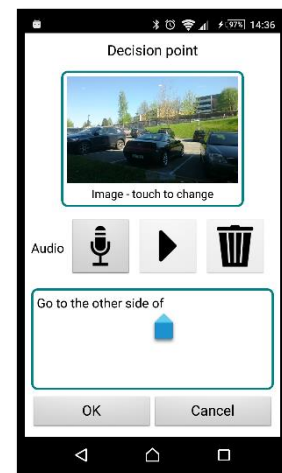
In addition to the route, the map shows your current position as a blue dot (the accuracy of positioning depends on satellite positioning not being disabled in the phone, and being in view of satellites). The map can be dragged around with a finger, and zoomed in and out using two fingers.



There are two map controls in the bottom corners of the view. The left one zooms in and centres on the current position. The right one zooms and moves the map to exactly match the borders of the route.

Creating decision points

Press the *add* button (top right) to create a new decision point, to be added at the end of any current route. For positioning the point, you are given the choice between using the current position (only available if the phone currently has a GPS fix) or by touching the map. You also have the option to change to transit mode, or back to walk mode if the last point was in transit mode. You are then taken to the decision point screen, to provide the instructions. Touching an existing decision point on the map will also bring up the decision point screen for that point, to review or edit the instructions.



In the decision point screen you specify the image, audio and text for the point. To set an image, you press the image field, which launches the camera. The camera screen has a single button to capture an image. Note that images must be in landscape mode, so you must lay the phone on its side to capture the image – hold the phone so that the text on the button has the correct orientation.

For audio instruction, press the microphone button to start recording (this uses the phone's microphone). Press it again to stop (it is a stop button while recording). You can also play back the current instruction, and delete it (the rubbish bin button).

Write the text instruction in the text field. The decision point is created or updated when you press OK, storing the change.

Deleting and inserting points

Pressing the selection mode button on the top right, lets you select decision points instead of editing them when you press them. This allows two operations: deleting selection points and inserting a point between existing points.

To delete points, select one or more points and press the *delete* button.

To insert a point, you need to select a single point. Then press the *add* button, and you will be asked if you want to insert the point before or after the selected point. You then touch the map to position the new point.

Moving decision points

The final button, in the top right corner, toggles a move mode. In this mode you can press and drag decision points to move them around the map. Press the *move* button again to save the changes. The other buttons are disabled while move mode is on.

13 Context Settings User Manual for pilot 2

As part of the POSEIDON mobile applications, we include the ability for the primary and secondary user to alter settings which control the context-awareness functionality of the system.

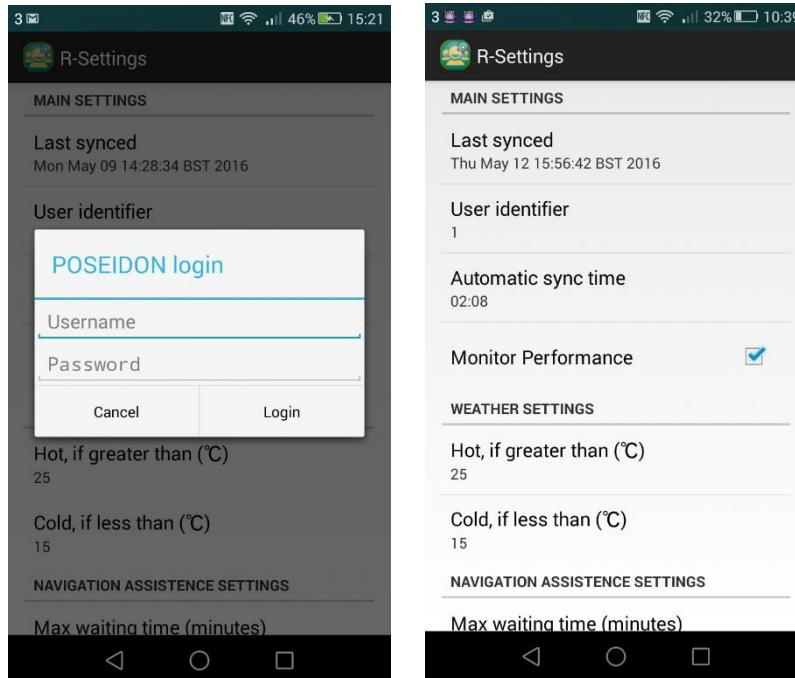
Firstly, you need to open the application. The application is named “R-Settings”, and has an icon as shown in Figure 1.



Figure 1 Application icon

When you open the application, you will be first requested to Login.

To login, you should put your POSEIDON username and password. This is the same details you use for the POSEIDON Web. After you login, you will see the different context settings.



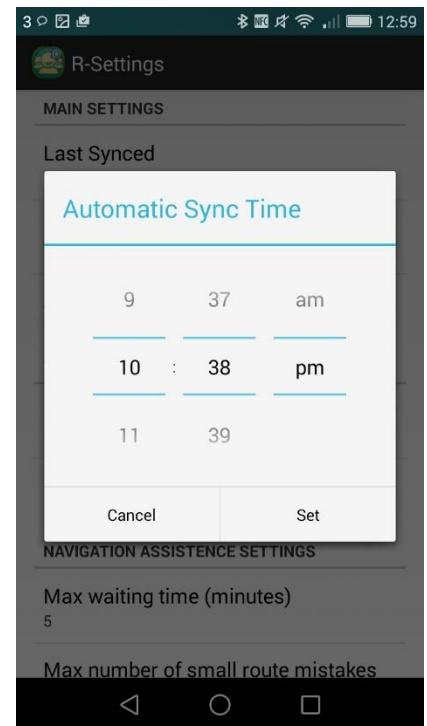
The settings are made up of the following items:

1. **Main Settings:** This refers to general purpose settings.
2. **Weather Settings:** This refers to settings that can affect weather related reminders to the user.

3. **Navigation Assistance Setting:** This refers to settings that govern the level of acceptable events while the user is travelling before warnings are given.

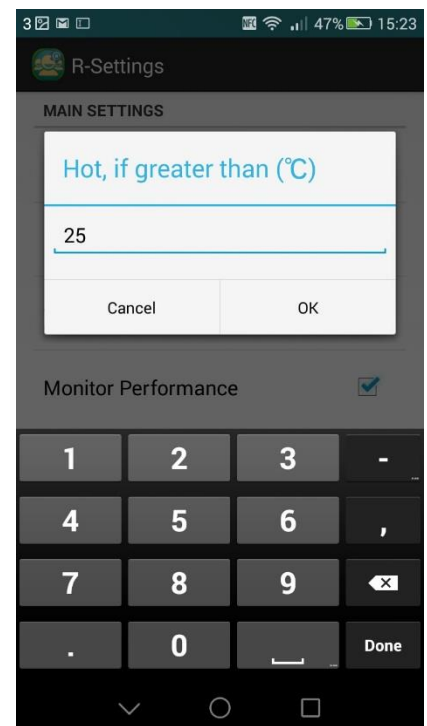
The **Main Settings** section has the following items:

- **Last synced:** This refers to the last time the system communicated with our system. If you click on this item, it will synchronize immediately.
- **User Identifier:** This regards your identification in our system. In the event of problems, quoting this will assist us in seeing problems if some should arise.
- **Automatic sync time:** This setting deals with the time of the date in which it is best for it to send data to our central systems. It is best to set this item to a time when you know your phone is likely to be connected to Wi-Fi. This will prevent you use using more mobile data. If you click on this item, you can change the time to suit your needs
- **Monitor Performance:** On the POSEIDON Web system, secondary users can view statistics about the user regarding their journey times, and problems they might encounter on their journeys. This setting allows the user to specify if that service can use data from this application. If they prefer privacy, click this setting off, and no statistics will be viewable.



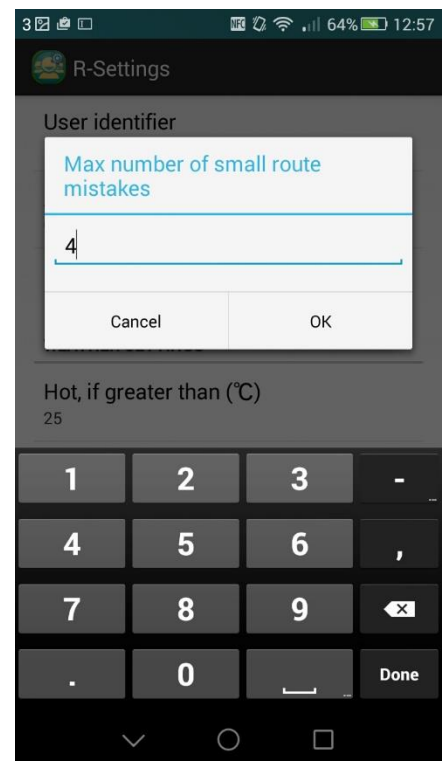
The **Weather Settings** section has the following Items:

- **Hot, if greater than (C):** This refers to the temperature you believe should be classed as hot for your user. As some users can be more sensitive to the outdoor temperature, it is important you pick a temperature you believe the user should be reminded to be careful of the sun. Click on this item, and you can then set the temperature of your choice.
- **Cold, if less than (C):** This refers to the temperature you believe should be classed as cold to user. On cold days, it might be suggestable the user wears a warm coat. Set this temperature to a setting you believe a user should put a coat on before leaving the house. Click on this item, and you can then set the temperature of your choice.



The **Navigation Settings** section has the following items:

- **Max waiting time (minutes):** This setting refers to the maximum amount of time the user should be relatively standstill e.g. waiting for a bus. If the user is found to be waiting longer than this time, a warning message will be shown to the users. Click on this item, and you can then set the number of your choice.
- **Max number of small route mistakes:** This setting refers to the maximum number of mistakes and route deviations when they are travelling. If the user makes more mistakes than this setting allows for, a warning message will be shown to the user. Click on this item, and you can set the number of your choice.



14 Home Navigation System (HNS) for pilot 2

The routes that you have created in the Route Creation app will be available in the Home Navigation System (HNS) on the computer. In HNS the primary user can rehearse the routes (by playing games) before he or she goes out to navigate. Learn more about this in the following instructional video: www.youtube.com/watch?v=BP7sO41OaV0.

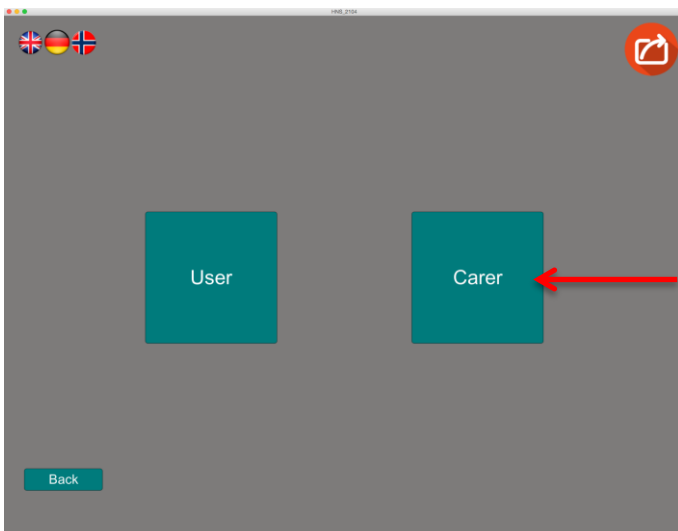
This user manual will show you how to edit the routes so that the primary user can play the games in HNS.

14.1 How to set direction for each decision point in a route

When you enter the HNS programme, click on the icon that shows a man walking.

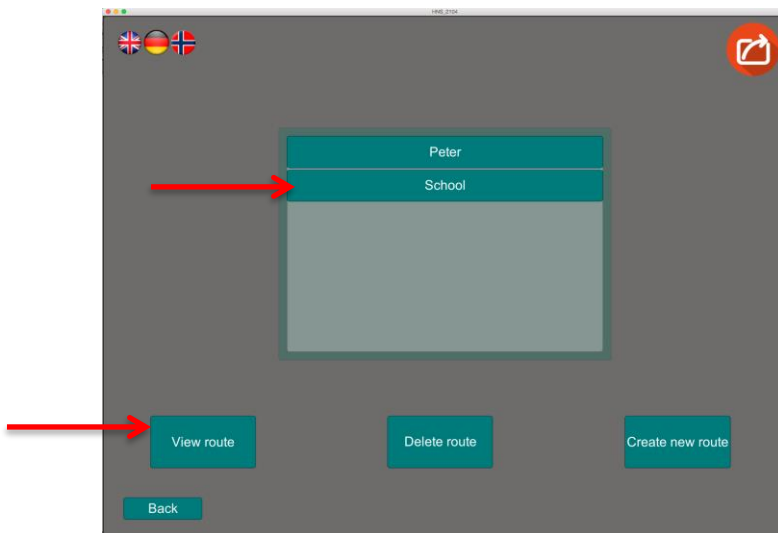


Then click on **Carer**.



The routes that you have made will appear in the field (in the screenshot below the routes are named `Peter` and `School`).

Click on the route that you want to edit, and click **View route**.



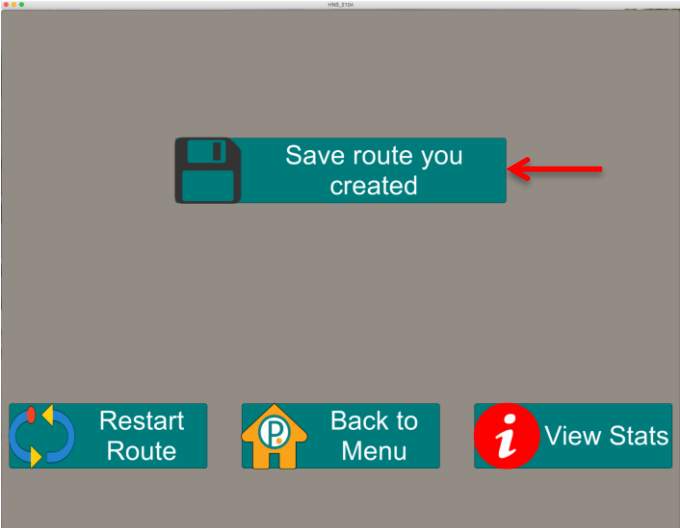
Now the first decision point of the route will appear – showing Google Street View in addition to the text and the photo that you added in the Route Creation app.

You can use the arrows on your keyboard to navigate 360 degrees. When the direction is correct (the direction that the primary user will follow), click on **Set direction**.



Click on the orange arrow to continue to the next decision point, and repeat the instructions above.

When you have gone through all of the decision points, this page will appear. Click on **Save route you created**. Now the route is ready to be rehearsed by the primary user.



15 POSEIDON – User Manual for social media

Social media is all about sharing, contributing and engaging your society.

In POSEIDON we have enabled functionality that gives each member of the POSEIDON community the possibility to engage, share and contribute to the community.

There are several opportunities for you to contribute and engage in the user community.

- 1) You could start a **discussion**, or get engaged in a discussion
- 2) You could write a **blog post**, and have this shared with everyone else, and to open up for a discussion based on your contribution
- 3) You could also create a **special group** within the POSEIDON community where you can share send direct messages that are only readable by the group or the individual you communicate with.

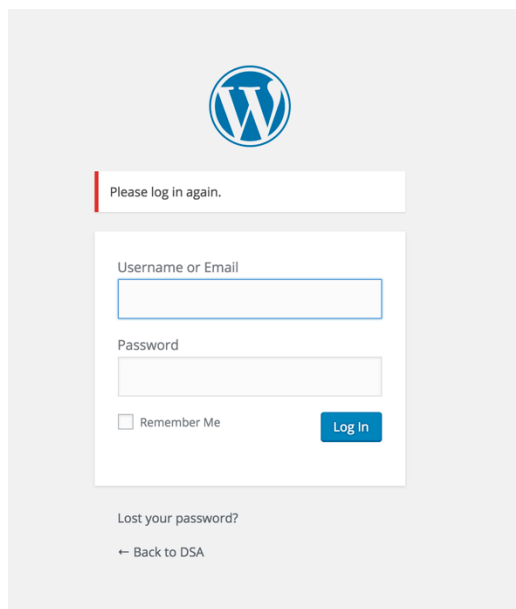
The POSEIDON community is a controlled community, meaning that only people who are members of Down associations around Europe are granted access and membership. In contrast to other social media sites such as Facebook, Instagram, Google+, LinkedIn, Twitter etc. we do not sell your information, we do not share or sell information about your content and your activities with anyone.

The POSEIDON social community is safe to use, and its success is depending on everyone's participation and engagement.

15.1 Usage of social media functionality

Log in

Before you start you need to log in. There is a separate menu-item you can click on to do that. When you click on the the "Login" link you get the following screen:



Then you need to enter your Username or the Email address you used to register, and enter your password before clicking the "Log in" blue button. If you mark the "Remember me" option you will automatically be logged in the next time you visit the POSEIDON-ecosystem site. If you can't remember

your password, you have to click on the “Lost your password?” link and follow the appropriate instructions.

The personal overview functionality

The POSEIDON-ecosystem web are in practice 3 different systems combined.

A web site for the DOW association to share and communicate information that are relevant and important for their community.

This information could come from another DOW association in Europe

Based on topics that are being discussed in the discussion forum it could identified a need for information on a topic, or some of the discussions could be amended into an article.

Information could also come from international research journals and other sources of information

A forum for discussions, where you could share your thoughts and ideas on anything you find relevant.

You can comment on discussions threads created by others

You can create new threads of discussions within a topic

You can create new topics that you would like to discuss

A personal communication site

Where you can share messages with other members of the POSEIDON-ecosystem

You can create groups with other members to share and discuss more private issues

You get an overview of your activities, comments and messages.

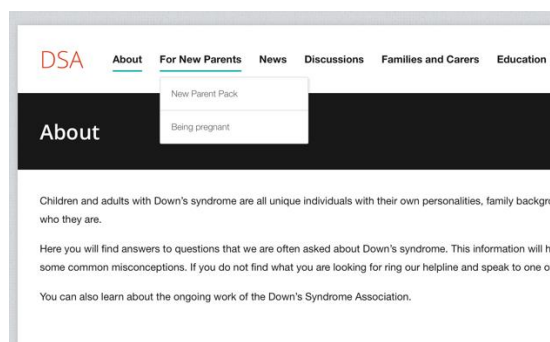
You can create groups and send messages to individuals who are member of other countries DOW associations.

The best way to learn this functionality and to understand how it works is by trying, and remember you cannot do anything wrong...

Only a few of the main components of the functionality will be explained in this document. If you know how to use FaceBook – the use of the POSEIDON-ecosystem will not be that different.

A web site

The POSEIDON ecosystem works as a normal web site, where the DOW association shares information of relevance. As can be seen in the illustration below.

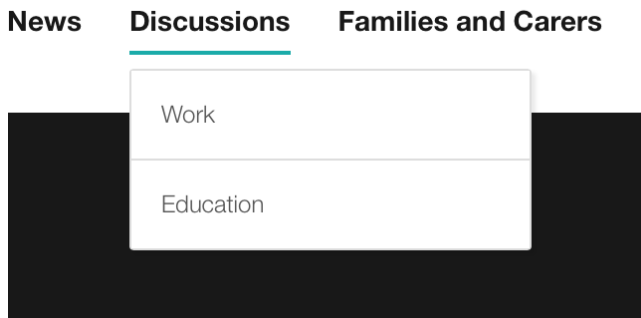


Discussions

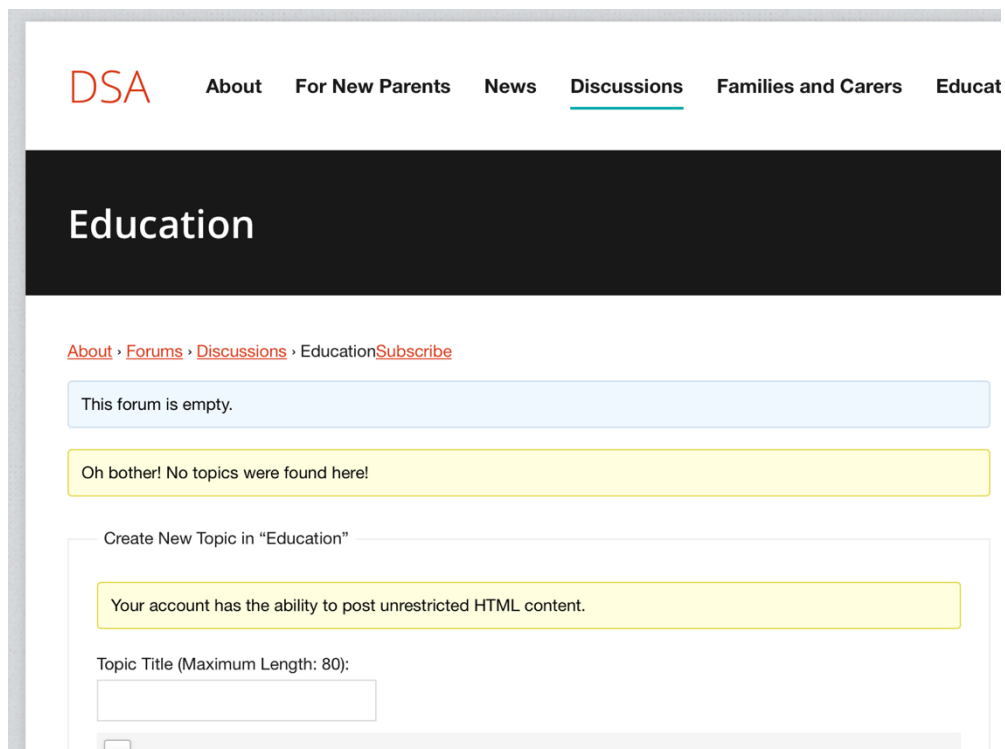
In the discussions area you can share and discuss anything of interest.

Different topics of discussions are organized in “domains” and if you would like to discuss a topic that is not within one of the domains available, you have to contact the administrator and ask for a new discussion domain (Forum) to be created. You will also note that discussions domains with no activity could be archived and removed from the active discussions area.

The discussions menu and discussion domains is seen in the illustration below.



When you click on e.g. Education you get the following illustration:



And since no-one has started to discuss anything about Education there is no treads or anything to see.

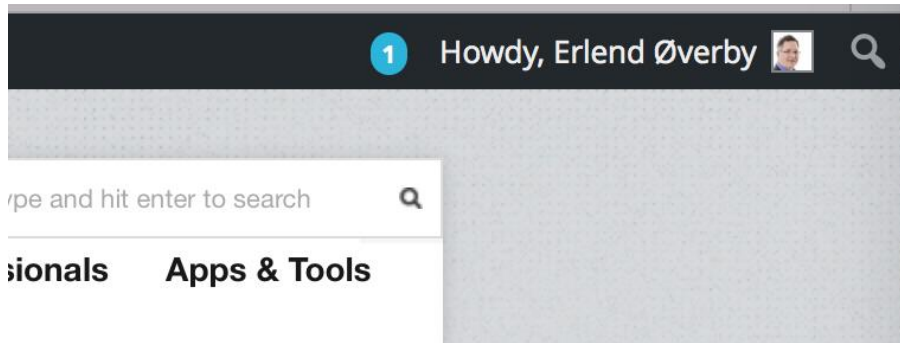
To create a new Topic, you have to write a new topic in the “Topic Title” text input field.

And below the area of grey “HTML³” tags that could be used you can write what you would like. You can also upload images to illustrate your point of topic that you would like to discuss with your peers.

To post your discussion topic you have to press the “Submit” button at the bottom of the page.

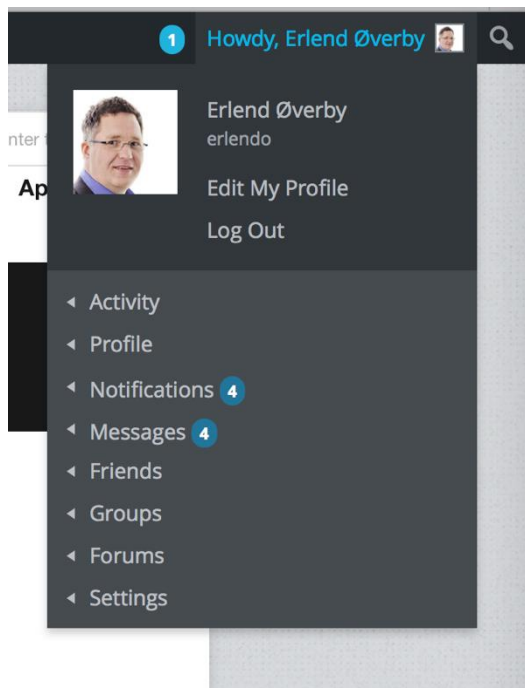
Personal communication

To share information with other individuals, or to create groups together with others you find this functionality at top right corner of your browser window, as seen in the illustration below.



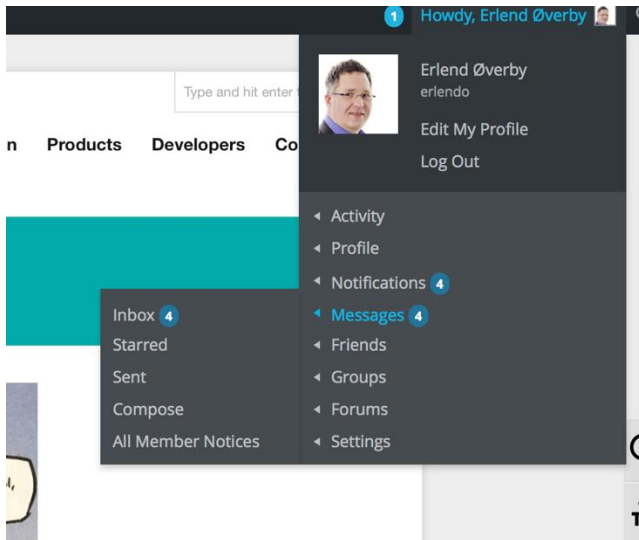
The number in blue indicates how much that have happened since you checked it out.

When you click on your name you get a drop-down menu with the different options, we will only explain a few of them here.



As we see in the menu I have 4 unread messages (and 4 Notifications that I have unread messages) When I move my mouse over “Messages” I get a new sub-menu for the choices that are relevant for my messages, as indicated in the illustration below:

³ HTML – Hyper Text Markup Language, codes that provides semantic and controls how information are presented in the web-browser.



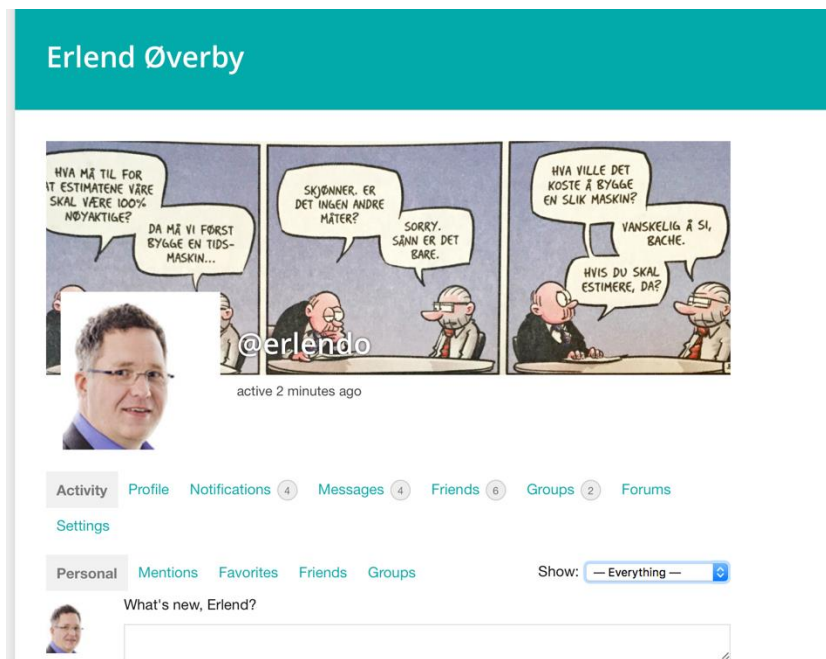
All options with an “arrow” to the left have similar sub-menus. If I had clicked on the Messages option without expanding the sub-menus, I would get to my-page with the Messages option chosen. If you click directly on the “Inbox” in the sub-menu you will be taken directly to the Messages page and to your Inbox there.

Your page

When you are on your page you will see that this can be customized, on my page I have chosen a cartoon as my background, you could choose any picture you like.

From your page you will have different menus for different actions you can take. Most of these are self-explanatory.

The more active you are in discussions, and in sharing and communication with others, you will see this activity reflected at your page.



You should explore all options, and try them out – remember you cannot do anything wrong.

What might cause confusion

When exploring “Your page” you will note that the menu has changed from your country site, this is because you have the opportunity to send a message to anyone in any DOW association in Europe that are a member of the POSEIDON-ecosystem. To get back to your country site, you just have to click on the “Country sites” menu option and choose your country. You will then be back at your discussions and familiar menus.

15.2 Pilot 2 participants

The people participating in the Pilot-2 project of the POSEIDON project will also find that they have a special menu item “Pilot-2” where they can discuss and share their views on activities related to the Pilot-2 testing, such as comments on the usability of the tools, the apps, what you would like to see, what is missing or whatever idea you have about the need for people with down syndrome and their carers on how technology could assist and provide a better day.

References

[1] Development framework, POSEIDON project D5.1.

[2] Tellu AS. Link: <http://www.tellu.no/>

[3] How to Implement Safe Sign-In via OAuth. Link: <http://devcenter.kinvey.com/html5/tutorials/how-to-implement-safe-signin-via-oauth>