SEVENTH FRAMEWORK PROGRAMME

FP7-ICT-2011-1.5 Networked Media and Search Systems
b) End-to-end Immersive and Interactive Media Technologies

Specific Targeted Research Project

VENTURI
(FP7-288238)

immersiVe ENhancemenT of User-woRld Interactions

D2.4.1 STE U8500-based Platform baseline delivery,
integrating existing AR framework

Due date of deliverable: 31-12-2011
Actual submission date: 23-12-2011

Start date of project: 01-10-2011
Duration: 36 months
## Summary of the document

<table>
<thead>
<tr>
<th>Document Code:</th>
<th>D2.4.1 “STE U8500-based Platform baseline delivery, integrating existing AR framework”</th>
</tr>
</thead>
<tbody>
<tr>
<td>Last modification:</td>
<td>December 21, 2011</td>
</tr>
<tr>
<td>State:</td>
<td>Ready for Submission</td>
</tr>
<tr>
<td>Participant Partner(s):</td>
<td>STE, ST-Italy, Metaio</td>
</tr>
<tr>
<td>Editor &amp; Authors (alphabetically):</td>
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<tr>
<td>Fragment:</td>
<td>No</td>
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<tr>
<td>Audience:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>☒ Restricted to other program participants</td>
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<td>Abstract:</td>
<td>This document describes D2.4.1 “STE U8500-based Platform baseline delivery, integrating existing AR framework”. It describes how to obtain, install and operate the existing U8500 based hardware and software platforms.</td>
</tr>
<tr>
<td>Keywords:</td>
<td>Software platform, Hardware platform, U8500, Augmented Reality framework</td>
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Executive Summary

Scope
This document describes how to obtain and operate existing U8500 hardware and software platforms as well as existing Augmented Reality framework.

Audience
This deliverable is restricted and it is addressed to all VENTURI partners. It is assumed that the readers of this document are skilled with Android SDK basics for mobile phones and tablets. For more information about Google’s Android SDK, please refer to the following link: http://developer.android.com/sdk/index.html

Summary
In this report all the necessary steps needed to setup the existing Augmented Reality platform are described. The report includes instructions for:

- Obtaining the ST-Ericsson U8500 reference hardware platform
- Obtain and install ST-Ericsson existing Android stack
- Operate Augmented Reality software stack

For further instructions, questions and help a dedicated wiki for has been setup at the following link: https://www.steerforge.com/wiki/index.php?group_id=197&pagename=WP2

Structure
This deliverable is structured as follows: Section 1 describes how to obtain the U8500 hardware platform from ST-Ericsson and gives a brief overview of it. Section 2 introduces the process for downloading the Android-based software platform from VENTURI servers. Section 3 describes Metaio’s Augmented Reality Framework.
1. U8500 hardware reference platform

Logistic information
In order to facilitate technical and logistical communications amongst VENTURI partners, a dedicated portal managed by ST-Italy and ST-Ericsson has been setup, with restricted access to VENTURI partners. At the following address:

https://www.steerforge.com/plugins/docman/?group_id=197&action=show&id=1465

An Excel sheet can be edited to inform ST-Ericsson about U8500 reference board delivery details, namely:

- Partner name
- Number of boards requested
- Shipment address #1
- Shipment address #2

ST-Ericsson provides partners with a shipment tracking number.

Platform overview
In order to provide a general platform understanding, this section gives a brief overview of the different elements that compose the hardware reference platform. This information, and those contained in the next sections, will be useful to flash the prebuilt Android image and to start to work with it. Figure 1 shows a global view of the VENTURI reference board running the provided Android based software image. This image, as explained in the next section, also includes the existing VENTURI AR framework. From Figure 1 the position of the external connector of the debug serial interface and the position of the camera can be inferred. The camera, shown in detail in Figure 2, can be both connected either as a front or as a rear camera using (or not using) the provided adapter. Finally, the VENTURI reference board is equipped with a 6x3 keyboard. A different function can be assigned to each key (with some keys currently being unused). Key assignments are illustrated in Figure 3.
Figure 4 shows the connectors and buttons available on the left and right sides of the VENTURI reference board. Most of them are self explanatory and few clarifications are needed. Starting from the left side, the HDMI connector can have a different shape on some boards and, in any case, it is not enabled in the provided prebuilt Android based software image. Still on the left side, the External keypad connector is not present on all VENTURI reference boards and finally, on the right side, the RJ45 Ethernet connector (if present) is in any case not enabled.

Figure 5 Rear side of VENTURI reference board
Figure 5 shows the rear side of the VENTURI reference board. The two RF connectors are not needed to run the provided prebuilt Android based software image whilst the “Charger connector” can be used to charge the board battery. For doing this, the provided 5Volts “mobile phone like” charger is needed, “Battery type selection” switches must be set according to the following configuration: 1=ON, 2=OFF, 3=OFF, 4=OFF and the battery must be connected on the back side of the VENTURI reference board, in the slot over the SIM reader. As an alternative to the battery, the board can also be powered directly by the provided 4Volts power supply. For doing this, the battery must be removed and the 4Volts power supply need to be plugged in to the connector that becomes, in this way, available on the back (see Figure 6).

![Figure 6 Battery/power supply slot on the back side of the VENTURI reference board](image)

**Figure 6** Battery/power supply slot on the back side of the VENTURI reference board

Finally, Figure 7 shows how the External connector to the debug serial interface must be plugged. Pay attention to the red wire orientation to avoid to short-circuiting the lines and damaging the board!

![Figure 7 External serial connector detail](image)

**Figure 7** External serial connector detail
2. Android software stack

The Android software stack is released as a pre-built image that is ready to be flashed onto the VENTURI reference boards. This image has been produced by ST by merging the original one provided by STEricsson with the VENTURI AR framework provided by Metaio. As a result, the final released image includes the existing VENTURI AR framework that, in this way, is automatically installed on the VENTURI reference boards without the need for the partners to manually install the Augmented Reality framework.

The above images, together with board flashing tools, are available at the following addresses:

https://www.steerforge.com/file/download.php/197/59/p47_r39/venturi-u9500_100-dv0.1_with_junaio_a

https://www.steerforge.com/file/download.php/197/60/p47_r39/venturi-u9500_100-dv0.1_with_junaio_b

https://www.steerforge.com/file/download.php/197/61/p47_r39/venturi-u9500_100-dv0.1_with_junaio_c

https://www.steerforge.com/file/download.php/197/62/p47_r39/venturi-u9500_100-dv0.1_with_junaio_d

https://www.steerforge.com/file/download.php/197/63/p47_r39/venturi-u9500_100-dv0.1_with_junaio_e

https://www.steerforge.com/file/download.php/197/64/p47_r39/venturi-u9500_100-dv0.1_with_junaio_f

The image is split into six chunks for the Steerforge hosting site due to file sizes limitations. Once downloaded, you need to re-join the above images using the following command (in Linux):

cat venturi-u9500_100-dv0.1_with_junaio_* > ste_u9500_100_android_u9500_defconfig_with_junaio.tgz

In order to install the image onto the VENTURI reference board, another external program named “Sign Server” is required. Its installer and instructions are contained in an archive available at the following address:


Each partner needs to download the above files and uncompress them. With these files, available and uncompressed, the steps needed to get a VENTURI reference board up and running can be summarised into the following two groups:

- Sign Server installation
- Pre-built image flashing

To illustrate these in more detail, in the next sections of this document, the folder in which the ste_u9500_100_android_u9500_defconfig_with_junaio.tgz archive is uncompressed will be indicated as `<image_folder>` and the folder in which the Sign_Server.tgz archive is uncompressed will be indicated as `<sign_folder>`.
2.1 Sign Server Installation

The pre-built image of the Android software stack needs to be signed with the sign keys provided before it can be installed onto a VENTURI reference board, the Sign Server tool is needed for this. Each partner needs to install it on a Windows machine. The installation can then be shared on a LAN and used by different partner’s clients.

Detailed instructions on the Sign Server Installation process and options can be found in the following document:

<sign_folder>/CD00293725_U8500_SignServer_Adm_Guide_Rev_2.pdf

For the partners’ convenience, the minimal steps required to obtain a working Sign Server installation are listed here:

- uncompress <sign_folder>/19003-LXA119409_SignServer_TargetCode_Rev_AE.zip in <sign_folder> folder
- launch <sign_folder>/19003-LXA119409_SignServer_TargetCode_Rev_AE/SignServer.exe
- choose the “Distributed server” option at the “kind of installation” prompt. This is recommended in order to be able to use the same installation from different clients on the same LAN. Obviously it will be possible to use the Sign Server also from the same machine on which it is really installed.

In the next dialog the user must insert the IP address of the machine onto which you are installing the Sign Server. The IP address can be retrieved in the following way:

Start → run → type “cmd” → <enter> → type “ipconfig” → <enter>.

The IP addresses for the different available network interfaces will be shown.

In the next dialog, the installation path for the Sign Server can be specified. This will be indicated in this document as <sign_installation_folder>. If possible, try to keep the default path.

In the next dialog the user must check/select the “Share signpackage folder” option and then click “Finish” to complete the installation.

After installation, the “sign keys” and the “sign packages” contained in the pre-built image of the Android software stack must be copied to the <sign_installation_folder>.

In more detail:

copy the entire content of

<image_folder>/ste_u9500_100_android_u9500_defconfig_with_junaio/signing/signkeys, to
<sign_installation_folder>/Platform Assistant/Server/SignKeys

and the entire content of

<image_folder>/ste_u9500_100(android_u9500_defconfig_with_junaio/signing/signpackages, to
<sign_installation_folder>/Platform Assistant/Server/SignPackages.

Finally, <sign_installation_folder>/Platform Assistant/Server/SignPackages must be shared so that it is accessible to the Sign Server tool and to the client that requires signing.
To do this:

**right click on** `<sign_installation_folder>/Platform Assistant/Server/SignPackages` →

Sharing and Security →

select “Sharing” tab →

enter “SignPKGs” as Share name →

click **Permission** and select “allow” for all groups (this step is strongly recommended so as to avoid permission problems) →

click **OK**.

Note: to be able to share `<sign_installation_folder>/Platform Assistant/Server/SignPackages`, **administration permissions** on the system might be needed.

At this point the installation is complete and the Sign Server can be launched in the following way:

Start →

Programs →

Platform Assistant →

Server.

Type “**p**” at the Sign Server prompt and press **<enter>**. Available Sign Packages should be listed. If not, something in the previous steps has gone wrong so the user should carefully check the Sign Packages And Signing Keys copy and sharing parts.
2.2 Pre-built image flashing

According to the previous instructions, the pre-built image of the Android software stack has been extracted to the <image_folder>. This folder contains the real binaries of the image and also the tools that interact with the sign server. Next, the image needs to be physically install on the VENTURI reference board. Detailed instructions on this installation process can be found in the following document:

<sign_folder>/U9500-100_User_Manual_DV0.pdf

Whilst the Sign Server must be run solely on a Windows machine, installation can be carried out under Windows or Linux. For partners’ convenience, minimal steps to obtain a working installation on a VENTURI reference board have been summarized in the following paragraphs.

The first step consists of setting up various ‘environment variables’ that point to the Sign Server installation (see previous section for details).

**Under Windows:**

Control panel ->

system ->

Advanced tab ->

environment variables ->

Set a new “user variables” named “SIGNSERVER” to the value “<sign server ip number>:<sign server port>”

**Under Linux:**

export SIGNSERVER=<sign server ip number>:<sign server port>

export SIGNPACKAGEROOT=<mount point>

*Note: In Linux, it is strongly recommended to work as “root” to avoid tricky permission problems with the USB stack.*

The Second step is different for Windows and Linux systems:

**Under Windows:**

Install the USB-drivers located in <image folder>/flashkit/windows-usb-driver.

See detailed install_instructions.txt for instructions located in the same directory under installer.

**Under Linux:**

mount.cifs //<sign server ip number>/SignPKGs <mount point> -o user='\<windows login username>':pass=<windows login password> dom=<windows domain>
Next, attach the VENTURI reference board to the power supply and turn it off.

Go to `<image folder>/ste_u9500_100_android_u9500_defconfig_with_junaio` and launch

**under Windows**

`.\flasher.bat -t <target-hw> -e -c`

**under Linux**

`.\flasher -t <target-hw> -e -c`

where `<target-hw>` is “hrefp_v20_v7x_db9500b0_secst_1ghz” for HREFP_V2.0_V72, HREFP_V2.1_V10 for 9500-100 RSTEP1_V2.2_V10 boards

When prompted, connect the board to the PC with the provided USB cable. The board should turn on automatically and the installation procedure should start. You must wait for the completion message.
3. Augmented Reality framework

The existing junaio AR framework for the initial phase of VENTURI is provided in the form of the currently available version 3.1.1 for Android. It supports Android OS 2.1 or higher. ST-Italy has included the available version inside the pre-built firmware image originally provided by ST-Ericsson. In this way, the Junaio AR framework is automatically installed onto the VENTURI references boards.

Junaio offers a free, web-based API that enables developers to create exciting Augmented Reality experiences. Junaio not only supports Location-based Augmented Reality, but also image-based tracking. Within junaio, information is organized into channels, e.g. a location-based provision of Wikipedia content is available in the ‘Wikipedia Channel’.

Each partner will need to register as a developer on the junaio website http://www.junaio.com. Registration is free, whether they are creating or publishing a channel. Prior to publishing a channel, the channel is not visible to other junaio users in the general search. However, it is visible to the developer’s account (i.e. the developer logs into junaio on the device with their developer account) in order to enable testing directly on the device. Also, if the VENTURI partners wish to share channels amongst themselves, whilst keeping them non-public during development, a direct access to the channel from other accounts is also possible by using a specific QR code.

Quickstarts and extensive tutorials are available at http://www.junaio.com/develop/quickstart as well as a listing of additional tools: http://www.junaio.com/develop/tools/. In addition, exchanges with other developers is encouraged in the junaio AR platform developer forum http://groups.google.com/group/junaio-developer?pli=1.

In Q1 2012, an additional basic stand-alone offline AR application will be also provided to the partners by metaio as a back-up solution for conference presentations or alike. It will contain image-based tracking and it will enable the displaying of content which is stored locally on the device.