Ecosystem infrastructure for smart and personalised inclusion
and PROSPERITY for ALL stakeholders

Runtime Environment Final Prototype

ANNEX III: Runtime Environment Setup Manual

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2	06/07/2016	Daniel Zeigler	FHG	MyUI setup instructions
3	06/07/2016	Marios Komodromos	UCY	GPII instructions
4	29/07/2016	Christos Mettouris, Marios Komodromos	UCY	Quickstart Guide, final improvements, Screenshots

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Executive Summary

This document servers as the Integrated Runtime Environment Setup and Installation Manual (related to D203.1, Task 203.3, WP203). The manual describes thoroughly any prerequisites for installation, as well as the S/W and H/W installation steps needed to successfully install and configure the Integrated Runtime Environment. It also provides a few examples to ensure proper installation.

1 Introduction

The main goal of the task **T203.3 Runtime Environment Prototype**, is to achieve a scalable and extensible integration of the three platforms (AsTeRICS ARE, URC, MyUI) in order to produce a multiplatform environment which will "harvest" the benefits of each platform. To fully understand the added value of the resulting solution, a basic knowledge of each platform is required. A brief description of AsTeRICS, URC and MyUI can be found below:

- AsTeRICS: Assistive Technology Rapid Integration & Construction Set
  The "Assistive Technology Rapid Integration and Construction Set" (AsTeRICS) offers a flexible framework for Assistive Technologies (AT), which can be adapted to the motor abilities of users.
- URC: Universal Remote Console
  The overall purpose of the URC framework (standardized in ISO/IEC 24752) is to provide a mechanism, enabling users to control any target with any controller devices fitting best the user's needs
- MyUI: Framework for model-based adaptive user interfaces
  MyUI provides an environment to render and adapt a user interface to the user context during runtime.

Furthermore, the GPII framework was used as the basic infrastructure for better and centralized coordination of the three platforms through the identification of the users via NFC (Near Field Communication) technology and adaptation to their needs and preferences.

More detailed descriptions of the three platforms can be found in D203.1 Runtime Environment Final Prototype.

2 Prerequisites

1) Windows OS
2) 32-bit Java SE Development Kit (8 or above)
3) Web camera
4) Web browser (Chrome Version 45 or above for MyUI)

Software installation

To test or use the complete solution, the following platforms should be installed and configured appropriately:

1) AsTeRICS
2) URC
3) MyUI
4) GPII

Before going through the setup instructions, it is required to:

- download the content from this link: https://github.com/mariokom/RuntimeEnvironment
- extract the contents of the folder to a preferred location
- **Important:** let <`REFolderPath`> be this location, it may be needed later on

For a **Quickstart Guide** please see section 3.

Section 4 includes more detailed steps on how to setup and configure the Integrated Runtime Environment.

3 Quickstart Guide

- **Step 1:** By default, AsTeRICS is configured to communicate with UCH on the same machine (localhost). If there is a need for UCH to run on a different machine, please see Section 4, otherwise no further actions are required: the AsTeRICS files are precompiled and preconfigured.
- **Step 2:** Install GPII by using the installer to be found here: '<**REFolderPath**>`/GPII/GPII.160119.044327.msi`'
- **Step 3:** Run (double click) the '<**REFolderPath**>`/auto-conf.bat`' file with administrator privileges (right click on the file → Run as administrator). The execution of this file will automatically clone MyUI in order to be hosted by the UCH server, as well as configure the GPII framework. The execution window will prompt the user to enter the GPII installation folder path (the default GPII installation folder path will be similar or identical to '`C:\Program Files (x86)\GPII`'). If any errors occur during the execution of the file, if you do not have administrator privileges or if you are running a windows version older than Windows 7 it is recommended to substitute this step (Step 3) by following the instructions in:
    - 4.3, **Installation section**
    - 4.4, **Configuration section**

To test that everything was installed and configured correctly, you can do the following:

1) Start GPII by executing the file located at <**GPIIRootFolder**>`/start.cmd`.
2) Notify GPII that a specific persona was logged in by visiting this URI in the browser: '`localhost:8081/user/nicholas/login`'
3) The GPII will automatically start the three applications (AsTeRICS, MyUI, UCH).
    - AsTeRICS should take control of the mouse.
    - MyUI should appear on your screen, in chrome browser.
    - UCH should run on the background, ready to interact with AsTeRICS or MyUI and control the targeted devices or applications.
4) You may proceed by following Step 4 of the Head-ColouredLightBulb and WoehlkeWebsteckdose electricity outlet demo described in Sections 5.1 and 5.2
5) Close the program by logging out the persona by visiting the URI: '`localhost:8081/user/nicholas/logout`'
6) Close GPII.

4 Setup

4.1 Install and configure AsTeRICS

Installation & Configuration:

No further actions required. The AsTeRICS files are precompiled and preconfigured.

Configuration regarding AsTeRICS – UCH communication (to run on different machines)

By default, AsTeRICS is configured to communicate with UCH on the same machine (localhost). **If there is a need for UCH to run on a different machine, please follow the next steps:**

To run UCH on a different machine than AsTeRICS, we need to change the `'Head-ColouredLightBulb.acs'` model via the AsTeRICS Configuration Suite (ACS) tool. To do so, we should navigate to `'<`**`REFolderPath`**`>/AsTeRICS'` folder and run the `'start_ARE.bat'` file. Then open the ACS folder and run the 'ACS.exe' file. Wait for both programs to start and follow the steps below:

1) Click the `'Connect To ARE'` button in the ACS window.

2) Click the `'Download Component Collection'` button and wait until a confirmation window appears which declares that a new component collection was installed.

3) Click the `'Load Model from Storage'` button.

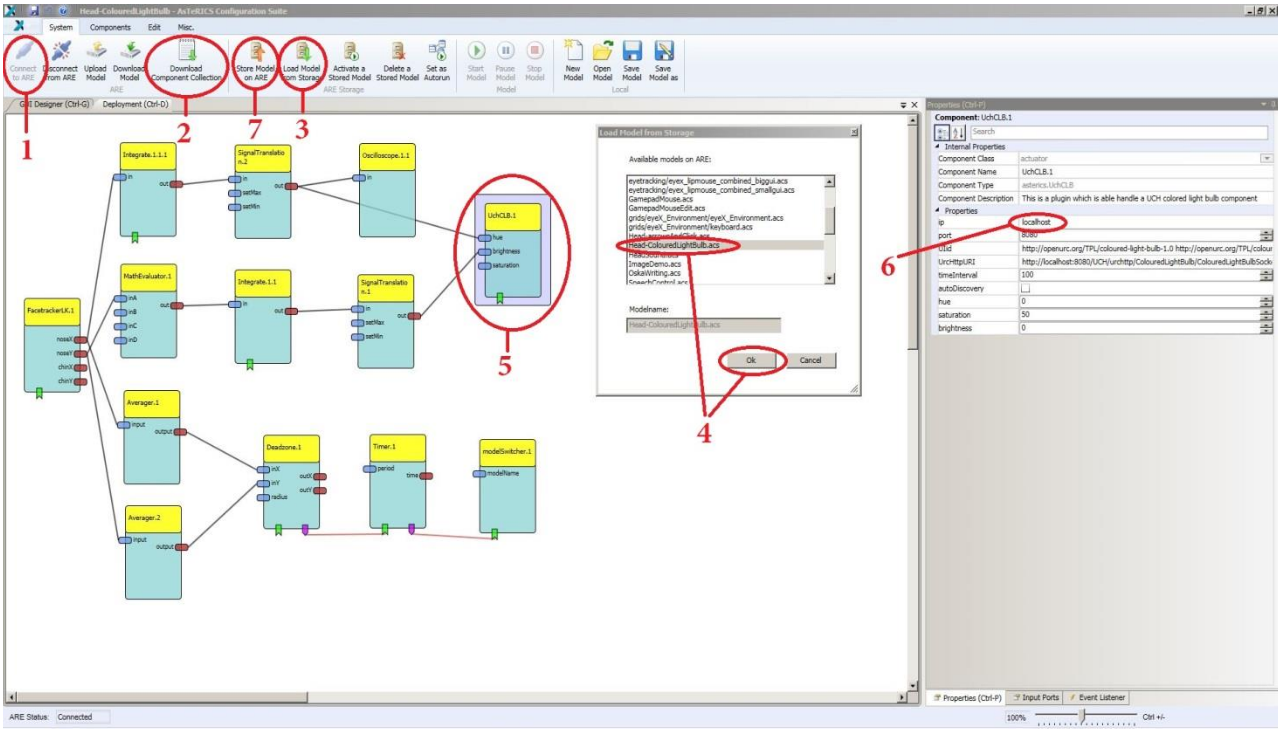
4) In the window that will appear, locate and click the `'Head-ColouredLightBulb.acs'` model. Click the `'ok'` button.

5) You should now see the components contained in the model. Locate the UchCLB component (it should be on the top-right corner) and select it.

6) In the right panel, you should see the configurable parameters of this component. Change the `'ip'` parameter to the ip address of the machine where the URC will be running on.

7) Click on the `'Store Model on ARE'` button. Click OK.

8) Close ACS and ARE.



Load Model from Storage

Available models on ARE:

eyetracking/eyex_lipmouse_combined_biggui.acs
eyetracking/eyex_lipmouse_combined_smallgui.acs
GamepadMouse.acs
GamepadMouseEdit.acs
grids/eyeX_Environment/eyeX_Environment.acs
grids/eyeX_Environment/keyboard.acs
Head-arrowAndClick.acs
Head-ColouredLightBulb.acs
HeadSound.acs
ImageDemo.acs
OskaWriting.acs
SpeechControl.acs

Modelname: Head-ColouredLightBulb.acs

Ok Cancel

Component: UchCLB.1

Internal Properties

Component Class	actuator
Component Name	UchCLB.1
Component Type	asterics.UchCLB
Component Description	This is a plugin which is able handle a UCH colored light bulb component

Properties

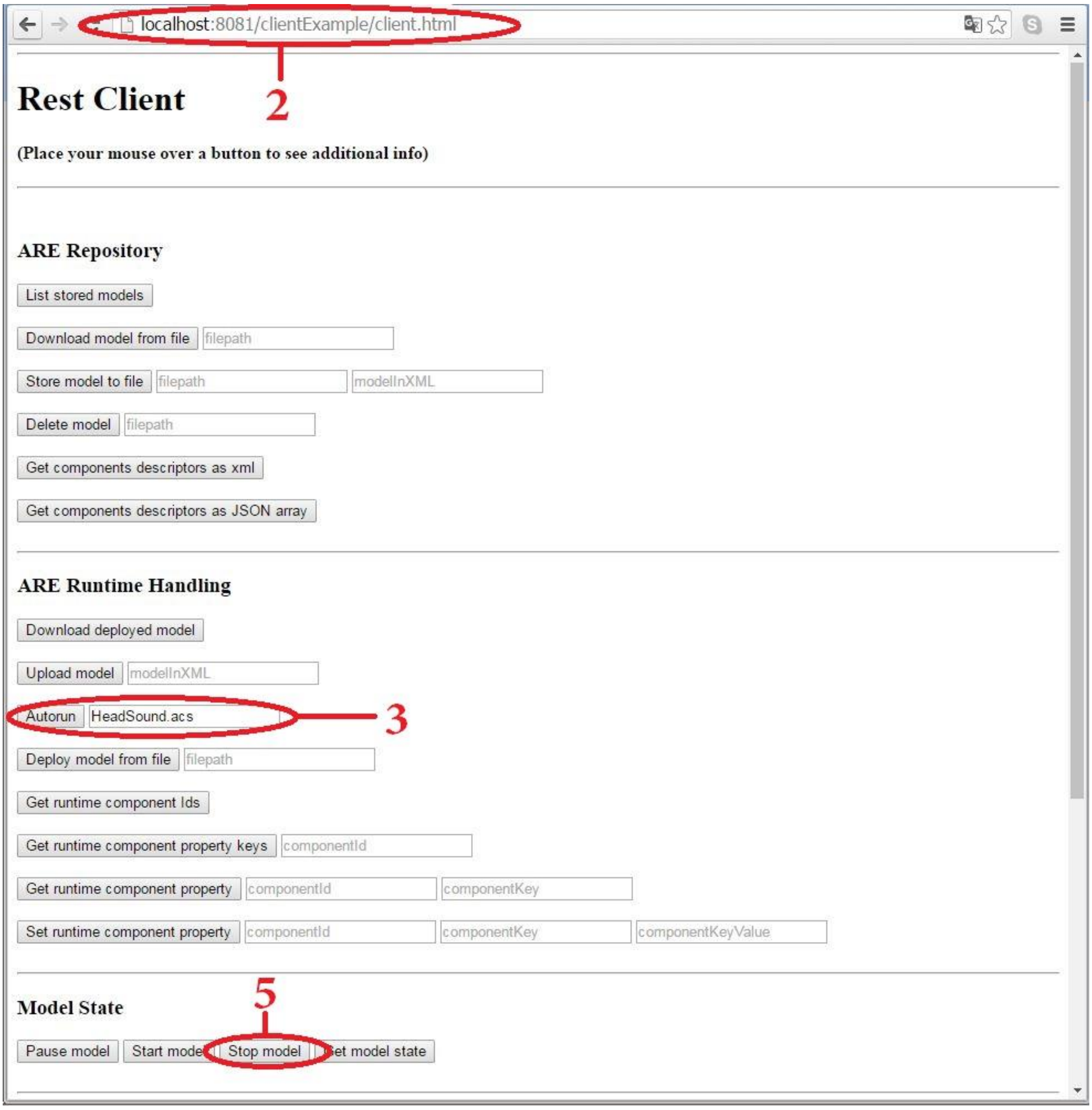
ip	localhost
port	8080
UIid	http://openurc.org/TPL/coloured-light-bulb-1.0 http://openurc.org/TPL/colour
UrcHttpURI	http://localhost:8080/UCH/urchttp/ColouredLightBulb/ColouredLightBulbSock
timeInterval	100
autoDiscovery	□
hue	0
saturation	50
brightness	0

Figure 1: Steps to change UCH component IP address in AsTeRICS

Testing:

You can test that AsTeRICS was installed successfully using a web client. Follow the steps below to do so:

1) Run the `'start_ARE.bat'` file located in the `'<`**`REFolderPath`**`>/AsTeRICS'` folder.
2) Open a browser and visit: `'http://localhost:8085/clientExample/client.html'`.
3) In the `'ARE Runtime Handling'` section, type `'HeadSound.acs'` in the text field next to `'Autorun'` button. Click the `'Autorun'` button.
4) Now we should notice that the ARE GUI was changed and we are also able to produce sounds with head movements!
5) Stop the model by clicking on the `'Stop model'` button, in the `'Model State'` section
6) Close the ARE.



localhost:8081/clientExample/client.html

Rest Client

(Place your mouse over a button to see additional info)

ARE Repository

ARE Runtime Handling

Autorun HeadSound.acs

Deploy model from file
filepath
Get runtime component Ids
Get runtime component property keys
componentId
Get runtime component property
componentId
componentKey
Set runtime component property
componentId
componentKey
componentKeyValue

Model State

Figure 2: Steps to test AsTeRICS installation

4.2 Install and configure URC

Installation:

No further actions required. The URC is precompiled and preconfigured. It can be deployed anywhere in your network. A Java Runtime environment 1.8. is required to run the UCH.

Configuration:

The UCH is preconfigured to run all related use cases. Still, if it is necessary to change some settings (e.g. the port number), open the `config.xml` file that is located in the bin folder of your UCH installation: `‘<`**`REFolderPath`**`>/UCH’`. If it is not there, start the UCH by running the 'startUCH.bat' file in '<**REFolderPath**>/UCH'. By doing so, a new standard configuration file will be generated.

Testing:

To test the URC server, a simulation page was created that when accessed it depicts the values of the URC remote sensors/actuators. To run the Philips HUE Coloured Light Bulb example:

1. Go to '<**REFolderPath**>/UCH' folder and run the 'startUCH.bat' file
2. Open a browser and go to: http://localhost:8080/UCH/Webclient/index.html
3. Click on the ColouredLightBulb link
4. The appeared UI is used to display the real time values of the URC remote actuator (the Philips HUE light)

In case the browser and the UCH are located on two different machines, we need to replace 'localhost' with the IP address of the UCH. If bonjour is installed, we can also replace 'localhost' by 'uch.local'.

In order to check all connected targets, point your browser to http://localhost:8080/UCH and click on 'More information on the UCH software (including help for more complex configurations'. Then, click on "Webclient index:" we should now see a list with different connected targets. You can click on them to get a simple, tabular user interface to control them.

4.2.1 Installation of Philips Hue

Installation:

Important: The Philips Hue Bridge needs to be connected to a router with internet access. Please make sure that the PC/laptop that runs UCH is connected via Ethernet to the router that is also connected to the Philips Hue Bridge. The router enables a LAN. It is also mandatory that it is connected to the internet as UCH needs internet access.

UCH ships with all modules that are required to connect to a Philips Hue bridge:

1. Connect the Philips Hue bridge to your network (as explained above) and switch it on
2. Point your browser to http://localhost:8080/UCH/Webclient/index.html and select 'Philips Hue Configuration Manager'
3. Click on 'Discover new Philips Hue Bridge: **we need to confirm the discovery process at the Philips Hue Bridge by pushing the button on the top**
4. New Philips Hue bulbs get visible at the Webclient Index Page at http://localhost:8080/UCH/Webclient/index.html

The above process is to be executed only the first time a new bridge is connected to the network. UCH stores all information in order to automatically connect to it in the future.

Important: To run the scenarios in section 5, we need to make sure that the 'Head-ColouredLightBulb.acs' AsTeRICS model uses the same Philips Hue Bulb that is actually in use, i.e. the one we have just set-up with UCH above.

After making sure that the New Philips Hue bulbs are visible at the Webclient Index Page at http://localhost:8080/UCH/Webclient/index.html (step 4 above), please note down **the name of the one that is currently active** (the one AsTeRICS will need to access). Then go to http://localhost:8080/UCH/interfacelist/index.html, click on *"More information on the UCH software"* and then on the UIList link. In the retrieved XML file (http://localhost:8080/UCH/GetCompatibleUIs) search for the name of the active Philips Hue bulb and **note down the uiID field (copy the whole thing)**. This uiID should be the same as the UIid of the UchCLB component of the 'Head-ColouredLightBulb.acs' AsTeRICS model. To check whether this applies, please follow the process of section 4.1 on how "To run UCH on a different machine", but instead of changing the 'ip' parameter of the UchCLB component, change the UIid parameter to the correct one you have noted down. Don't forget to click on the 'Store Model on ARE' button, select the 'Head-ColouredLightBulb.acs' and then click OK.

4.3 Install and configure MyUI

Note: You can run (double click) the '<**REFolderPath**>/auto-conf.bat' file to automatically clone MyUI, as well as configure the GPII (see section 3 – step 3). If '<**REFolderPath**>/auto-conf.bat' file was executed, you can skip **MyUI installation sub-section**.

Installation:

Copy the folder '<**REFolderPath**>/MyUI' into a subdirectory served by your UCH installation: '<**REFolderPath**>/UCH/bin/Webclient/'.

Configuration:

If you did not change the configuration of AsTeRICS, MyUI is already configured to work with it. If your ARE is running at a URI different from 'http://localhost:8085/' you need to change the value of the areURI variable in line 7 of '<**REFolderPath**>/MyUI/src/myui-app.js' accordingly.

Testing:

Important: To test MyUI, the URC system needs to be up and running (Section 2.2.2).

Open an instance of the Google Chrome web browser (Version 45 or above) to 'http://localhost:8080/UCH/Webclient/myui/index.html' or the appropriate location if you have used another target directory in the installation step. This should result in a user interface similar to the Figure 3.

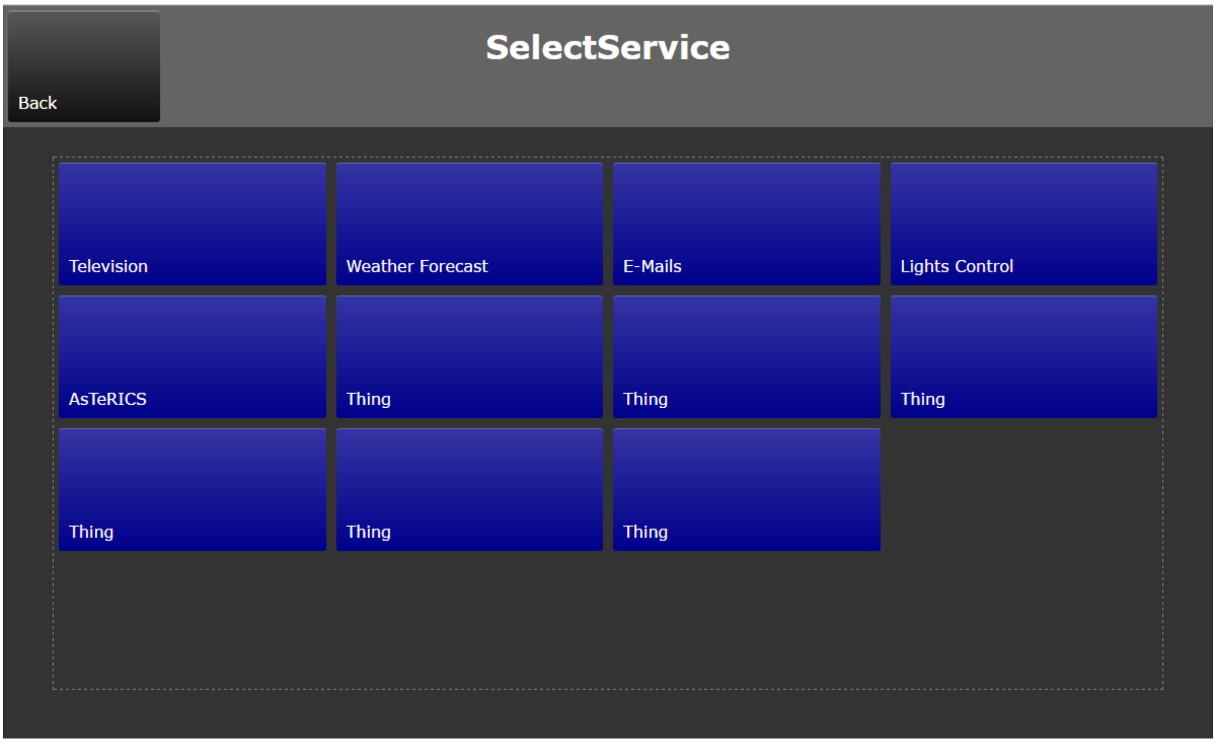


Figure 3: The user interface presented by the MyUI Runtime

4.4 Install and configure GPII

Note: You can run (double click) the `'<`**`REFolderPath`**`>/auto-conf.bat'` file to automatically clone MyUI and configure GPII (see section 3 – step 3). If `'<`**`REFolderPath`**`>/auto-conf.bat'` file was executed, you can skip **GPII configuration sub-section**.

Installation:

To install GPII use the installer to be found here:
'<**REFolderPath**>/GPII/GPII.160119.044327.msi'

Configuration:

To configure the GPII framework for the T203.3 task, you need to change specific files in the location where the GPII was installed. Let <**GPIIRootFolder**> be the path of the root folder where GPII was installed (the default installation path should be 'C:\Program Files (x86)\GPII'). See below for the required changes:

1) Before copying the file for this step, it is required to make some modification to its contents:

   Copy the actual Runtime Environment root folder path to a document (eg notepad).

   Replace single backslashes with double backslashes. For example:
   `C:\path\to\folder` → `C:\\path\\to\\folder`

Go to <**REFolderPath**>`/GPII/win32.json`

Replace the '<rootFolderPath>' occurrences in this file with the edited path.

After the modifications are done, replace the file located in:
<GPIIRootFolder>`/node_modules/universal/testData/solutions/win32.json`
with the file located in:
<REFolderPath>`/GPII/win32.json`

2) Replace the file located in:
<**GPIIRootFolder**>`/node_modules/universal/testData/deviceReporter/installedSolutions.json`
with the file located in:
<**REFolderPath**>`/GPII/installedSolutions.json`
3) Replace the file located in:
<**GPIIRootFolder**>/node_modules/universal/testData/ontologies/ISO24751-flat.json
with the file located in:
<**REFolderPath**>`/GPII/ISO24751-flat.json`
4) Copy these files:
<**REFolderPath**>`/GPII/nicholas.json`
<**REFolderPath**>`/GPII/mr_moroz.json`
<**REFolderPath**>`/GPII/ms_moroz.json`
and paste them to the folder:
<**GPIIRootFolder**>/node_modules/universal/testData/preferences

Testing:

To test that everything was installed and configured correctly, execute the following steps:

1) Start GPII by executing the file located at <**GPIIRootFolder**>`/start.cmd`.
2) Notify GPII that a specific persona was logged in by visiting this URI in the browser: `'localhost:8081/user/mary/login'`
3) The on screen keyboard program should appear on the screen.
4) Close the program by logging out the persona, by visiting the URI: `'localhost:8081/user/mary/logout'`
5) Close GPII.

NFC Configuration:

To use NFC identification for the personas of the scenario, an NFC reader and three NFC tags are required. For our purposes we have used and ACR122U NFC Reader for PC and NFC tags operating in the standard radio frequency of 13.56 MHz.

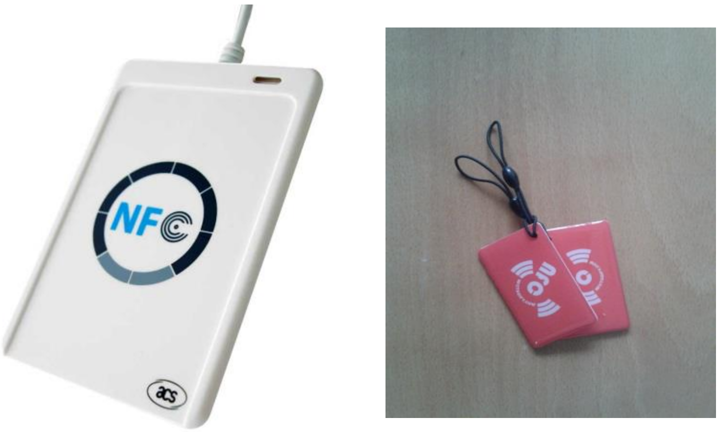
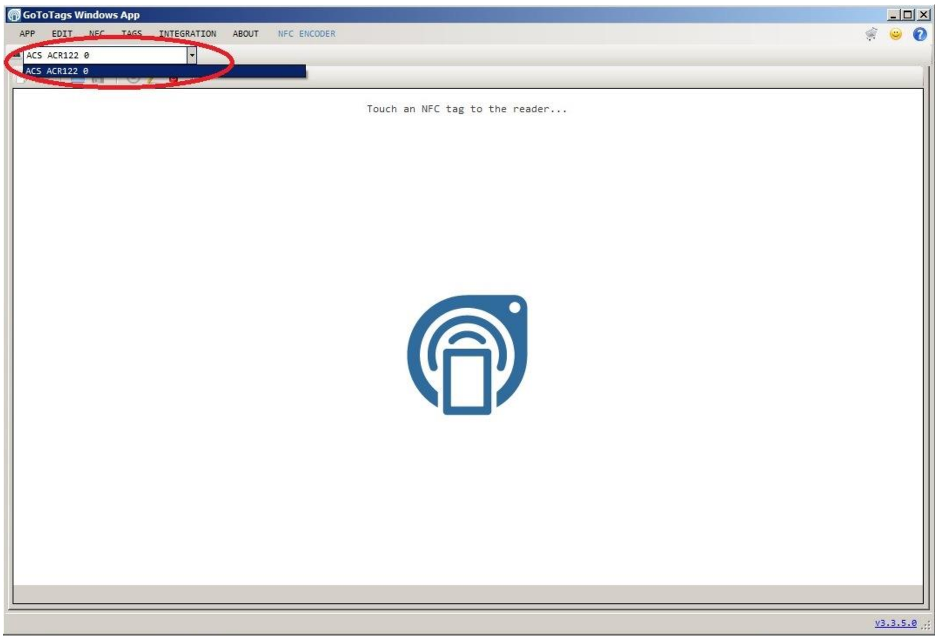


Figure 4: NFC reader and NFC tag

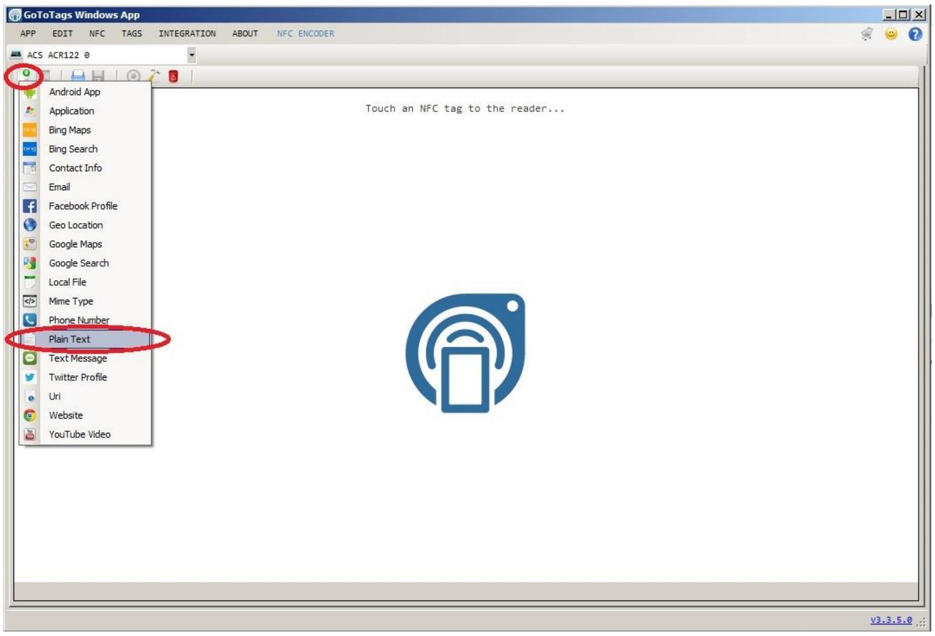
1) Download and install GoToTags windows application (Download link: https://gototags.com/products/windows-app/)
   Any other program capable of controlling an NFC reader and writing to an NFC tags will do.
2) Plug-in the NFC reader device. Give the operating system a few minutes to identify the device. In case the system is unable to automatically identify and download the drivers, please find them in: “<**REFolderPath**>/GPII/NFCDrivers”
3) Open GoToTags application.
4) Select the NFC reader



Touch an NFC tag to the reader...

Figure 5: NFC Setup

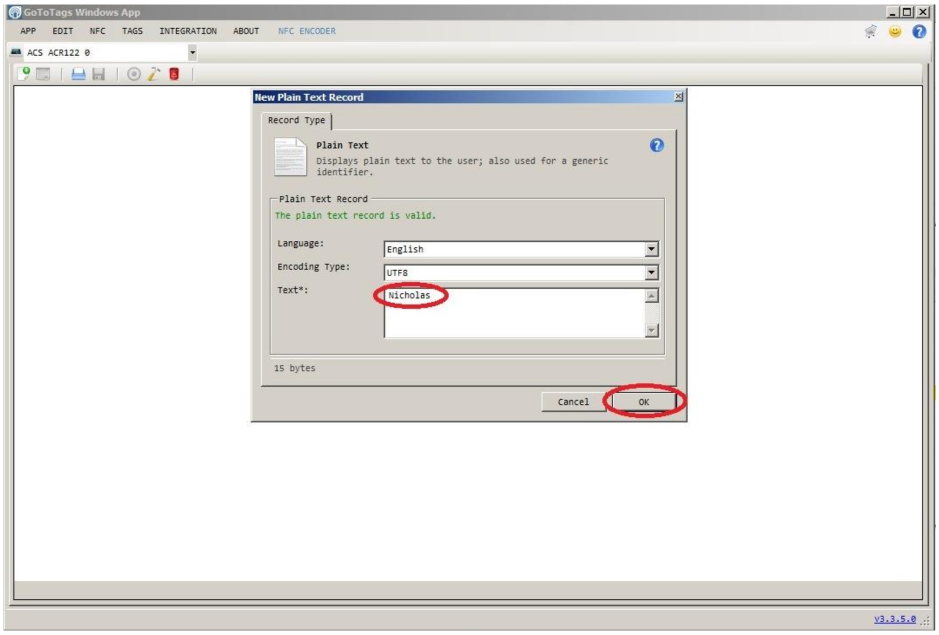
5) Click on the ‘`Add new record`’ button (top left corner) and select the ‘`Plain Text`’ type



Touch an NFC tag to the reader...

Figure 6: NFC Setup

6) A new window should appear. In the ‘`Text`’ field, write the name ‘`Nicholas`’ (the name of one of the three personas we are going to use). Press the OK button.



New Plain Text Record

Record Type

Plain Text
Displays plain text to the user; also used for a generic identifier.

Plain Text Record
The plain text record is valid.

Language: English

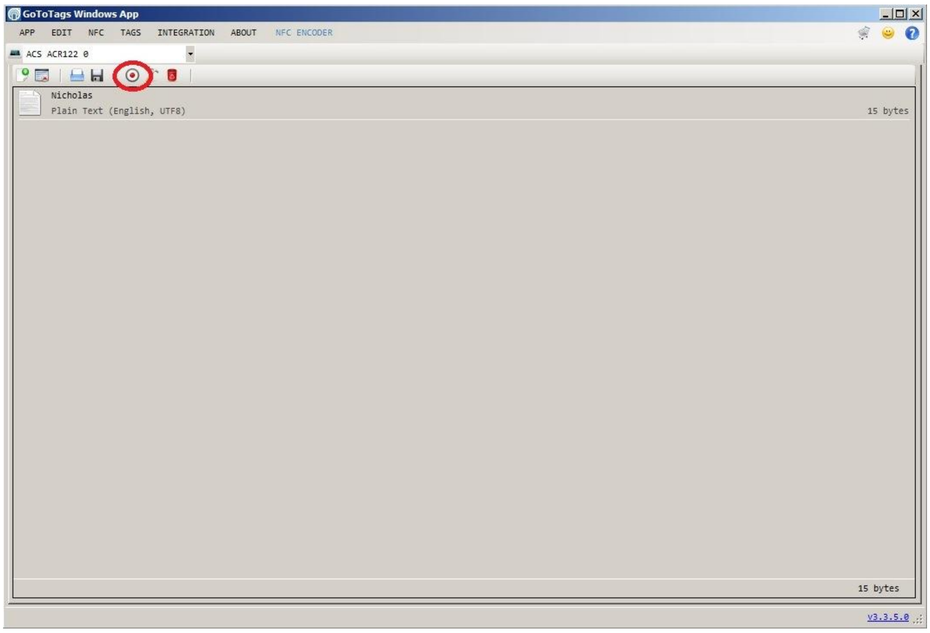
Encoding Type: UTF8

Text*: Nicholas

15 bytes

Figure 7: NFC Setup

7) Click on the ‘`Encode NFC tags`’ button.

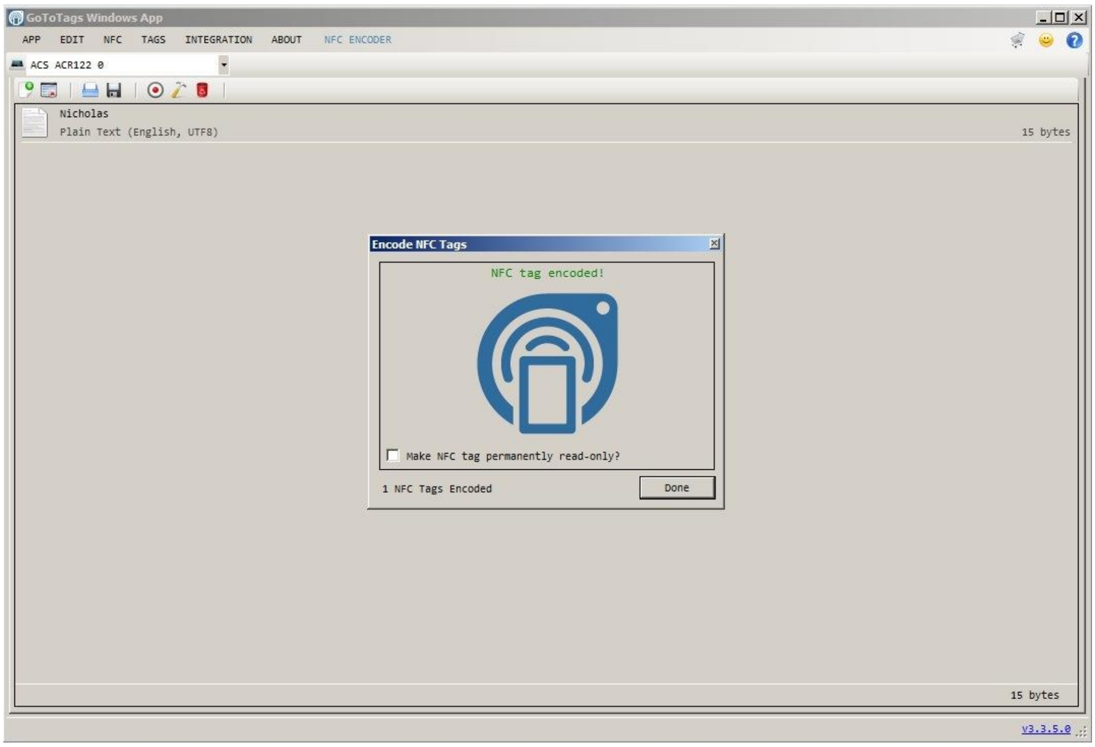


Nicholas
Plain Text (English, UTF8) 15 bytes

15 bytes

Figure 8: NFC Setup

8) The application is now waiting for an NFC tag to write on. Move an NFC tag near the NFC reader. Hold it there for some seconds until a sound is heard that indicates that the "write" process was completed.



Nicholas
Plain Text (English, UTF8)
15 bytes

NFC tag encoded!

□ Make NFC tag permanently read-only?

1 NFC Tags Encoded

15 bytes

Figure 9: NFC Setup

9) Repeat steps 5 to 9 two more times, replacing the name 'Nicholas' with the name 'Mr_Moroz' and 'Ms_Moroz'.

10) Close GoToTags.

4.5 GPII & MyUI User Preferences

We may change the user needs and preferences used by GPII and MyUI. Navigate to <**GPIIRootFolder**>/node_modules/universal/testData/preferences and open the json file of the persona you need to change, e.g. nicholas.json. You may change the maxElementsPerScreen that handles the number of elements the user sees on screen, as well as the bodyTextFontSize which corresponds to the desired font size.

5 Test the integrated system

To test the integrated runtime environment, follow the steps below:

1) Start GPII.
2) If you have configured NFC:
   - Connect the NFC reader device to the PC
   - Locate and run '`Start RFID listener`' file (installed with GPII)
   - Move an NFC tag near the NFC reader

   If you have not configured NFC:
   - Open a web browser
   - Visit the url http://localhost:8081/user/ms_moroz/login
3) The GPII will automatically start the three applications (AsTeRICS, MyUI, UCH).
   - AsTeRICS should take control of the mouse via head movement. Keeping still for four seconds over something selects it.
   - MyUI should appear on your screen, in chrome browser.
   - UCH should run on the background, ready to interact with AsTeRICS or MyUI and control the targeted devices or applications.

To use the Philips HUE Lights please follow the set-up process in Section 4.2.1.

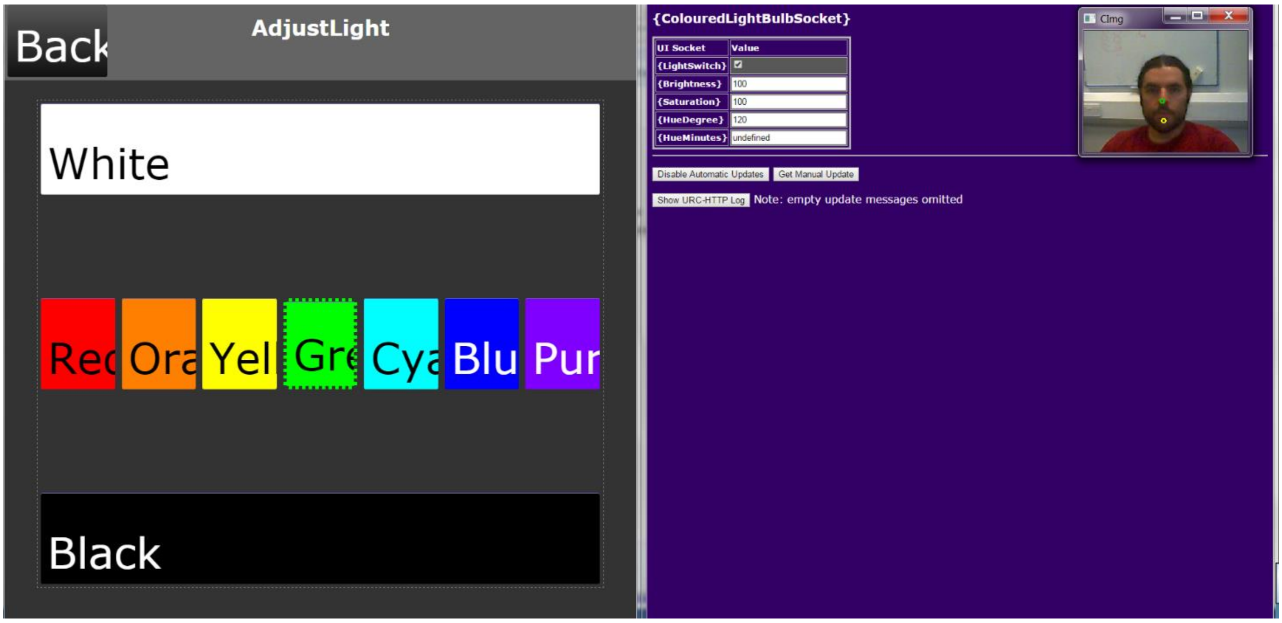
Proceed with Sections 5.1 and 5.2

5.1 ARE → MyUI → URC

4) **a. To run the Philips HUE Lights example:** Go to the browser (MyUI) and click on the '`Lights Control`' button and then on the '`ColouredLightBulb`'. In the appeared interface there are multiple buttons which can change the colour of the lamp.
   - If you have connected the actual coloured light bulb (H/W), you should see the light changes in colour.
   - If not, you can observe the changes in the emulator by visiting the url: http://localhost:8080/UCH/Webclient/index.html and selecting the coloured light bulb from the list (see Figure 10).

   b. To run the electricity outlet example: Go to the browser (MyUI) and click on the '`Switched Outlets`' button and then on the '`WoehlkeWebsteckdose`'. In the appeared interface there are 3 buttons which can switch on and off the URC electricity outlet sensor.
   - If you have connected the actual WoehlkeWebsteckdose electricity outlet, you should see the outlet switching on and off.

- If not, you can observe the changes in the emulator by visiting the url: http://localhost:8080/UCH/Webclient/index.html and selecting the WoehlkeWebsteckdose (See Figure 11).

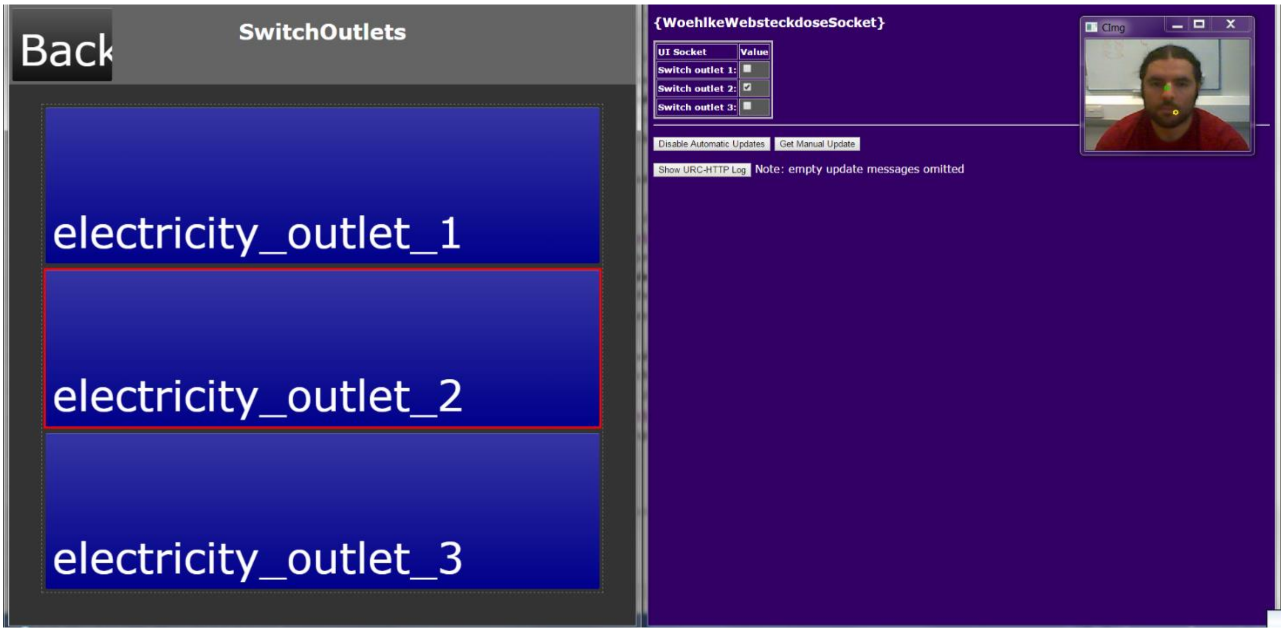


{ColouredLightBulbSocket}

UI Socket	Value
{LightSwitch}	☑
{Brightness}	100
{Saturation}	100
{HueDegree}	120
{HueMinutes}	undefined

Note: empty update messages omitted

Figure 10: Observe the light colour changes in the emulator



{WoehlkeWebsteckdoseSocket}

UI Socket	Value
Switch outlet 1:	□
Switch outlet 2:	☑
Switch outlet 3:	□

Note: empty update messages omitted

Figure 11: Observe the electricity outlet WoehlkeWebsteckdose changes in the emulator

5.2 MyUI → ARE → URC

4) **a. To run the Philips HUE Lights example:** Go to the browser (MyUI), click on 'AsTeRICS' button and select the Head-ColouredLightBulb model (Figure 12). The AsTeRICS ARE is expected to initiate the Head-ColouredLightBulb AsTeRICS model which continuously changes the colour of the lamp via head movement. By keeping still for four seconds this functionality stops and AsTeRICS ARE takes control of the mouse again via head movement. The colour of the lamp is then the last selected colour.

   - If you have connected the actual coloured light bulb (H/W), you should see the light changes in colour when moving your head.
   - If not, you can observe the changes in the emulator by visiting the url: http://localhost:8080/UCH/Webclient/index.html and selecting the coloured light bulb from the list. Then, open a new tab to an assistive client web page here http://localhost:8085/clientSmall/client.html and click on the Start monitoring colour button. Figure 13 shows the simulation demo where head movements change the colour shown within the assistive client web page to the left that simulates the Philips HUE light, while the webpage on the right depicts the URC remote server updates (**important:** webpage refresh from browser refresh-button is needed). The colour updates are initiated from the AsTeRICS Head-ColouredLightBulb model directly via head movements of the user.

   b. To run the electricity outlet example: Go to the browser (MyUI), click on 'AsTeRICS' button and select the Head-ElectricityOutlet model. The AsTeRICS ARE is expected to initiate the Head-ElectricityOutlet AsTeRICS model which can switch on and off the electricity outlet via mouth movement: mouth movement (opening) changes between “switch on” and “switch off”. Switch again to mouse control with head movements by turning your head to the right.

   - If you have connected the actual WoehlkeWebsteckdose electricity outlet, you should see the outlet switching on and off.
   - If not, you can observe the changes in the emulator by visiting the url: http://localhost:8080/UCH/Webclient/index.html and selecting the WoehlkeWebsteckdose (see Figure 14). **Important:** webpage refresh from browser refresh-button is needed to see changes.

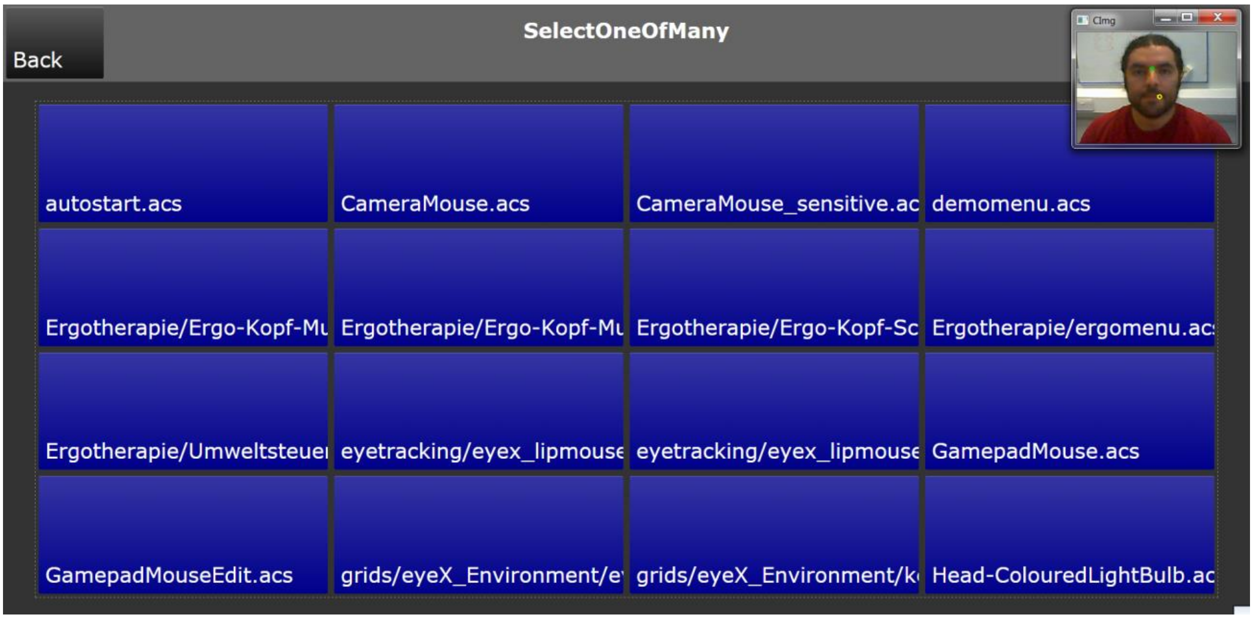
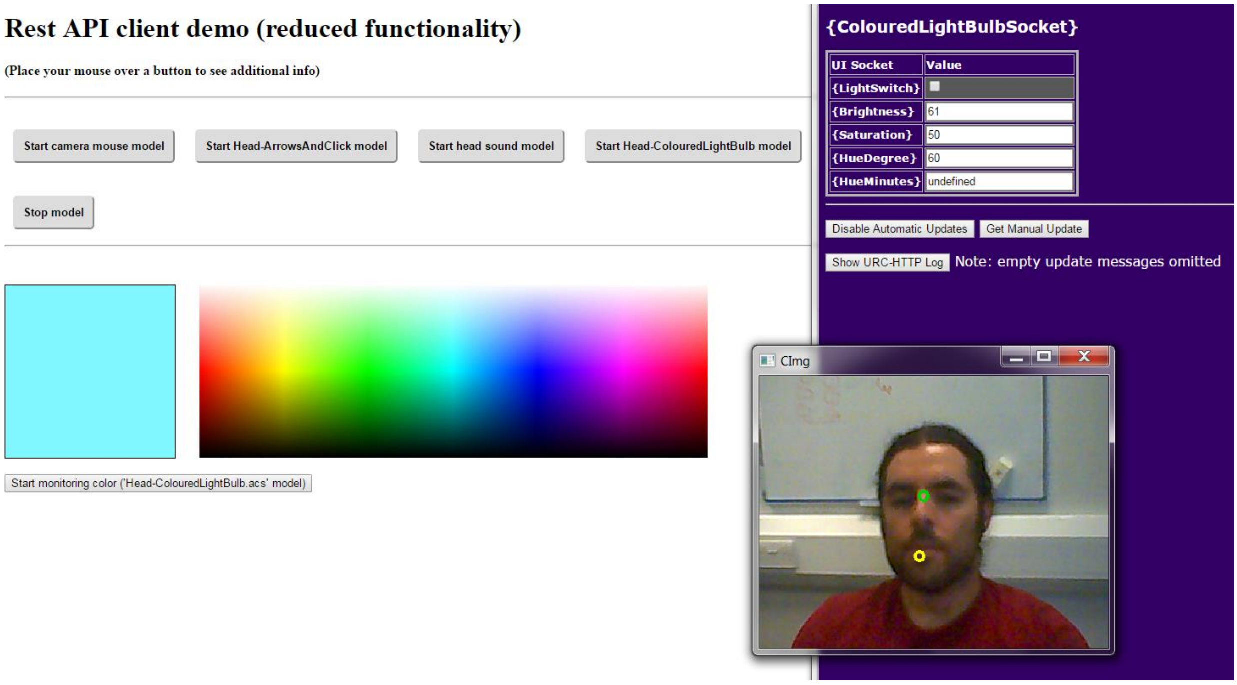


Figure 12: Select the Head-ColouredLightBulb model (lower right corner)



Rest API client demo (reduced functionality)

(Place your mouse over a button to see additional info)

Start camera mouse model
Start Head-ArrowsAndClick model
Start head sound model
Start Head-ColouredLightBulb model
Stop model
Start monitoring color ('Head-ColouredLightBulb.acs' model)
CImg

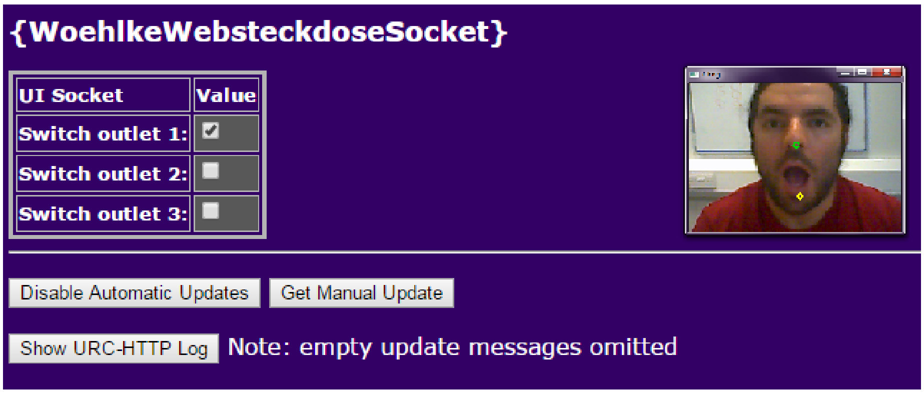
{ColouredLightBulbSocket}

UI Socket	Value
{LightSwitch}	□
{Brightness}	61
{Saturation}	50
{HueDegree}	60
{HueMinutes}	undefined

Disable Automatic Updates
Get Manual Update
Show URC-HTTP Log

Note: empty update messages omitted

Figure 13: Simulation for the Philips HUE Light Bulb



{WoehlkeWebsteckdoseSocket}

UI Socket	Value
Switch outlet 1:	☑
Switch outlet 2:	□
Switch outlet 3:	□

Note: empty update messages omitted

Figure 14: Observe the changes in the emulator