

DOMEO Project AAL-2008-1-159

Description of robuMATE

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Authors	Arnaud LAGO \ Meftah Ghrissi		
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Abstract:

This document is accompanying the delivery of robuMATE prototypes, also called Kompaï (trademark for further commercial deployment).

Keyword List:

robuMATE, description, fact sheets

Summary

There are 5 robuMATEs/Kompaï delivered to partners: !

Robot serial number	Date of delivery	Location	
1-5-5979-4	01/03/2010	Bidart, France	
1-1-5979-1	02/06/2010	Budapest, Hungary	
1-2-5979-2	02/06/2010	Vienna, Austria	
1-17-10-2	11/10/2010	Paris, France	
1-3-5979-3	01/11/2010	Toulouse, France	
1-27-5979 -5	20/05/2011	Budapest, Hungary	

Except the last one delivered later, all robots have been upgraded at mid-term to implement improvements coming from preliminary lab and on site trials.

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1. Introduction

The robuMATE/Kompaï is an indoor mobile platform with 2 propulsive wheels used as a generic platform and designed to ease the development of advanced robotics solutions. It can recognize and synthesize the voice, and navigate in unknown environments. It also remembers meetings, manages your shopping lists, plays music and can be used as a video conference system.

It is equipped with an embedded controller running Windows CE for low level control, and with a tablet-PC running Windows Embedded Standard 7 for high level applications.

In this project it is used as a personal assistant for elderly persons, as tele-presence device and doubt removing.



Figure 1: robuMATE/Kompaï

2. Technical characteristics

Platform	robuMATE/Kompaï		
Dimensions	L x x h = 455 x 41 x 125 mm		
Ground clearance	50 mm		
Weight	31 kg		
Number of wheel	2 propulsive wheels, 2 castor wheels		
Direction	Differential type		
Turning radius	Turn on the spot (middle point of propulsive wheels) needs an area diameter of 552 mm.		
Max speed	1 m/s		
Playload	Max 30 kg		
Slope Evolution on a flat surface, max slope to 11% with payload			
Using temperature	0°C-40°C		
Storing temperature	0°C-60°C		
Humidity	0-90% without condensing		
Batteries	Li-ion 24 VDC – 20 Ah		
Autonomy	About 8 h		
Recharging time	About 6 – 7 h		
Embedded controller	PURE for low level and robuBOX-Kompaï for high level.		
Operating system	Windows CE 6.0 for embedded computer and Windows Embedded Standard 7 for tablet PC.		
Driving mode	Xbox 360 wireless gamepad, automatic navigation.		
Sensors	Sick laser		
	Axis IP camera		
	USB camera		
	9 US sensors		
	16 IR Sensors		
	2 bumpers		





Figure 3: robuMATE/Kompaï body

3. Docking station

The robot is provided with its docking station to charge batteries. This device must be connected to the 220V. The robot can reach it automatically when its battery level is low.



Figure 4: robuMATE/Kompaï with docking station

4. Using the robot

The robot can be used by two kinds of people.

- The persons who must be assisted, in this case they will use the voice or tactile control of the HMI on tablet PC.
- The operators for tele-presence and doubt relevant that uses a web interface called Lokarria.

4.1. Robot used by assisted persons

Assisted persons have access to a graphic interface to control the robot. The main menu gives access to informative data, speech interaction control and functionalities.



Figure 5: Main menu

4.1.1.Informative data

Battery level: the battery indicator is green for full charge and turns to red when the batteries become empty. Remaining percentage is also displayed next to a little icon which turns green when the robot is charging.



Figure 6: battery level indicator

Internet connectivity: this icon indicates if the application is currently connected (green) or not (red). It automatically switch between states, some main buttons will also be disabled if the connection is lost.



4.1.2. Speech interaction control

Two buttons located on the left side are related to speech interaction. They are also displayed on every graphic page. They are **strictly independent** and are used to represent current voice recognition / synthesis states (enabled, disabled, available or not) and to switch manually turn them on and off. Here there are 3 different configurations:



Figure 8: speech interaction configurations

In the first one both recognition and synthesis are available and enabled, in the second one they are both available but not enabled and in the last one they are both not available.

4.1.3. Functionalities

robuMATE/Kompaï robots provide 9 simple functionalities to help people into the daily life. This chapter describes these functionalities (from left to right and up to down icons of main menu, see Figure 5).



4.1.3.1. Mail

On the left side, the user can select one of his Gmail contact or he can use a virtual keyboard to write directly an email address. This virtual keyboard appears when one of the three areas is selected (*Addressee, Subject* or *Message*). To make the keyboard disappear, click again on the area.



4.1.3.2. Video calls

This page allows starting a video call through Skype. It can be automatically displayed after the end-user accepts an incoming call with the pop-up window.



D4.0 : Description of robuMATE

On the left side, contacts are listed by buttons. There are two kinds of contacts: end-user's relatives and healthcare-related contacts. The end-user can switch between categories using the two buttons. Depending on their online status these buttons are enabled or not and they are all disabled during a call. In the screenshot above, only one contact is currently connected. On-line status and contacts availability can evolve with time.



Figure 12: Video calls contacts

During a video-call, the video is automatically displayed on the central frame. The end-user can end a call using the red *Hang up* button, he/she can also control the USB camera at any time with the four control buttons located on the right hand side.



Figure 13: Video calls camera control

4.1.3.3. Web browser



Figure 14: Web browser

This page contains a classical web browser. Some favorite websites can be displayed under "Favorites" on the left side; they are defined in a configuration file. The users just have to touch one of them to access the related website. Navigation through pages can be done using the classical "previous" and "next" arrows located above the web browser.

Shopping list	
Move a product to the list	Your shopping list Cherry x 1 Kiwi x 1
Cherry Kiwi Grapefruit Lemon	
Orange Prune	Clear
Figure 1	5: Shopping list

4.1.3.4. Shopping List

On the left side, the end-user can choose between several products divided in five categories:

- Fruits
- Vegetables
- Fishes and meats
- Beverages
- Miscellaneous

4.1.3.5. Weather forecast

This page allows seeing the current weather conditions, temperatures and next days forecast.

We	eather forecast	
	City Bidart	Current conditions
		Mostly Cloudy 6°C
	Next days forecast	
	Today Min: 4°C Max: 9°C Tuesday Min: 6°C Max: 9°C	Mednesday Min: 6°C Max: 9°C Max: 10°C
× •	1	

Figure 16: Weather forecast

4.1.3.6. Agendas

This page mainly shows a calendar where are combined two Google agendas which are respectively used for personal events and medical appointments. If an alarm is set, the alarm time will be displayed in the top right corner.



4.1.3.7. Games

The end-user can play up to six flash games thanks to this page. Click on one of the six game icons displayed on the right side frame to start. When switching from one game to another nothing is saved and a new game has to be started again.



4.1.3.8. Health manager

In the "Medication" frame, the end-user can see the medication he/she has to take during the current time slot. When a medication is correctly taken, the end-user can notify it by touching the graphical element which will turn to green. Medication to take remains blue and unchecked.

If the end-user forgot to take a medication during a previous time-slot (or forgot to notify that he/she took it), these medications are listed in the "Missed medication" frame (with the name of the time slot they belong to). The end-user can notify that he/she actually took the medication or that he/she doesn't care by touching the graphical element which will delete it.

Health manager				
ricalarinager				
Medication				
Fervex - 1 pill(s)				
08h - 10h Morning				
10h - 13h Noon				
13h - 18h Afternoon				
18h - 22h Evening Missed medication				
Ministed medication				
Contracting Sings - 3 specificity				
Figure 19: Health manager				

4.1.3.9. Navigation

The robuMATE/Kompaï robot is able to move autonomously inside a known environment symbolized by a map used for localization and navigation. It is able to detect an obstacle on the path followed and bypass it if it is possible or stop in front of it.

The building of the map is done during the installation phase by an operator, by driving the robot slowly over the environment. The operator can modify manually this map to add some forbidden area.

Once the map is created and tuned, some point of interest can be added by the operator by driving the robot to those locations and store them.



4.2. Robot used thought Lokarria

Lokarria can be used from any internet connected computer. Use either Google Chrome or Mozilla Firefox web browsers to connect on. The webpage can be added as bookmark.

It should be used for tele-presence or doubt removing.

Usemar Passwo	ne: Username rd: ••••••

Figure 21: Lokarria logging page

Use the identifiers provided by Robosoft to log in and to access to the Lokarria dashboard.

4.2.1.The Dashboard

The dashboard is the main page of Lokarria. All the robots you can access are listed and the names of those which are currently connected are displayed in green. For example, in the screenshot below, only one robot is available for the user account and it is currently running.

LOKAR Dashboard	RIA Help	<u>Logout</u>			
My Robo	Manitoring Videoconformate Register Lago				
Kompai-DEMC					
Wy User Username Email First Name Last Name	Data				
	Figure 22: Lokarria dashboard				

For each robot, four pages are available:

- Monitoring: see "Remote robot control" section below
- Videoconference: see "Video Conference" section below
- **Register:** add commentaries about actions done.
- Logs: give access to the main logs of the robot.

Click on the corresponding icon to reach the pages.

4.2.2.Remote robot control

On this page, the image from the IP camera located at ground level and the laser are displayed on the left side. On the right side, it's the map of the area where the robot is displayed. The current location of robot is the red point. Points of interest of the area are listed below the map.



Figure 23: Lokarria monitoring

The user can use the control buttons located on the center to drive manually the robot. Double-click on the map or click on a registered goal, wait for a path to be displayed in green on the map and then press the **Move** button. Any movement can be stopped using the **Stop** button.

4.2.3.Video Conference

This page allows the user to join an **Oovoo** video chat room and to make also automatically the robot to join it.

First, log in to the Video chat room using any name and wait for your webcam image to be displayed.

LOKARRIA Dashboard Help	<u>Logout</u>
Robot Monitoring Site Monitoring Videoconference Register Logs Kompai-DEMO	
Video Chat Room	
Room title: Lokarna Start oovoo Room owner: vdupourque	on robol
To join the video chait room please enter your hanne	
Enter your name: Medical center #64	• +

Figure 24: Lokarria video conference logging

Then, click on the **Start oovoo** on robot button. This will force the robot to join the room, just wait few second and the video coming from the head of the robot should appear. The buttons located on the right side allows controlling the webcam on the robot side.



Figure 25: Lokarria video conference

To stop the video call on the robot side, click again on the **Start oovoo on robot** button.

4.2.4. Register

This page is used to keep trace of actions from remote users.

🔇 Lokarria - Robotics Pl	🐸 ROBOSOFT: Projects				
LOKAR Dashboard	Administration Help				
Robot Monitoring	Site Monitoring Videoconference Regi	ster Logs Kompai-DEMC)		
View New Searc	<u>ch Select Export to: YAML XML JSON</u>				
		Title	Description	Author	Date
		Déblocage	Ce soir à 22:30, le robot semblait être bloqué à qq cm de la docking station	Vincent Dupourqu	né 2011-06-30 20:32:32 UTC
		Restart	Restarted saturday 2 p.m the tablet PC shutdowns because it was not powered.	Arnaud Lago	2011-07-02 15:31:31 UTC
		Docked manually	I docked it manually near 10 p.m the robot seems not charging	Arnaud Lago	2011-07-04 20:48:58 UTC
		Re-docking manually	I undock then dock the robot manually, now it is charging	Arnaud Lago	2011-07-04 20:51:21 UTC
		Blocked 20 cm ahead of docking-statio	n Manual control to connection	Vincent Dupourqu	té 2011-07-05 19:10:14 UTC
		Tried to resume	I move the robot with pendant, clicked on stop button, and tried to go to kitche	. Vincent Dupourqu	ié 2011-07-05 20:07:39 UTC
		Please tune time	Time of post is wrong ! (2 hours late)	Vincent Dupourqu	né 2011-07-05 20:08:48 UTC
		Emergency call	Unexpected push on the button	Yoann Pons	2011-07-06 09:42:55 UTC
		Emergency button pushed	The button has been pressed by mistake;	Yoann Pons	2011-07-06 16:12:43 UTC
		Blocked 20 cm ahead of docking-statio	n Moved manually to docking station	Vincent Dupourqu	ié 2011-07-06 20:31:12 UTC
		Emergency call	Mrs Patricia pressed the button by mistake	Yoann Pons	2011-07-07 09:17:27 UTC
		Emercency button pressed	The emergency button was pressed by mistake.	Yoann Pons	2011-07-07 15:35:49 UTC
		Emercency button pressed	Mrs Patricia pressed the button by mistake.	Yoann Pons	2011-07-08 07:44:36 UTC
		Emergency call	Mrs Patricia pressed the button by mistake.	Yoann Pons	2011-07-08 09:15:37 UTC
		Manual assistance	Docked manually at 10.40 pm	Arnaud Lago	2011-07-11 20:42:38 UTC
		missed appointement	11h00 Everything is OK	Yoann Pons	2011-07-27 09:07:40 UTC
		Doctor	Event	Yoann Pons	2011-07-27 10:10:17 UTC
		New	Event	Yoann Pons	2011-07-27 10:32:52 UTC
		new	event	Yoann Pons	2011-07-27 10:33:32 UTC
		Déblocage	Le robot est bloqué le long du lit. Je le bouge manuellement par Lokarria, et i	Vincent Dupourqu	té 2011-08-05 13:08:25 UTC

Figure 26: Lokarria register

4.2.5.Logs

From this page you can get back logs of robots into excel format.

