Instead of speaking about what **Borneo** (our programmable embedded display module) is able to do, we will speak about what **Borneo** is already doing. Thru several articles, we will see different applications which show the **Borneo** system capacities.

Borneo is a flexible hardware/software solution based on **FPGA** and **Java** technology to create easily customized embedded systems. The system will be customized in order to fit the application requirements: low power, Embedded HMI, low cost, signal processing, etc.

For more Information about Borneo system:

🇫🇷 http://www.a-e-d.com/borneo.html

🇫🇷 http://www.a-e-d.com/PDF/AED_BorneoPla.pdf

🇫🇷 http://www.a-e-d.com/PDF/AED_ProduitBorneoPla.pdf

🇫🇷 http://www.a-e-d.com/PDF/AED_Borneo.pdf

Borneo and Man Machine Interface

In this article, we are going to see an internet connected device application which mainly uses the **Man Machine Interface (MMI)** functions of **Borneo**. This application controls the MMI of home and industrial heat pump devices.

Overview

Borneo has been integrated in several heat pump system. Borneo manages the Man Machine Interface of the heat pump. It is able to display and modify around 200 parameters over 30th different pages. It is used to control and display: the temperature for several areas, the temperature time schedule, the power consumption, installation parameters, etc. The system can be used alone, in this case it is controlled by the physical MMI, or it can be connected to an internet box and controlled either by the physical MMI or by a distant Virtual MMI which is executed on computer, smartphone or tablet.

Virtual Man Machine Interface (VMMI)

The Virtual Man Machine Interface (VMMI) can be used for two reasons. The first one, is to give a distant access to an embedded system. The system must be connected to internet and the VMMI can be displayed on any computer, tablet or smartphone.
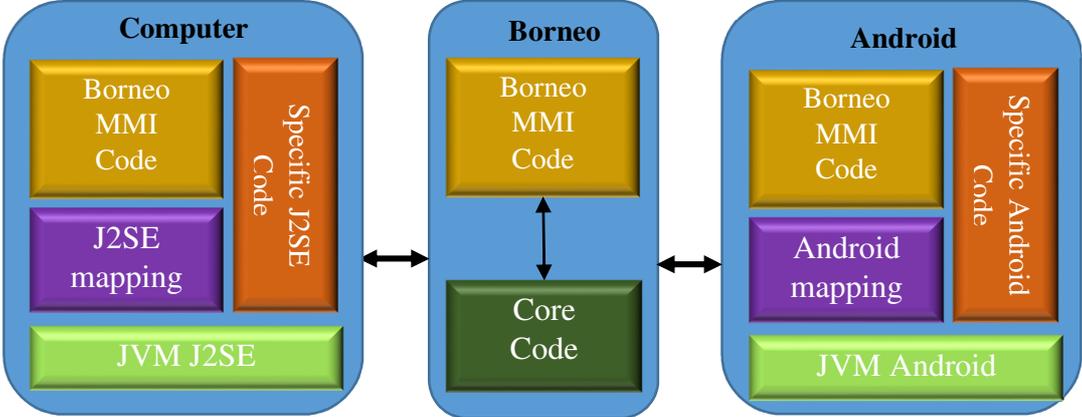

The second reason is to provide a graphical user interface to a system which is not equipped with a display. Embedded systems are often used in hostile environments with a lot of vibrations, shocks, water, heat, cold, etc. The display can't support these kind of environments. Some embedded systems can't integrate a display because they have to be very small. And another good reason is the cost: most of embedded systems must be as cheap as possible and they can't support the price of a display. Furthermore, today it is easy to find portable displays: smartphone and tablets. Instead of integrating low cost displays in small embedded system we can share one very good display with all embedded systems. It still remains to connect the embedded system with the portable display. For standard tablets or smartphones, the Bluetooth is the most simple because all tablets/smartphones include Bluetooth. If the embedded system is connected to a portable computer or a specific display we can use every type of communication link: infrared, USB, Zigbee, etc. It will depend on the cost, security, size, etc. In a few words, with the VMMI technology, the embedded system will be cheap, robust, low power consuming and small.
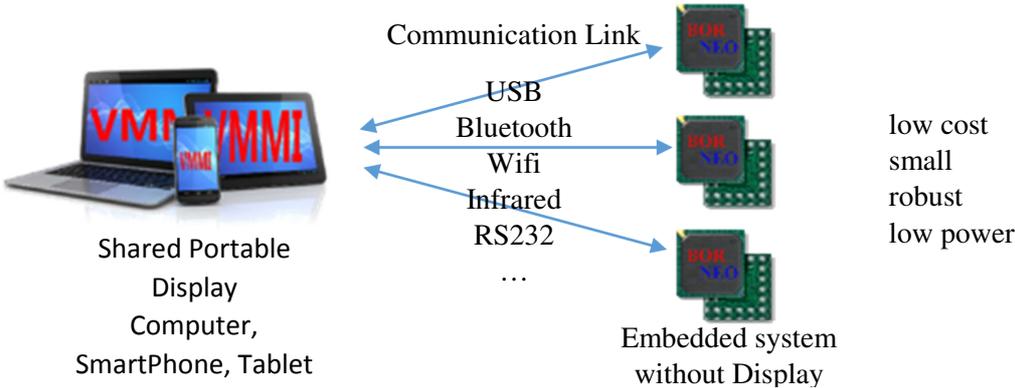
This illustration shows an example of an energy counter. The basics functions are activated with a very cheap interface (7 segment display, push buttons) and the full interface (time programmation, maintenance parameters, etc...) could be displayed with a VMMI on a portable display.
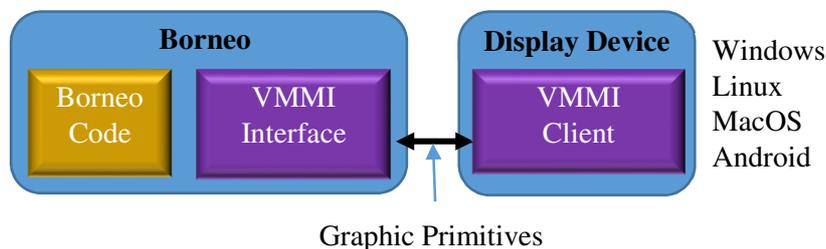
Minimal Interface: 7 Segment display/2 push button Function : Display instant Consumption
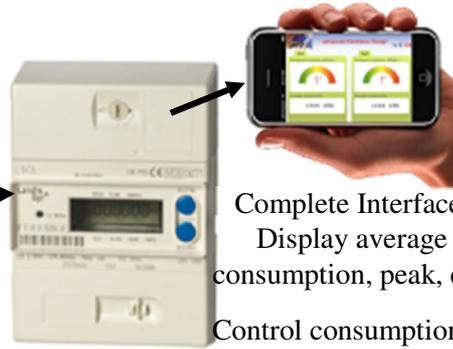
Complete Interface: Display average consumption, peak, etc.

Control consumption, report alarm, etc…

VMMI : 2 implementations

AED uses 2 ways to implement VMMI. The first one takes advantage of the Java language. Borneo is programmed with Java and Java is able to run on a computer (Windows, Linux, MacOS) with a Java Virtual Machine and on an Android device (application language). AED has developed a mapping layer which is able to put Borneo code either on Computer (J2SE) or on Android system. So once you have written a functional code on Borneo for the MMI, you can copy this code in an applet or in an Android application. The code which is running on computer, Borneo and Android is the same, only the mapping layer changes. Some specific code can be added to Android or J2SE application in order to use specific resources of the device (3D, audio, etc.). In this case you can run the MMI even if the device is not connected to the Borneo system. You can modify some data and these data will be transmitted once the connection (to internet for example) will be effective.

Borneo

Borneo Code

VMMI Interface

Display Device

VMMI Client

Windows
Linux
MacOS
Android

Graphic Primitives

The second way is to use the integrated VMMI function of Borneo. A client must be executed on the display platform. Each graphic primitives (draw point, drawstring, fillrect, display image, etc.) are sent by Borneo to the display system. The client displays all primitives on the screen and send every action (press, release, X, Y) to the Borneo system. The main benefit of this solution is that only one MMI is running. If the Borneo MMI is modified it will be automatically updated on the Display Device. This MMI is also able to upload and download data.

For more Information about Virtual Man Machine Interface :

http://www.a-e-d.com/IHMV.html

http://www.a-e-d.com/PDF/Electronique-Septembre-2010-n8.pdf

http://www.a-e-d.com/PDF/Jautomatise-Juillet-Aout-2010-N71.pdf

http://www.a-e-d.com/PDF/AED_IHMV.pdf