Urban-Waste Management System

Adoption of Open Source Linux based Embedded Operating System including embedded TCP/IP connection for networking & improved product functionalities.

Gb.Com is a private owned company based in northern Italy providing IT solutions for process automation and automation solutions in various fields.
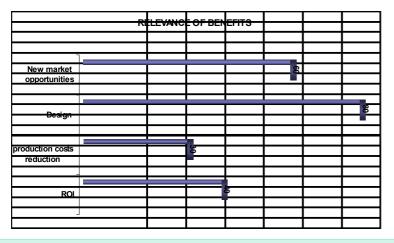
With a strong interest in alternative energy and ecological field, Gb.Com has also delivered automation units for photovoltaic power generation and had already experience on Windows-based Waste Management Systems having delivered already 15 such systems.

With the new waste management and taxation law, highly networked solutions are necessary. The new Linux based solution provided by Gb.Com is a user friendly cost effective solution to easily manage the ecological island.
Four such units have been installed on the 4thQ 2003.

GBCOM	
Employees	5
Turnover	500K€ (yr2002)
Industrial sector	solutions for automated systems
Technology introduced	Linux, TCP/IP

ECONOMIC BENEFITS

RELEVANCE OF BENEFITS

New market opportunities

Design

production costs reduction

ROI

Technological Development is a Key issue to propose advanced new products: technological partner like us are preferred by service providers like in waste management business.

- Expected return on investment of over 250% over three years;
- Reduction of production costs (the functionalities are compressed into one board and one ESBC);
- Internal Replication: before project end, a "PC based information point" (kiosk) has been delivered for citizen information: also Linux &TCP/IP based!;
- Other two "replications" are under development.

PRODUCT IMPROVEMENTS

Main improvements of the enhanced product are:
- Standard Ethernet 10/100 network connection.
- Easy interfacing to host server
- The unit can communicate to the host with different operating systems but common TCP/IP protocol
- The ability to download data from the installed system;
- The ability to effectively set the parameters of the devices remotely and control them;
- The capability to connect more devices to the same Tax Office PC using TCP/IP connection.

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How to go about it

TECHNICAL CHOICE OPTIONS

Rationale for the technology selection: Use of standard HW for reduced time-to-market is a must. Use of known Op. Systems with large amount of resources needed is a negative cost issue.

Open Source Linux : the use of an open source embedded Linux (only needed part assembled together) with a low amount of memory needed into an Embedded Single Board Computer connected to a customised board ensured a reduced time to market, low risk design, low costs, possibility to set a new product in a very short time, possibility to implement a TCP/IP connection in a short time without risks, possibility to design powerful user interfaces. The system is also easily upgradeable.

Ethernet TCP/IP: The Ethernet-TCP/IP connection was adopted to connect the device to host server using standard services and can de used also to implement a remote connection for system debug and SW update.
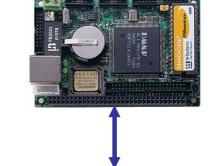
TECHNICAL IMPLEMENTATION

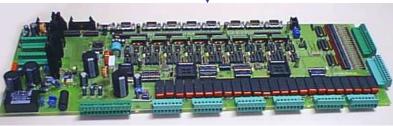The improved product development included:

• The development of a peripheral control board with several com-ports to allow the Embedded Single Board Computer to manage the peripherals needed for the waste-mgmt system (magnetic card reader, weighing unit, actuator-motor, I/O's).
• Ethernet for TCP/IP connection.
• Modem for PPP connection.
• Embedded Linux application to manage ecological island.
• Embedded Linux application to manage bag dispenser.

• Implementation of a local FTP server.
• Implementation of a local client FTP.
• Implementation of a host FTP server.

The main open source SW used:
• Linux kernel updated to 2.4.20.
• SysLinux updated.
• udhcp updated & BusyBox updated.
• PPP server function & Login shell added
• Set root filesystem to read only.
• Link /var and /tmp to RAM disk to reduce writing of disk.

BENEFITING FROM BEST PRACTICE

EC IST Programmes aim to improve the competitiveness of European enterprises by promoting the adoption of under deployed or emerging technologies. This will enable these enterprises to increase their competitiveness and enhance their economic growth. The demonstrator described here is one example of the many Best Practice projects undertaken. Further details of projects covering a wide span of applications, industry sectors and technologies can be found on **www.euroines.com**

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