Wearable Computing for Field Archaeology

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http://www.wear-it.net

The hostile field archaeology environment : heat, humidity and dust ....

The Wearable system as hands-free assistance

Project aim:

The specification, design and construction of a prototypical wearable computer for use in field archaeology. The system should survive the hostile environment, providing prolonged and reliable computing resources. The prototype systems described here provided automated image capture facilities at a Birmingham University archaeological field trial in Forum Novum, Italy.

Future systems will provide users with the ability to annotate the images during collection and to share these annotated images to support collaborative working

Automated image capture from the wearable

The Birmingham University Field Archaeology Forum Novum Field Trial.
(above Dr Vince Gafney of The Birmingham University Field Archaeology Unit (BUFAU)
And right - archaeologists and cameras - our team members taking pictures of the wearable (and taking pictures of having their picture taken!)

Using a wearable computer for field archaeology

Existing Data
• plan visit & survey
• access database

Survey
• intelligent capture
• annotation

Analysis & Interpretation
• interpretive capture
• collaborative analysis

Archiving & Retrieval
• referencing
• meta-data

Version 1.0 of the vision cube for image sharing and display.

Prototype Evolution

From left to right;

(V1) The first prototype with a 32Mb PC104 module with a 166MHz Intel Tillamook CPU (December 1999)

(V2) The same enclosure allowed the higher specification of the 64Mb PC104 module with the 266MHz Intel Tillamook CPU (March 2000)

(V3 & V2) The two systems side by side. (March 2001)

(V3) Little internal change, but the new case makes the system more robust and reliable. (March 2001)

(V3) The V3 includes internal power regulation for increased efficiency and reduced radio emissions, and is suitable for the newer mobile PIII 700MHz, 128Mb PC104 modules. (August 2001)

Hardware Specifications

- V1 – 1st Prototype, Toshiba 810Mb HDD, 32Mb Ram, 166MHz, Win95
- V2 – 2nd Prototype, IBM 6.5Gb HDD, 64Mb Ram, 266MHz, Win98 SE
- V3 – 3rd Prototype, Toshiba 10Gb HDD, 128Mb Ram 700MHz, Win98 SE Lite, Windows 2000*

- In development, currently running Win98 SE – Lite, with original 166MHz board (3.0), 700MHz board should be integrated October – November 2001 (3.1).

Energy	All systems can be run off the belt-mounted NiMH battery pack for approx. eight hours. For short-term observations etc. a much smaller Lithium-Ion battery (Sony info-lithium™) can be used for up to two hours. A micro switched mode AC adapter can also be used which will work from 90 – 260 V AC for use around the world. The system supports ACPI 1.0, which allows Windows 98 and later to reduce power consumption and even suspend to disk vastly reducing the power up delay. Reducing power consumption also has the advantage of reducing heat generation.
Display	There are varying display capabilities of the main system. The system has the capability to directly drive many different types of digital flat panels. As well as standard VGA equipment including standard monitors and analogue head mounted displays (HMD's) such as our Micro-optical display.
Software	Our systems all run Windows™ operating systems, which has the advantage of compatibility with the many existing systems in the relevant disciplines. Linux is of interest, particularly for possible future application. Linux has increasing embedded systems support, very easy slimmed down kernels and features making for a fast systems, however, there is still limited support for many features required by our specification.

Current and future work:-.
Image annotation and context awareness functions are the focus for the next prototype. New display devices for image sharing are also of interest - our first (rather large) prototype vision cube is shown on the left.

For more information :- **www.wear-it.net**