KordTech

KORD® IT APPLICATIONS

Kord® Interface Technology (Kord® IT) consists of a suite of hardware and software that creates an intuitive, ambidextrous, one (or 2) handed chordic graphic user interface for computing and mobile electronic devices. The Technology was originally developed at the Australian Institute of Marine Science (AIMS) for use in the WetPC® underwater computer. This paper provides an overview of how the Kord® IT might be used in applications on the land.

A NOVEL CGUI

Assuming that at least one hand is available for computer control we have five binary inputs (the five digits of the hand). One hand can thus grip a 'Kord® Pad', an input device with five keys. Five digits give 31 pressable combinations, or chords. Whilst this is sufficient to control screens of reasonable complexity, the problem is representing which digits to press for a given operation.

The solution is an ideographic grammar that maps on-screen buttons or icons to the required key presses. The spatial arrangement of the on-screen graphic components defines this in a simple, easily learnt manner. Once mastered, the grammar permits the user to understand any screen of controls or options presented to them.

The chordic graphical user interface (CGUI) is akin to a digital mouse, in that it enables the user to 'point' at activable on-screen objects. Unlike a conventional keyboard the Kord® Pad keys have no notional character mapping, that is, the keys don't actually represent anything. All the conceptual mapping is done in the user's head by the understood grammar. Thus, even alpha-numeric character sets can be entered by on-screen virtual keyboards. The essence is, 'what you see is what you press' - WYSIWYP.

ADVANTAGES

Tthe main advantages of the CGUI and Kord® Pad are:

- Compact
- easily incorporated into hand-held devices
- one-handed and ambidextrous
- wearable
- easy to learn and use (typically 60 secs)
- unaffected by vibration or movement
- requires minimal visual concentration or feedback
- utilises muscle memory and rhythm for speed
- can control complex software, and
- private

APPLICATIONS

The CGUI and Kord® Pad have applications anywhere that complete compact control is required, for example: mobile phones, camcorders, remote controllers, appliances for the disabled, notebook and pen computers, pocket organisers; wearable and mobile computing (including harsh environments); computer games, webTV, non-roman character typing interfaces; and as a supplement to a conventional keyboard interface.

By no longer tying the control buttons of a device to physical hardware, but instead representing them through software as 'soft buttons', great flexibility can be achieved. Hardware upgrades will not require new devices to be purchased to cope with changes, as the input device remains the same.

A chordic interface will look considerably different from a conventional one. The push-button nature of the interface lends itself to simple 'chunky' appearances that are easy to perceive and operate whilst on the move. However it is possible to design screens with similar visual complexity to those in use in desktop environments. Indeed, it is possible to emulate virtually all aspects of conventional graphic user interfaces.

The WYSIWYP concept is not limited to operating systems. Sophisticated 'virtual machines' can be controlled, these are machines that look and act like their physical counterparts, eg: Rolodexes, instrument panels, clock radios, machine tools, etc.

Regardless of how small computers become, the limiting factor in any human-machine interface is physical size, i.e. what can be held in the hand. The compact nature of the chordic interface makes it feasible to include in numerous hand-held devices e.g. mobile phones, remote controllers, etc.

Communications

Manufacturers are now producing a variety of hand held devices which provide not only communication facilities but also access to the internet. The next generation of device will not only be a phone but also a PDA, internet appliance and computer all wrapped in one package. Very little thought has been given to how this type of device will be controlled. Conventional technologies such as the pen, QWERTY keyboard, trackball are ill-suited to such an application. Voice recognition has significant potential although there will be need for an alternative input mechanism which is more direct. The CGUI could be easily and cost effectively incorporated within such devices and would enable users to operate them whilst on the move.

Asian Character Input Devices
Non-Roman alphabet countries currently struggle to represent their languages with QWERTY keyboards. For example, it takes an average of 10-12 keystrokes on a QWERTY keyboard to produce one Chinese character. This can be significantly reduced (to about 4 chord sequences) using only 5 keys - either on a standard keyboard or a 5 key hand controller. Obviously standardisation through chordic interfaces where the hardware remains the same and only the software changes has enormous potential.

Computer Games
The CGUI could also be incorporated within game interfaces to aid messaging and in the access of certain control functions. Currently, players need to take their hands from the controls in order to perform complex tasks (eg. sending a simple message, adjusting mission controls, etc). The CGUI could be accessed as a small menu bar using the home keys of the QWERTY keyboard.

Controllers
The intuitive, and compact nature of the interface, may lend itself to a broad range of consumer devices, such as TV remote controls and cam-corders. Current devices have a plethora of buttons on their exterior to activate functions. Market research shows that many of the functions are rarely used because the user can never remember which combination of buttons to press. The buttons could be reduced to just 5; the user interacts with software on the TV or camcorder's display which shows them which buttons to press to activate a particular function. Obviously standardisation through chordic interfaces where the hardware remains the same and only the software changes has enormous potential.

Telematics
Manufacturers are now producing a range of sophisticated devices to satisfy the growing market for in-vehicle navigation and information systems. Most have interfaces that are difficult to operate while driving and require the user to take their hands off the steering wheel and eyes from the road. Whilst voice recognition technology has obvious advantages and appears to be the interface of choice, there still will be times when it is inconvenient or impractical to use. A CGUI might serve as a competitive alternative to other conventional interfaces (eg. push buttons, trackball, remote controllers). Cars are now being produced with head-up displays. The CGUI could be incorporated within those displays and five-keys could be built directly into the steering wheel.

Defence
Sophisticated computing devices are now being put into the hands of front-line soldiers – be they running across open country, squatting in a hole, or riding in the back of a vehicle. Receiving (and sending) the latest intelligence and reconnaisance data in a timely manner is essential to the success of a mission. Encumbered with gear (much like a SCUBA diver!), walking or running, often with only one hand free (the other holds a rifle) and where there is high background noise (or perhaps they have to be quite!). How is a soldier going to control the computer? Most conventional interfaces just aren't designed for working effectively in these types of situations. This is where the CGUI comes into its own. A Kord® Pad strapped to an arm or attached near the shoulder would enable the computer to be controlled in almost any circumstance. A flexible form could be incorporated into the stock of a rifle which would mean that the soldier wouldn't have to take his hands from the weapon, even whilst sending a simple report.

Given its obvious advantages, the CGUI might also be used to control computers in armoured vehicles which are cramped, noisy and bumpy. Taking to the air, the CGUI could be used in avionics controls where its simplicity and ease of use could be used to good effect, thereby reducing the cognitive demands placed on the fighter pilot. Irrespective of whether a soldier is walking, driving a vehicle or flying a plane, the interface which is presented to him is basically the same.

Handicapped aids
Physically challenged users who have difficulty using conventional interfaces could also benefit from using the CGUI. There are about 48,000 people in the United States who use an adapted typewriter or computer. The CGUI would be ideally suited to many of them, especially those people with speech impairment, limited motor skills or possibly the use of only one hand (or a few fingers). Computer control could be achieved via a 5-key controller either strapped into the hand or incorporated within another aid (eg. frame of wheelchair). The interface can be automatically reconfigured where the user may have one or two fingers which are missing or dysfunctional. Furthermore, it's on-screen display makes it ideal for training of the physically challenged.

CONCLUSIONS

Clearly, in everyday life users increasingly face the problem of controlling sophisticated machines with conventional methods - the complexity and awkwardness of which will only increase. Many of the current interfaces, which were developed for desktop computers, are inappropriate for controlling and interacting with mobile devices. Recent advances in computer technology, such as wearable computers have interface problems crying out for compact solutions. Chordic interfaces and WYSIWYP technology hold the promise for resolving many of these problems. Increasing consumer dissatisfaction with non-standard and clumsy interfaces, and socio-technological phenomena such as digital convergence, mean that the time is right for industry to establish a uniform and universal interface. Our CGUI might just be the solution.

Want to know more?

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