5 Pen PC Technology

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Abstract—P-ISM ("Pen-style Personal Networking Gadget Package"), which is nothing but the new discovery, which is under developing, stage by NEC Corporation. P-ISM is a gadget package including five functions: a pen-style cellular phone with a handwriting data input function, virtual keyboard, a very small projector, camera scanner, and personal ID key with cashless pass function. P-ISMs are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. This personal gadget in a minimalist pen style enables the ultimate ubiquitous computing.

Index Terms— P-ISM ,display , camera ,CPU pen , Battery ,Virtual Keyboard ,Bluetooth , Wireless Connectivity , etc.

1 INTRODUCTION

Five pen pc shortly called as P-ISM ("Pen-style Personal Networking Gadget Package"), is nothing but the new discovery, which is under developing stage by NEC Corporation. P-ISM is a gadget package including five functions: a CPU pen, communication pen with a cellular phone function, virtual keyboard, a very small projector, and a camera. P-ISM's are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. This personal gadget in a minimalist pen style enables the ultimate ubiquitous computing.[1]

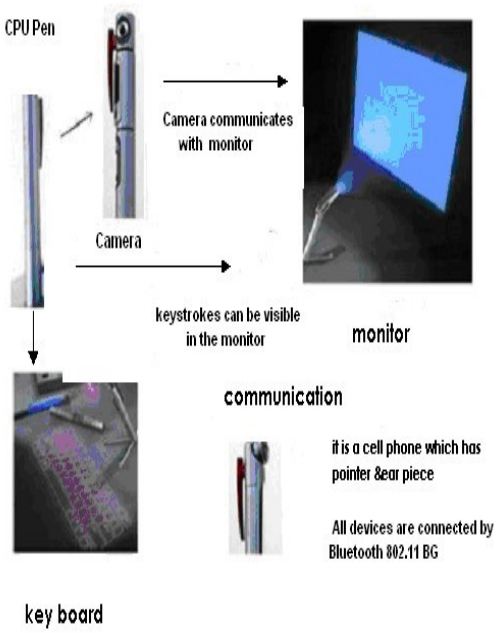

Fig. 1.1 Diagram of 5 Pen PC Technology

1.1 COMPONENTS NAME

Concept Component	Function	Reliability
CPU Pen	Computing Engine	Open
Communications Pen	Cell Phone, Pressure Sensitive Pointing Device, Pointer and ear piece. Communications using Bluetooth	Near Term
Display	LED Projector A4 Size Approx. 1024 X 768	Slightly Farther Out Than the Phone and Camera
Keyboard	Projected keyboard with 3D IR Sensor	Slightly Farther Out Than the Phone and Camera
Camera	Digital Camera	Near Term
Based	Battery Charger and Mass Storage	Open

Fig.1.2 Components name

2 HISTORY

The conceptual prototype of the "pen" computer was built in 2003. The prototype device, dubbed the "P-ISM", was a "Pen-style Personal Networking Gadget" created in 2003 by Japanese technology company NEC. The P-ISM was featured at the 2003 ITU Telecom World held in Geneva, Switzerland.

The designer of the 5 Pen Technology ,"Toru Ichihash", said that" In developing this concept he asked himself – "What is the future of IT when it is small?" The pen was a logical choice. He also wanted a product that you could

touch and feel. Further, the intent is to allow for an office anywhere."

However, although a conceptual prototype of the "pen" computer was built in 2003; such devices are not yet available to consumers.

"The design concept uses five different pens to make a computer. One pen is a CPU, another camera, one creates a virtual keyboard, another projects the visual output and thus the display and another communicator (a phone). All five pens can rest in a holding block which recharges the batteries and holds the mass storage. Each pen communicates wireless, possibly Bluetooth."

3 CPU PEN

The functionality of the CPU is done by one of the pen. It is also known as computing engine. It consists of dual core processor embedded in it and it works with WINDOWS operation system.The central processing unit (CPU) is the portion of a computer system that carries out the instructions of a computer program, and is the primary element carrying out the computer's functions. The central processing unit carries out each instruction of the program in sequence, to perform the basic arithmetical, logical, and input/output operations of the system.

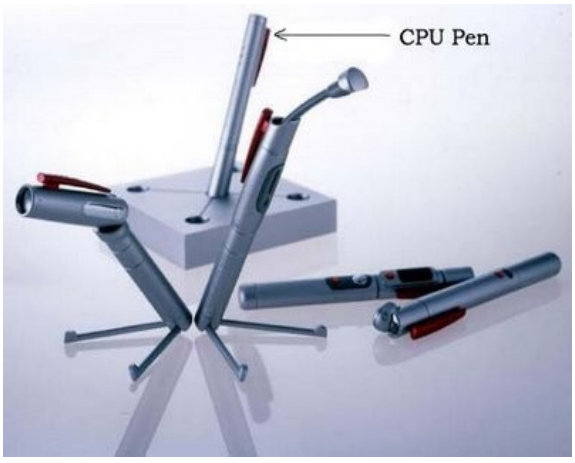

Fig.3.1 Diagram of CPU pen

3.1 CONTROL UNIT

The control unit of the CPU contains circuitry that uses electrical signals to direct the entire computer system to carry out, stored program instructions. The control unit does not execute program instructions; rather, it directs other parts of the system to do so. The control unit must communicate with both the arithmetic/logic unit and memory.

3.2 MICROPROCESSOR

Previous generations of CPUs were implemented as discrete components and numerous small integrated circuits (ICs) on one or more circuit boards. Microprocessors, on the other hand, are CPUs manufactured on a very small number of ICs; usually just one. The overall smaller CPU size as a result of being implemented on a single die means faster switching time because of physical factors like decreased gate parasitic capacitance. This has allowed synchronous microprocessors to have clock rates ranging from tens of megahertz to several gigahertzes. Additionally, as the ability to construct exceedingly small transistors on an IC has increased, the complexity and number of transistors in a single CPU has increased dramatically. This widely observed trend is described by Moore's law, which has proven to be a fairly accurate predictor of the growth of CPU (and other IC) complexity to date.

3.3 OPERATION

There are four steps that nearly all CPUs use in their operation: fetch, decode, execute, and write back.

The first step, fetch, involves retrieving an instruction (which is represented by a number or sequence of numbers) from program memory. After an instruction is fetched, the PC is incremented by the length of the instruction word in terms of memory units. Often, the instruction to be fetched must be retrieved from relatively slow memory, causing the CPU to stall while waiting for the instruction to be returned. This issue is largely addressed in modern processors by caches and pipeline architectures (see below).

The final step, write back, simply "writes back" the results of the execute step to some form of memory. Very often the results are written to some internal CPU register for quick access by subsequent instructions.

After the execution of the instruction and write back of the resulting data, the entire process repeats, with the

next instruction cycle normally fetching the next-in-sequence instruction because of the incremented value in the program counter. In more complex CPUs than the one described here, multiple instructions can be fetched, decoded, and executed simultaneously.

3.4 CLOCK RATE

The clock rate is the speed at which a microprocessor executes instructions. Every computer contains an internal clock that regulates the rate at which instructions are executed and synchronizes all the various computer components. The CPU requires a fixed number of clock ticks (or clock cycles) to execute each instruction. The faster the clock, the more instructions the CPU can execute per second.

The late CPU design that uses clock gating is that of the IBM PowerPC-based Xbox 360. It utilizes extensive clock gating in order to reduce the power requirements of the aforementioned videogame console in which it is used.

3.5 PERFORMANCE

The performance or speed of a processor depends on the clock rate and the instructions per clock (IPC), which together are the factors, for the instructions per second (IPS) that the CPU can perform. Processing performance of computers is increased by using multi-core processors, which essentially is plugging two or more individual processors (called cores in this sense) into one integrated circuit. Ideally, a dual core processor would be nearly twice as powerful as a single core processor. In practice, however, the performance gain is far less, only about fifty percent, due to imperfect software algorithms and implementation.

4 COMMUNICATION PEN

P-ISM's are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. They are connected through Tri-wireless modes (Blue tooth, 802.11B/G, and terabytes of data, exceeding the capacity of today's hard disks.

This is very effective because we can able to connect whenever we need without having wires. They are used at the frequency band of 2.4 GHz ISM (although they use different access mechanisms). Blue tooth mechanism is used for exchanging signal status information between two devices. This techniques have been developed that do not require communication between the two devices (such as Blue tooth's Adaptive Frequency Hopping), the most efficient and comprehensive solution for the most serious problems can be accomplished by silicon vendors. They can implement information exchange capabilities within the designs of the Blue tooth.

Fig.4.1 Diagram of Communication Pen

4.1 BLUETOOTH

Bluetooth uses a radio technology called frequency-hopping spread spectrum, which chops up the data being sent and transmits chunks of it on up to 79 bands (1 MHz each; centered from 2402 to 2480 MHz) in the range 2,400-2,483.5 MHz (allowing for guard bands). This range is in the globally unlicensed Industrial, Scientific and Medical (ISM) 2.4 GHz short range radio frequency band.

4.2 IEEE 802.11

IEEE 802.11 is a set of standards for implementing wireless local area network (WLAN) computer communication in the 2.4, 3.6 and 5 GHz frequency bands. They are created and maintained by the IEEE LAN/MAN Standards Committee (IEEE 802). The base current version of the standard is IEEE 802.11-2007.

4.3 CELLULAR NETWORK

A cellular network is a radio network distributed over land areas called cells, each served by at least one fixed-location transceiver known as a cell site or base station. When joined together these cells provide radio coverage over a wide geographic area. This enables a large number of portable transceivers (e.g., mobile phones, pagers, etc.) to communicate with each other and with fixed

transceivers and telephones anywhere in the network, via base stations, even if some of the transceivers are moving through more than one cell during transmission.

Cellular networks offer a number of advantages over alternative solutions:

- Increased capacity reduced power use larger coverage area.
- Reduced interference from other signals.

An example of a simple non-telephone cellular system is an old taxi driver's radio system where the taxi company has several transmitters based around a city that can communicate directly with each taxi.

A simple view of the cellular mobile-radio network consists of the following:

- A network of Radio base stations forming the base station subsystem.
- The core circuit switched network for handling voice calls and text.
- A Packet switched network for handling mobile data.
- The Public switched telephone network to connect subscribers to the wider telephony network.

5 VIRTUAL KEYBOARD

The Virtual Laser Keyboard (VKB) is the ULTIMATE new gadget for PC users. The VKB emits laser on to the desk where it looks like the keyboard having QWERTY arrangement of keys i.e., it uses a laser beam to generate a full-size perfectly operating laser keyboard that smoothly connects to of PC and most of the handheld devices. As we type on the laser projection, it analyses what we are typing according to the co-ordinates of the location. A virtual keyboard is a software component that allows a user to enter characters. A virtual keyboard can usually be operated with multiple input devices, which may include a touch screen, an actual keyboard, a computer mouse, a head mouse and an eye mouse

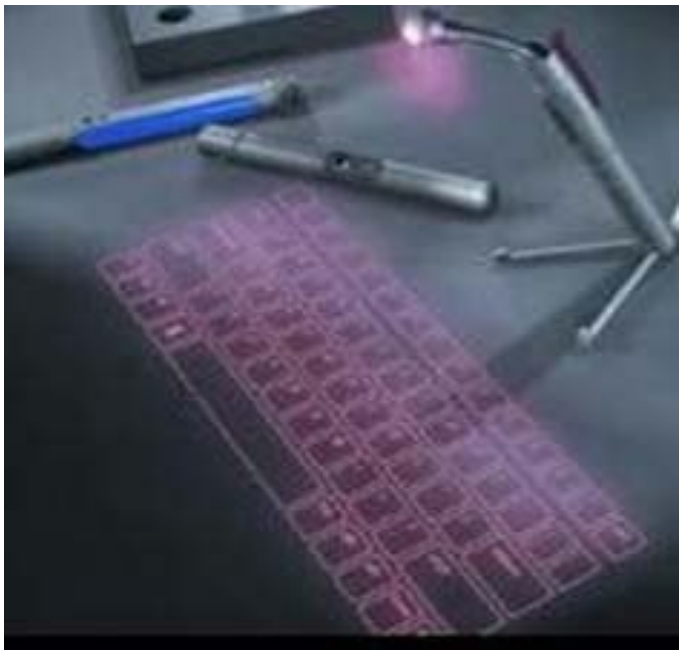

Fig.4.1 Diagram of Virtual Keyboard

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5.1 TYPES

On a desktop PC, one purpose of a virtual keyboard is to provide an alternative input mechanism for users with disabilities who cannot use a physical keyboard. Another major use for an on-screen keyboard is for bi- or multi-lingual users who switch frequently between different character sets or alphabets. Although hardware keyboards are available with dual keyboard layouts (for example Cyrillic/Latin letters in various national layouts), the on- screen keyboard provides a handy substitute while working at different stations or on laptops, which seldom come with dual layouts.

The standard on-screen keyboard utility on most windowing systems allows hot key switching between layouts from the physical keyboard (typically alt-shift but this is user configurable), simultaneously changing both the hardware and the software keyboard layout. In addition, a symbol in the systray alerts the user to the currently active layout.

Although Linux supports this fast manual keyboard-layout switching function, many popular Linux on-screen keyboards such as gtkeyboard, Matchbox-keyboard or Kvkbd do not react correctly

Virtual keyboards are commonly used as an on-screen input method in devices with no physical keyboard,

where there is no room for one, such as a pocket computer, personal digital assistant (PDA), tablet computer or touch screen equipped mobile phone. It is common for the user to input text by tapping a virtual keyboard built into the operating system of the device. Virtual keyboards are also used as features of emulation software for systems that have fewer buttons than a computer keyboard would have.

Virtual keyboards can be categorized by the following aspects:

- Physical keyboards with distinct keys comprising electronically changeable displays integrated in the keypads.
- Virtual keyboards with touch screen keyboard layouts or sensing areas.
- Optically projected keyboard layouts or similar arrangements of "keys" or sensing areas.
- Optically detected human hand and finger motions.

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Virtual keyboards to allow input from a variety of input devices, such as a computer mouse, switch or other assistive technology device.

An optical virtual keyboard has been invented and patented by IBM engineers in 2008.It optically detects and analyses human hand and finger motions and interprets them as operations on a physically non-existent input device like a surface having painted keys. In that way it allows to emulate unlimited types of manually operated input devices such as a mouse or keyboard. All mechanical input units can be replaced by such virtual devices, optimized for the current application and for the user's physiology maintaining speed, simplicity and unambiguity of manual data input.

On the Internet, various JavaScript virtual keyboards have been created, allowing users to type their own languages on foreign keyboards, particularly in Internet cafes.

5.2 SECURITY CONSIDERATIONS

Virtual keyboards may be used in some cases to reduce the risk of keystroke logging. For example, Westpac's online banking service uses a virtual keyboard for the password entry, as does Treasury Direct (see picture). It is more difficult for malware to monitor the display and mouse to obtain the data entered via the virtual keyboard, than it is to monitor real keystrokes. However it is possible, for example by recording screenshots at regular intervals or upon each mouse click.

The use of an on-screen keyboard on which the user "types" with mouse clicks can increase the risk of password disclosure by shoulder surfing, because:

An observer can typically watch the screen more easily (and less suspiciously) than the keyboard, and see which characters the mouse moves to.

Some implementations of the on-screen keyboard may give visual feedback of the "key" clicked, e.g. by changing its color briefly. This makes it much easier for an observer to read the data from the screen.

6 DIGITAL CAMERA

The digital camera is in the shape of pen .It is useful in video recording, video conferencing, simply it is called as web cam. It is also connected with other devices through Blue tooth. It is a 360 degrees visual communication device. This terminal will enable us to know about the surrounding atmosphere and group to group communication with a round display and a central super wide angle camera.

Fig.6.1 Diagram of Digital Camera

A digital camera (or digicam) is a camera that takes video or still photographs, or both, digitally by recording images via an electronic image sensor. Most 21st century cameras are digital.

Digital cameras can do things film cameras cannot: displaying images on a screen immediately after they are recorded, storing thousands of images on a single small memory device, and deleting images to free storage space. The majority, including most compact cameras, can record moving video with sound as well as still photographs. Some can crop and stitch pictures and performs other elementary image editing. Some have a GPS receiver built in, and can produce Geotagged photographs.

7 LED PROJECTOR

The role of monitor is taken by LED Projector which projects on the screen. The size of the projector is of A4 size. It has the approximate resolution capacity of 1024 X 768. Thus it is gives more clarity and good picture.

Fig.7.1 Diagram of Led Projector

A video projector is a device that receives a video signal and projects the corresponding image on a projection screen using a lens system. All video projectors use a very bright light to project the image, and most modern ones can correct any curves, blurriness, and other inconsistencies through manual settings. Video projectors are widely used for conference room presentations, classroom training, home theatre and live events applications. Projectors are widely used in many schools and other educational settings, connected to an interactive whiteboard to interactively teach pupils.

7.1 OVERVIEW

A video projector, also known as a digital projector, may be built into a cabinet with a rear- projection screen (rear-projection television, or RPTV) to form a single unified display device, now popular for "home theatre" applications.

Common display resolutions for a portable projector include SVGA (800×600 pixels), XGA (1024×768 pixels), 720p (1280×720 pixels), and 1080p (1920×1080 pixels).

The cost of a device is not only determined by its resolution, but also by its brightness. A projector with a higher light output (measured in lumens, symbol "lm") is required for a larger screen or a room with a high amount of ambient light. A rating of 1500 to 2500 ANSI lumens or lower is suitable for smaller screens with controlled lighting or low ambient light. Between 2500 and 4000 lm is suitable for medium-sized screens with some ambient light or dimmed light. Over 4000 lm is appropriate for very large screens in a large room with no lighting control (for example, a conference room). Projected image size is important; because the total amount of light does not change, as size increases, brightness decreases. Image sizes are typically measured in linear terms, diagonally, obscuring the fact that larger images require much more light (proportional to the image area, not just the length of a side). Increasing the diagonal measure of the image by 25% reduces the image brightness by more than one-third (35%); an increase of 41% reduces brightness by half.

7.2 PROJECTION TECHNOLOGIES

CRT projector using cathode ray tubes. This typically involves a blue, a green, and a red tube. This is the oldest system still in regular use, but falling out of favor largely because of the bulky cabinet. However, it does provide

the largest screen size for a given cost. This also covers three tube home models, which, while bulky, can be moved (but then usually require complex picture adjustments to get the three images to line up correctly).

LCD projector using LCD light gates. This is the simplest system, making it one of the most common and affordable for home theaters and business use. Its most common problem is a visible "screen door" or pixelation effect, although recent advances have minimized this.

The most common problem with the single- or two-DMD varieties is a visible "rainbow" which some people perceive when moving their eyes. More recent projectors with higher speed (2x or 4x) and otherwise optimized color wheels have lessened this artifact. Systems with 3 DMDs never have this problem, as they display each primary color simultaneously.

LCoS projector using Liquid crystal on silicon.

- D-ILA JVC's Direct-drive Image Light Amplifier based on LCoS technology.
- SXRD Sony's proprietary variant of LCoS technology.

LED projectors use one of the above mentioned technologies for image creation, with a difference that they use an array of Light Emitting Diodes as the light source, negating the need for lamp replacement.

Hybrid LED and Laser diode system developed by Casio. Uses a combination of Light Emitting Diodes and 445nm laser diodes as the light source, while image is processed with DLP (DMD) chip.

Laser diode projectors have been developed by Micro vision and Aaxa Technologies. Micro vision laser projectors use Micro vision's patented laser beam-steering technology, whereas Aaxa Technologies uses laser diodes + LCoS.

7.3 TYPES OF LED DISPLAY

There are two types of LED panels: conventional (using discrete LEDs) and surface-mounted device (SMD) panels. Most outdoor screens and some indoor screens are built around discrete LEDs, also known as individually mounted LEDs. A cluster of red, green, and blue diodes is driven together to form a full-color pixel, usually square in shape. These pixels are spaced evenly apart and are measured from center to center for absolute pixel resolution. The largest LED display in the world is over 1,500 ft (457.2 m) long and is located in Las Vegas, Nevada covering the Fremont Street Experience. The largest LED television in the world is the Center Hung Video Display at Cowboys Stadium, which is 160 × 72 ft (49 × 22 m), 11,520 square feet (1,070 m2).

Most indoor screens on the market are built using SMD technology—a trend that is now extending to the outdoor market. An SMD pixel consists of red, green, and blue diodes mounted in a single package, which is then mounted on the driver PC board. The individual diodes are smaller than a pinhead and are set very close together. The difference is that the maximum viewing distance is reduced by 25% from the discrete diode screen with the same resolution.

Indoor use generally requires a screen that is based on SMD technology and has a minimum brightness of 600 candelas per square meter (cd/m²), sometimes informally called nits). This will usually be more than sufficient for corporate and retail applications, but under high ambient-brightness conditions, higher brightness may be required for visibility. Fashion and auto shows are two examples of high-brightness stage lighting that may require higher LED brightness. Conversely, when a screen may appear in a shot on a television studio set, the requirement will often be for lower brightness levels with lower color temperatures; common displays have a white point of 6500–9000 K, which is much bluer than the common lighting on a television production set.

Battery:

The most important part in portable type of computer is battery and storage capacity. Usually batteries must be small in size and work for longer time. For normal use it can be used for 2 weeks. The type of battery used here is lithium ion battery. The storage device is of the type tubular holographic which is capable of storing. The use of lithium ion battery in this gadget will reduce energy density, durability and cost factor.

By making Five Pen PC feasible, it will enable ubiquitous computing therefore it is easier for people to use. Many applications can be imagined with this new technology. As it makes use of E-fingerprinting the gadget will be more secure, which allows only owner to activate the Pc. So even if we loose it, no one else can access the gadget. All PC's communicate each other with the help of

Bluetooth technology and the entire gadget is connected to internet (Wi-Fi). This technology is very portable, feasible and efficient. Everybody can use this technology in very efficient manner. Some prototypes have been already developed in 2003 which are very feasible, but currently unclear. The enhancement in this technology can be expected in coming years.

8 REMARK

8.1 ADVANTAGES

- Portable Feasible Ubiquitous
- Makes use of Wi-Fi technology
- Mobility
- Touch and feel the technology

8.2 DISADVANTAGES

- Currently unclear
- Cost
- Easily misplaced
- As the gadget is very costly the consumer cannot afford to purchase them.
- The virtual keyboards are already present in various companies like Lumio and Virtual Devices Inc.

9 CONCLUSION

The communication devices are becoming smaller and compact. This is only a example for the start of this new technology. We can expect more such developments in the future, It seems that information terminals are infinitely getting smaller. However, we will continue to manipulate them with our hands for now. We have visualized the connection between the latest technology and the human, in a form of a pen. P-ISM is a gadget package including five functions: a pen-style cellular phone with a handwriting data input function, virtual keyboard, a very small projector, camera scanner, and personal ID key with cashless pass function. P-ISMs are connected with one another through short-range wireless technology. The whole set is also connected to the Internet through the cellular phone function. This personal gadget in a minimalistic pen style enables the ultimate ubiquitous computing.

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REFERENCES

[1] http://www.computinghistory.org.uk/history.html

[2] http://en.wikipidia.org/wiki/pen_computing

[3] http://www.softwaretoolbar.com/virtual_keboard.html

[4] http://www.compinfo_center.com/ledprojector.html

[5] http://users.erols.com/rwseries/biblio.html

[6] http://rwservices.no._ip.info:81/pens/biblio70html#gray1888b

[7] www.scribed.com/doc/67990223/report_on_5_pen_pct_echnology

[8] http://www.rockinglearners.blogspot.in/p/virtual_keboard.html