IJCAT - International Journal of Computing and Technology, Volume 3, Issue 4, April 2016
ISSN : 2348 - 6090
www.IJCAT.org

Smart Quill Pen (The Hand Held Computer)

[1] Dipti Sinha, [2] Chitra Yaduvanshi , [3] Aakansha Gupta

[1,2,3] ECE Department, Poornima Group Of Institution,
Jaipur, Rajasthan, India

Abstract - In the market there are various pen's available but none of them performs operations other than writing. This paper focuses on the extraordinary invention of a pen that performs operation more than writing. Smart Quill is a computer housed within a pen. This pen replaces the keyboard in the office, but it is highly convenient for people who takes notes by hand. The present fashion of computations has started desiring small computers. This has made computer manufacturing companies to go for roughly tool similar to computers. Reducing the size of the handheld computers can only be taken so far before they become impracticable. Keyboards become so infinitesimal you require needle-like fingers to operate them and screens that necessitate stable indicator control to study trouble-free text.

Keywords **- Smart Quill, Accelerometer, Transcription, Digital Inkwell.**

1. Introduction

In this paper we are going to discuss about a pen that will retain the words that it is used to write, and then convert them into computer text. The idea that "it would be neat to put all of a handheld-PDA type computer in a pen". It is claimed to be the biggest revolution in handwriting since the invention of the pen. Users don't have to write on a special pad in order to record what they write. User could use this pen on any platform for writing such as tablet, screen or even air. The Smart Quill is not all space-age, though it contains an ink sealed unit so that users can witness what they write down on paper. Smart Quill contains sensors that trace movement by using the earth's solemnity system, irrespective of the device used.

The pen report the information inserted by the user. Your words of data can also be uploaded to your PC through the "digital inkwell", while the files that you might want to outlook on the pen are downloaded from Smart Quill as well. The Smart Quill overcomes the problem of typing.with subscripts and superscripts in a slightly smaller font size. This is acceptable.

2. Working of Smart Quill

Smart Quill is slightly larger than an ordinary fountain pen. Users can enter information into these applications by pushing a button on the pen and writing down what they would like to enter .The Smart Quill does not need a screen to work. The really clever bit of the technology is its ability to read handwriting not only on paper but on any flat surface – horizontal or vertical. There is also a small three-line screen to read the information stored in the pen; users can scroll down the screen by tilting the pen slightly. The user trains the pen to recognize a particular handwriting style - no matter how messy it is, as long as it is consistent, the pen can recognize it. The handwritten notes are stored on hard disk of the pen.

3. Features

1. Handwriting recognition and signature verification
2. Display scrolls using tilt sensors.
3. Communication with other devices.
4. Memory and power.

3.1 Signature Verification and Handwriting Recognition

1) Accelerometers measure hand movement in 2 or plane.
2) On board DSP converts to ASCII characters for Pen application.
3) Write on paper, flat surface, and vertical wall or in air
4) Single character recognition on pen
5) Record cursive letters and download to PC for decoding
6) Password by signature recognition Smart Quill works by into its memory.

There are two techniques used:

1. Accelerometer technology
2. Handwriting recognition software.

3.1.1 The Accelerometer Technology

This technology uses a device called Accelerometer which is used for measuring motion. A tiny accelerometer in a pen could be used to detect the stops and starts, arcs and loops of handwriting, and transmit this information to a small microprocessor that would make sense of it as text. There's also the possibility of viewing a full page of text through a special monocular magnified "virtual" screen that could be built into the end of the pen. Invisible writing in air is achieved through this unique technology called accelerometer that monitors hand movements and can also be used as a virtual hinge to scroll around the small screen on the pen and detect left or right- handed use. It records movement by using the earth's gravity system, whether you write on paper or in the air. Hence it is independent of surface used. Movements are stored within the Smart Quill. This information is transmitted on to a small microprocessor that would make sense of it as a text displayed on the sleek built in screen.

There are 2 types of accelerometer:-

1) Two Axes Accelerometer: This accelerometer measures acceleration in two axes. An example for Two Axes Accelerometer is ADXL202 Accelerometer.

2) Three Axes Accelerator**: -** This accelerometer measures acceleration in three axes. An example for Three Axes Accelerometer is Tronics +/- 2g accelerometer.

Fig. 1**:** Signature Verification and Handwriting Recognition

3.1.2 Handwriting Recognition Software

This software embedded in the microprocessor of the pen is used to recognize handwriting of the user. Pen works in conjunction with a regular PC on to which users install special handwriting recognition software.

The handwriting recognition software translates movements in to text on screen. Handwriting recognition software constitutes two major phases:

1. Handwriting transcription
2. Handwriting recognition

1. Handwriting Transcription

In this phase, the recorded acceleration signals are then transcript to its original form. Here this aspect is solved using simple double integration method in order to retrace the pen tip movement on paper.

2. Handwriting Recognition

The second huge aspect is the characters and signatures recognition. The hardware (accelerometers plus contact detector) embedded in the pen has proved really efficient combination for this application.

3.2 Display Scrolls by Tilting Screen

By tilting the pen, user can choose applications and scroll through without using scroll buttons**.** Below is an image of Smart Quill tilting Screen designed by Lindsey Williams for BT Labs. The pen would align text if it was held in left or right hand so the text was the correct way up for left or right handed people. This was done by using Micro Electromechanical Systems (MEMS) tilt sensors to measure tilt angle to earth. The Smart Quill micro controller read the angle and then mapped the large screen display onto the small 4 line display.

Smart Quill could also scroll through pages of display by tilting it in the hand and power off if no hand movement was detected or pen was flat on a desk. The demonstration unit below shows display inverting as Smart Quill was inverted in the hand. The choice of words was limited to what characters the LCD display driver could show while upside down (left hand picture) – only 14 of the 26 letters of the alphabet were usable.

These 14 characters were then processed by anagram software to produce 900 words that used these characters.

Fig.2: Display Scrolls by Tilting Screen

3.3 Communication with Other Devices

Earlier Smart Quill models developed by BT laboratories communicated with the PC via a radio transmitter, but the current prototype hooks up to a PC via a cable and electronic docking station called an "inkwell." .The data stored in the memory is uploaded to the personal computer when it is placed in to a docking station. An electronic docking station is a small cabinet to which a laptop or notebook computer can be attached for use as a Desktop computer; usually have a connector for externally connected devices, such as hard drives or scanners and ports that can be linked to components such as keyboard , monitor and printer. It can also be connected to printer, modem or mobile phones to send data electronically. The output accelerometer signals from the pen are digitized with a National Instrument capture card with a frequency Fe of 1000Hz and a low pass filter at Fc=1/3*Fe .Future models could receive e-mails and pager messages via a wireless messaging system .This enables two-way wireless communication with other computing devices.

4. Applications

Smart Quill is not all space-age. It contains an ink cartridge so that users can see what they write on paper .Hence a simple application of Smart Quill is that it write notes on paper. This information recorded in the pen is then downloaded to PC.

The information stored in the pen can be input to other devices such as mobile phones, printers, modems, desktop computers etc for different applications.

It also provides handheld computer applications such as digital diary, contacts, calculators etc.

It is used for receiving pager and email messages. This is possible through recent technology involved in Smart Quill, the wireless messaging system which allows two way communications between devices.

Smart Quill synchronizes files, emails and messages to PC.

Smart Quill can be used for voice record and supports speech recognition. Voice record is made possible through ADPCM speech compression Smart Quill also allows third party to add on application. Smart Quill is all mobile, smaller in size and enables one-handed use.

5. Disadvantages

In Smart Quill it seems to be not only unnecessary, but rather undesirable. The pen is a usual input device and mixing input and output capabilities may lead to user confusion (e.g. when should I look at it, how do I hold it if I am looking at the screen, and can I really write something at the same time?) The small size of the screen means constant cursor control, as BT themselves mention and it also means interference between writing and controlling the screen.

6. Conclusion

Smart Quill will be brought to the market by the end of 2006. The estimated cost of this futuristic pen is around $600.SmartQuill supports two factors: small size and convenient use. The future of Smart Quill ensures all computation power the user needs right inside the pen. Reducing the size of handheld computers can only be taken so far before they become unusable. Keyboards become so tiny you require needle-like fingers to operate them and screen that need constant cursor controls to read simple text. The introduction of Smart Quill is the best solution for this problem.

References

[1] RNRT Stylocom project, notificationn 0250016
[2] E.Millien, C.Roux, “Users input to design of a “communicating pen”,Smart Objects Conference,2003

[3] R.Baron R Plamondon "Acceleration measurement with an instrumented for sign verification andanalysis",IEEE Trans.Vol IM-38.

Dipti Sinha student ,final year ,Electronics and Communication, Poornima Group of Institution , Presented a paper on Image Processing in National conference, current research interests signal processing and biomedical science

Aakansha Gupta student , final year , best student award.