

# Smart Quill Technology

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**Abstract**— In current scenario the use of the computer appliance is become inevitable and so handheld computers are the most suitable, trendy and endorsed in today's world. Pens which are easily available in the markets are provided with the writing function only but here this paper presents the information on an outstanding gadget which is used for more than writing operation. Smart Quill is a pen that can remember the words that is used to write, and then transform them into computer text.

**Keywords**—Smart quill, Accelerometer, transcription, digital inkwell.

## I. INTRODUCTION

Smart Quill was invented by Lyndsay Williams of Microsoft Research's Cambridge UK Lab. "It could be neat to put all of a handheld-PDA type computer in a pen," this was the idea which came to inventor in her sleep. Add on to that she says "It's the pen for the new millennium". She was encouraged by Nigel Ballard who is a leading consultant to the mobile computer industry, Williams helped her and took her prototype to the British Telecommunication Research Lab, where she was promptly hired and given money and institutional support for her project. The prototype, called Smart Quill, has been developed by world-leading research laboratories run by BT (formerly British Telecom) at Martlesham, eastern England. It is claimed to be the biggest revolution in handwriting since the invention of the pen. To write anything by the use of Smart Quill there is no requirement of specific surface, user could write on tablet, paper or screen. This quill can also be used to write on the platform like air. Whatever information entered by the user is noted by the pen. With the help of the "digital inkwell" user's data could be uploaded to the PC. It alters the use of the keyboards in the offices and could help the user to ignore the typing step.



Fig 1 Smart Quill

## II. WORKING

One button is given on the pan, by pushing that and writing down what they want to insert, user could add the information to this device. There is no necessity of the screen to write down with Smart Quill. Reading of the handwriting which is written on any paper or flat surface vertical or horizontal, is the ability of this intelligent technology. To read the data stored in the pen a screen is provided called three-line screen also this screen can be scrolled down by tilting the pen slightly. Any confused or messy handwriting could be traced by the pen by giving it training to recognize the words. All the notes written by hands are stored to the hard disk of the pen. The pen is then connected to "digital inkwell" and then the data is imported to a computer, printer or to a mobile to send files electronically. Maximum no. of pages this pen can store is 10. At the top of the pen one tiny light is given which is used to write in the dark. If the use of the pen is over and it is left as it is than the power turns off automatically.

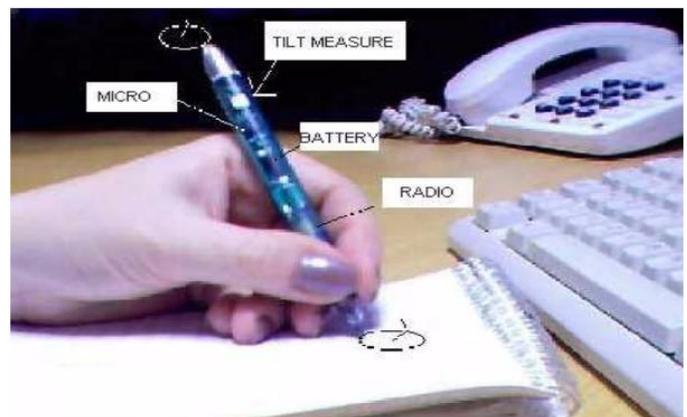


Fig 2 Working of Smart Quill

## III. FEATURES

### A. Display Technology

Smart Quill consist of Kopin Corp's Cyber Display which is ¼ inch diagonal LCD display. It uses circuitry built on a silicon wafer then removed and mounted to glass. To integrate displays to miniature monitors Smart Quill provides backlight, optics, packaging and ICS.

### B. HandWriting recognition

Smart Quill works by measuring the pen's movements and matching them to the movements that produce letters. There are two techniques as follows:

- Accelerometer technology
- Handwriting recognition software

#### Accelerometer Technology

A device called Accelerometer is used for measuring motion in this technology. It can be used to detect the arcs and loops, starts and stops of handwriting. Those information is transmitted to a small microprocessor that would make some sense of it as text. Also the invisible writing in air is achieved through this technology called accelerometer. There are two types of accelerometer as follows:

- 1) Two Axes Accelerometer – Two Axes Accelerometer measures acceleration in two axes. For example ADXL202.
- 2) Three Axes Accelerometer – Three Axes Accelerometer measures acceleration in three axes. For example Tronics +/-2g accelerometer.

#### Handwriting Recognition

Software Handwriting recognition software is a software that is embedded in the microprocessor of the pen and is used to recognize the handwriting of the user. The users install specific handwriting recognition software on a regular PC and the pen works in conjunction with that PC. This software translates the movements into the text on screen.

This software constitutes two major phases;

- I. Handwriting Transcription
- II. Handwriting Recognition

#### Handwriting Transcription

In Handwriting Transcription phase the recorded acceleration signals are transcribed to its original form. Firstly, the pen's spatial orientation is found followed by a double integration to solve all derivation problems.

#### Handwriting Recognition

Handwriting Recognition is the phase in which the characters and signatures are recognized. In this Euclidian distance is used as the comparison process and the decision process is the smaller distance found.

#### C. Display Screen using tilt sensors

User can choose applications and scroll without using scroll buttons by tilting the pen. By keeping the pen in left or right hand the text would get align. To measure tilt angle with earth Micro Electro-Mechanical Systems (MEMS) tilt sensors is used.

#### D. Communication with other devices

The earlier models of Smart Quill that were developed by BT laboratories communicated with the PC via a radio transmitter. But the current prototype hooks up via a cable to PC. When Smart Quill is placed into a docking station, the data stored in memory is uploaded to PC. An electronic docking station is a small cabinet to which a laptop can be attached that has connector for external connected devices such as scanners, hard drives, ports that

can be linked to components such as monitor, keyboard, printer.

#### E. Memory

Smart Quill has a memory 4MB EEPROM. At a time, the pen can store locally up to 10 pages of notes. Until the data is uploaded to the personal computer it is stored in the memory on the pen.

#### F. Power

Smart Quill is powered by Antiaircraft Artillery Battery (AAA). With a single AAA battery Smart Quill can work 25 hours continuously. It exhibits automatic on/off power system. The pen will automatically power down after a long period of no movement.

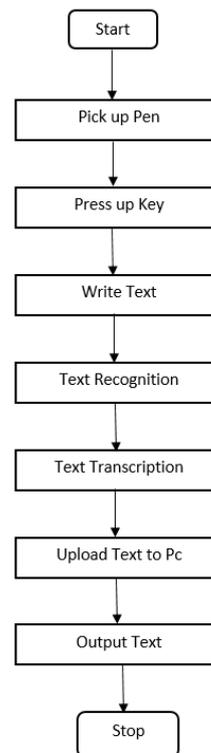


Fig 3 Flowchart

#### IV. 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 SmartQuill 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 e- mail messages. This is possible through recent technology involved in SmartQuill, the wireless messaging system which allows two way communications between devices.

#### V. ADVANTAGES

- Smart Quill can read on any flat surface and not only on paper.
- Smart Quill is protected by password.
- It is portable and highly convenient.
- With modems, printers etc. it can be linked.

#### VI. LIMITATIONS

- Smart Quill has accelerometer errors.
- People with hand tremours have inconvenience with it.

- It has a size bigger than a normal pen.
- Due to the thermal variations in the spring errors are introduced in the system.

#### VII. CONCLUSION

The main aim of this paper is to focus on enabling people with a pen which has much more functionality than an ordinary pen. How the idea of smart quill came to the inventor in her dreams is introduced. Here, all the description is given in detail about working of smart quill. Various features of the smart quill and how they are beneficial is stated in this paper. Also, benefits and limitations of this special pen is included in this paper.

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