

Spell-check pens: Learning with Technology and fun

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Abstract— *In this age of touch technology, people are diverting from the art of handwriting to touch based computing gadgets such as tablets, laptops and Smartphone. They prefer typing to handwriting because of number of user friendly apps like grammar checker which helps them in correcting their mistakes, instantly or they like to write on screen with stylus. But what if you get this facility on your handy pen? With this pen, you can write your contents without any spelling, grammatical mistakes or sentence correction error. In this paper, we have proposed a idea of using Spell-check pens which help you to not only improve your handwriting but also help you detect your spelling mistakes.*

Keywords— *Linux operating system, Non optical motion sensor, Bluetooth, Stylus, WI-Fi Module.*

I. INTRODUCTION

Fountain Pens:

A pen with a reservoir or cartridge from which ink flows continuously to the nib. *The pen draws ink from reservoir, through a feed, to the nib and deposits it on paper via combination of gravity and capillary action.*

Merits of Fountain Pen:

- Smoother writing.
- Wider variety of ink colour is available.

Demerits of Fountain Pen:

- Sometimes pen/ink incompatibilities due to flow low ink capacity
- Non water resistant ink.



Fig. 1 Fountain Pen

Ball Pens:

A pen that has a small metal ball as the point of transfer ink to paper. It was conceived and developed as a cleaner and more reliable alternative to Fountain Pen and world's most-used writing pen.

Merits of Ball Pen:

- Lower initial cost.
- Water resistant.

Demerits of Ball Pen:

- Ballpoints reliance on gravity to coat the ball pen with ink.
- Ball Pens cannot be used in space i.e. in zero gravity.



Fig. 2 Ball Pen

Digital Pen:

A digital pen is an input device which captures the handwriting or brush strokes of a user, converts handwritten analog information created using "pen and paper" into digital data, enabling the data to be utilized in various applications.

Merits of Digital Pens:

- Converts handwritten notes into digital text.
- Keeps things organized and allows for a back up file of notes and audios.
- Records people speaking and play it back.
- Can download apps onto the pen - Such as helping people speak different languages, play games, make music, and help define a definition of a word.

Demerits of Digital Pens:

- Privacy.
- Does not always download handwritten notes perfectly.
- High Cost.



Fig. 3 Digital Pen

Working of Digital Pen:

- A. The **ink refill** leaves an ink trail on the page. You can see this but the pen can't.
- B. The **infrared LED** in the base of the pen shines onto the page. You can't see it because your eyes can't detect infrared.
- C. The **light detector**, also in the base of the pen, picks up the infrared reflected off recognition marks printed on the special paper.
- D. The **microchip** in the pen uses the pattern of reflections to store images of the words you're writing
- E. The **Bluetooth** antenna built into the pen transmits the stored data wirelessly and invisibly through the air.
- F. The **wireless receiver** in your computer picks up the Bluetooth signals and stores what you've written. Software in the PC converts this data into normal, editable text you can import into a word-processing program.

Spell-check Pens:



Fig. 4 Spell-check Pen

The pen recognizes the characters and words and compares them to its dictionary database. As you write, the pen “reads” the words. Get something wrong and the pen vibrates. The algorithm can tell you wrote Police instead of Police or respond with a red flag when the written word simply does not exist in the database (e.g. “poleez”). So far it can’t yet predict what the writer might want to write, but that could come down the line.

The computer inside pen is an embedded Linux system. The board contains motion sensor, processor, memory, Wi-Fi and vibration module.

For instance – you could create an app so that Parents could check on their kids’ learning success with a statistics app. Two (or more) spell check pen users could work together in a single document using a co-writing app. Kids could play learning games together or send their grandparents handwritten postcards through the Internet. It could through the Internet. It could even enable real-time monitoring of school work in an education setting.

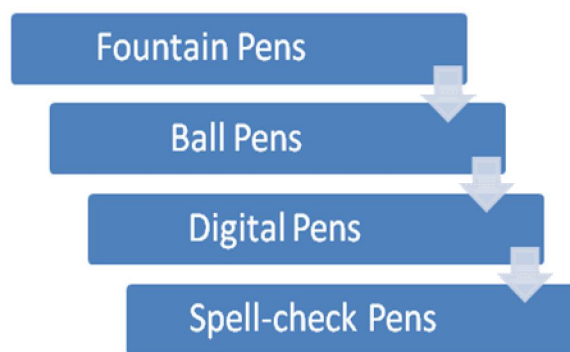


Fig. 5 Evolution of Pens

II. WORKING OF SPELL-CHECK PENS

It’s a digital pen that recognizes spelling and grammatical mistakes and warns you by a mild vibration. It does not require a surface to write anything on. Which means you can literally write on air. You can sync everything you write with this pen on your smart phone. Awesome everything is going “smart way” these days. Smartphones, smart TVs, smart cars and of course we have list of smart watches. An addition to the list of these smart gadgets is **smart pen**. German start-up Lernstift is working on one such innovative gadget that you can use to write on paper, on air or virtually any surface. And at the core of this smart pen lies an embedded Linux system.

And if you want to improve your handwriting, pen can help you do that as well.

You can use this pen as a fountain pen, ballpoint pen or pencil by replacing its tip. Initially, spell check pens will support only English but we can add more language.

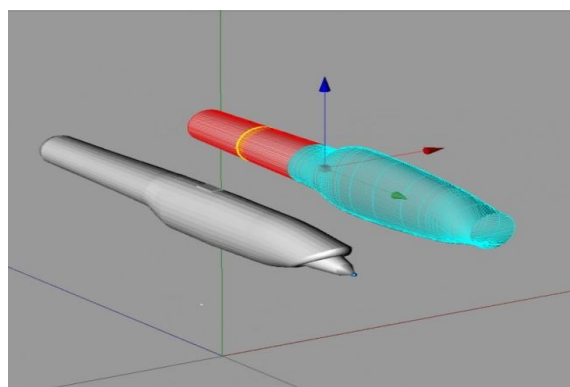


Fig. 6 CAD view of Spell-check Pens

It has two writing modes, Calligraphy and Orthography mode. In Calligraphy mode the smart pen vibrates once if a letter is illegible. In Orthography mode, it vibrates once for spelling mistake in a word and twice for a grammatical mistake in a sentence.

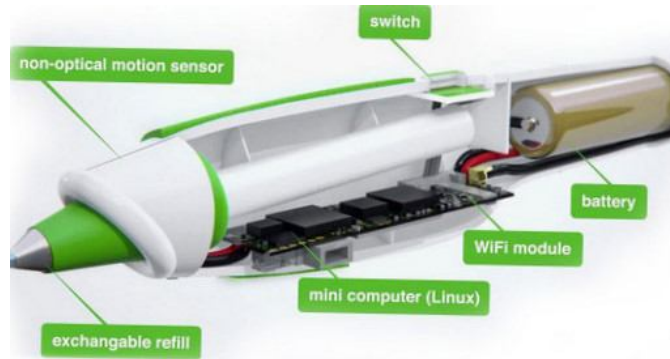


Fig. 7 Components of Spell-check Pens

The motion sensor recognises all writing movements, even if the pen is used to write in the air. This means it doesn't need any additional recognition devices or special paper to work, like other digital pens on the market.

Built-in Wi-Fi means it can connect to smart phones and computers for social media sharing or learning websites. It uses built-in handwriting software to compare the written words with the correct spellings. Future models will also be able to point out grammar mistakes such as wrong word order.

The refill can be replaced and may be changed from a ballpoint pen to a fountain pen or pencil. It combines a gyroscope with accelerometer, and to optimise the motion recognition, the inventors also added a magnetometer.

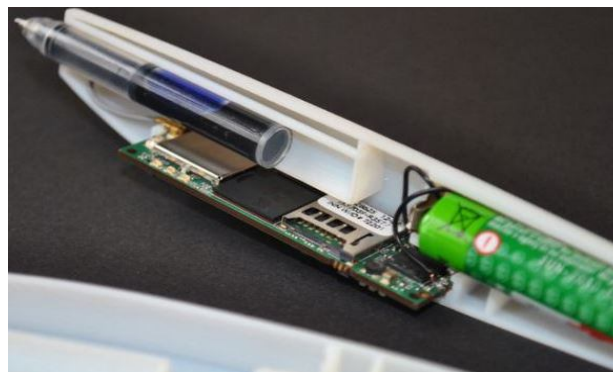


Fig. 8 Inner Working of Spell-check Pen

Additional features that can be added to Pen:

- **Bluetooth:** the Bluetooth antenna built into the pen transmit the stored data wirelessly and invisibly through the air.
- **Camera:** camera based pens can be used to record videos of our work which can be useful to analyze our work details and working of pen.
- **USB:** we can have a additional feature of USB to connect pen with Smartphone and computers.
- **Wi-Fi:** Built-in Wi-Fi means it can connect to Smartphone and computers for social media sharing or learning websites.

Merits of Spell-check Pens:

- This innovative product can be helpful in improving one's handwriting.
- Helpful for persons weak in grammar.
- Can be helpful in improving one's writing skill.
- It will re-divert people back to the art of handwriting.

Demerits of Spell-check Pens:

- It may not be suitable for aged people as human hands start trembling with age.
- Regular vibrations alert can be irritable for a writer.
- Continue alerts will disturb flow of a writing of a person.

III. CONCLUSIONS

In this paper we have suggested an innovative idea of Spell-check pens technology. The paper provides the types of components which can be used to form a digital pen that can be used to correct spellings and write more pretty. The paper describes working of smart check pens. The idea provided in this paper may be used by students, employees all over the world .Further modifications in the pen can help to correct grammatical mistakes. It is our belief that with further implementation and prototype evolution, it will be possible to make digital Spell-check pens appear as a commercial product targeting students and business professionals.

ACKNOWLEDGMENT

We would like to express our sincere thanks to our principal Prof A.P.Bodkhe and head of our department Prof G.R.Bamnote for their tremendous support and guidance. We would like to express gratitude and whole hearted thanks to our guide Dr C.M.Sedani under whose guidance this work is carried out. It was his keen interest encouraging passion and full co-operation. Last but not the least we would like to thank all those persons who are directly or indirectly related to our presentation.

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