# Turning a pen into a HAT (Handwriting Assisting Technology)

## *Investigating the effectiveness of a digital pen to improve handwriting skills*

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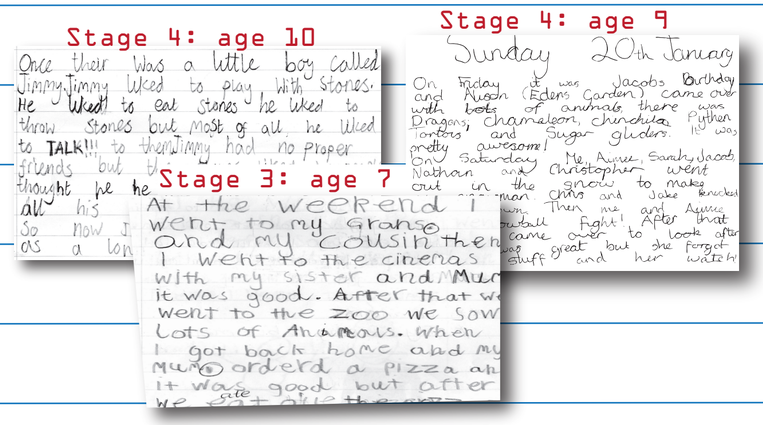
## Problem

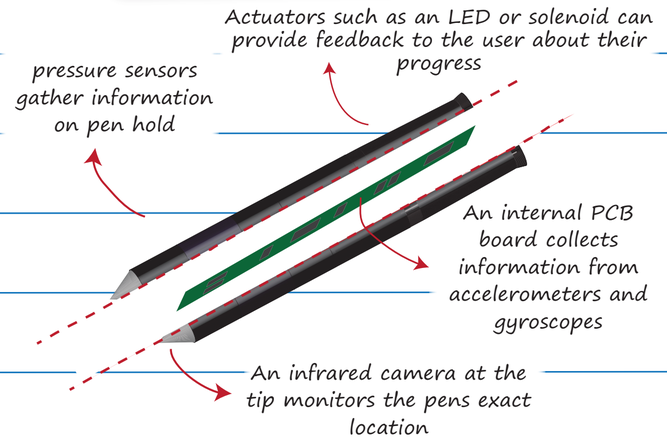
The 21st century classroom aims to raise a generation of computer literate digital natives. However, time spent on such activities inevitably results in less time for traditionally taught subjects – like handwriting. At present handwriting is only learnt at taught by teachers in class. With less time to support handwriting skills in class, is it possible to support pupils with a technology that will complement existing handwriting practices in order to enhance the resultant handwriting.

## Motivation

The evolution of handwriting was a major factor in the development of modern society. Whilst handwriting may be perceived as becoming redundant, it is still a:

- Necessary skill
- Major component of the curriculum
- Method of self-presentation
- And has proven neurocognitive benefits




## What makes 'good' handwriting?

It must be legible which requires appropriate and consistent:

- Pen hold
- Character sizes and slant
- Spacing between characters and words
- Writing rhythm and speed


## Developmental Stages of Writing:

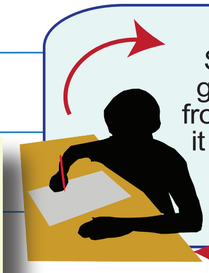
Stage 1: Learning to hold and control a pencil

Stage 2: Forming letters, writing on a line

Stage 3: Refining letters/words/spacing, introducing grammar

Stage 4: Joining up letters, improving speed

Stage 5: Developing fluency and a style



Sensors in the pen gather information from the user, process it and send feedback to the pen

More detailed feedback can be provided by connecting the pen to a secondary device

## Goal

To develop a pen like technology that will provide feedback directly to the user, without the need of a teacher, about their handwriting. This requires developing, testing and combining sensors and actuators to create a workable HAT prototype. Current pen technology from Anoto may used, built upon and then encapsulated in a cover created by a 3D printer. The resultant device must be portable, easy to use and practical in a classroom situation. Once prepared, user testing will be conducted with Stage 4 users. These users can write but need to improve speed, fluency and consistency in their writing. This provides scope for future work with adult learners.

Current work to date includes research into the history and development of handwriting, existing pen technologies, the development of learning theories, the teaching of handwriting and current handwriting schemes

## Proposed timeline of Work