

Project Charter: Keep in Touch
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Overview:

In this project, we aspire to create an interactive learning system for touch typing. One major flaw in most existing typing learning softwares is that while the proper mapping from fingers to keys is shown, it is not enforced. This allows learners to pick up bad habits that could result in ergonomic strain, potentially leading to repetitive motion injury and carpal tunnel syndrome later in life, especially for those who spend many hours typing a day.

Objectives:

- Design and optimize a smart glove with pressure sensors located at the fingertips
- Develop an interactive learning software for touch typing that integrates pressure sensor feedback with visual or tactile feedback for the user
- Integrate software and hardware components

Project Approach and Resources:

In order to map key strokes to the fingers being used, we will develop a glove containing pressure sensors (such as: <https://www.sparkfun.com/products/9673>) at the fingertips to detect when a finger is pressing down on a keyboard. We will be using the Freescale Kinetis KL25, an MBED board with an ARM Cortex M0+ processor to collect and process the data from the pressure sensor. Since the MBED board only has 5 analog channels, a multiplexer may need to be used to collect data from all 10 fingers. In parallel, we will develop a touch type learning program that uses data from the pressure sensors to ensure that the correct finger is being used. Feedback will be provided to the user in the form of a visual message or potentially a vibrate/LED signal.

Timeline of Major Deliverables:

Tuesday October 21	Project charter
Wednesday November 5	Finish gathering materials
Wednesday November 19	Finish core of typing program and initial hardware prototype
Wednesday November 26	Finish data processing part of software
Wednesday December 3	Finish integration of hardware and software
Wednesday December 10	Finish report and start rehearsing presentation
Wednesday December 17	Present project
Friday December 19	Submit report

Constraints, Risk, and Feasibility

Our system needs a very high degree of accuracy in order to be successful. False negatives or false positives in detecting finger pressure can easily result in a negative or frustrating experience for the user. The pressure sensors we use need to be of the appropriate sensitivity. This means that it must be sensitive enough to detect every single time a finger is pressed down. At the same time, the pressure sensors can't be so sensitive that even gently resting ones fingers on the keys cause them to detect a force.

Another constraint in our system is that we need accurate timing between our learning software and our glove in order to key presses detected by the computer to finger presses detected by the globe. Finally, since our microcontroller only has 5 analog inputs, we need to design a system that allows us to read from all 10 of our finger pressure sensors.

The main risk with this project is associated with our ability to minimize false positives and false negatives while maintaining accurate timing between our microcontroller and learning software. However since we are using very mature technologies, this project should be quite feasible.