

# Espresso: Typesetting Handwritten Mathematical Expressions in LaTeX

[Project Proposal]

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## ABSTRACT

This paper sets forth to describe and outline plans for the undergraduate Computer Science capstone project of the aforementioned author. The project is to research, design, and implement a tablet-based software solution for the capture of hand-written mathematical expressions and create the appropriate LaTeX source code from which to compile nicely-typeset versions of the aforementioned expressions.

The objective of the project is considerably challenging for an undergraduate Computer Science student to undertake. This proposal will explain how the process will be segmented incrementally in phases of research, design, and implementation so as to produce tangible results regardless of how rigorous the subject matter becomes.

The context of this project will include image processing, artificial intelligence, application development for the Apple iOS platform (particularly in the tablet form factor), as well as the adherence to a highly disciplined development cycle. The author will attempt to most accurately and most briefly explain any uncommon concepts described hereafter.

## 1. INTRODUCTION

Throughout modern history, the tablet form factor of computing has come, gone, and come again. In the late 19th Century, inventors worked to create devices that could take input and return output on the same slate surface. From Isaac Asimov's novel *Foundation* (1951) to Gene Roddenberry's *Star Trek* television series (premiered 1966) to Arthur Clarke's and Stanley Kubrick's film *2001: A Space Odyssey* (1968), tablet computers have been prominent in science fiction for over fifty years. Computer manufacturers and software developers have prototyped, designed, and implemented numerous iterations of the concept, historically with little success.

The utility of such a form factor of computing has only been recently fully realized, with the nascence of the "Post-PC" tablet, migrating away from the standard desktop usage paradigm commonly associated with computing. The modern tablet focuses on media consumption and so-called "basic" computing.

In today's reality, most "Post-PC" tablet devices are incredibly powerful both in hardware and in software, supporting complex and challenging computations including the decoding of video, image processing, interpretation of multiple inputs, managing several network connections, and displaying high-resolution two- and three-dimensional graphics.

The modern tablet has proven to be a preferable for several functions, most of which rely upon the user's direct interaction with the screen. This, of course, is the distinct difference (and advantage) of the tablet form factor over the conventional keyboard-mouse-monitor paradigm. Over the years, manufacturers and developers alike have struggled with a complex problem: handwriting recognition.

A relatively unexplored context of handwriting recognition is that of recognizing mathematical equations. The existing solutions appear to utilize full-scale handwriting recognition heuristics to recognize equations.

## 2. CONCLUSIONS

## 3. REFERENCES