

# Collaborative Software Development: The Thomas Paine Encyclopedia

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**Abstract**—We outline the collaborative effort in developing the mobile application “The Thomas Paine Encyclopedia” – an educational and research tool for historians, political scientists, and 18<sup>th</sup> century literature students and experts. The project was a collaboration between a computer scientist and a political historian, whose expertise complemented each other and helped shape the application as the most detailed, historically accurate resource on Paine and his life and works. The app provides an immersive historical experience for experts and students alike.

*Keywords:* Mobile App, Thomas Paine, Research/Education tool, User Interface

## I. INTRODUCTION

DURING the past decade, Digital Humanities has become a very active interdisciplinary research area aiming to bridge the gap between traditional Humanities disciplines and Computer Science. The goal of this large-scale endeavor is to develop and employ computer-based methodology and software in Humanities research and education. As part of this effort, we created and deployed “The Thomas Paine Encyclopedia” – a unique mobile application devoted to the life and works of Thomas Paine.

Thomas Paine was one of the Fathers of the American Revolution, an influential 18th century political thinker, philosopher, inventor, and writer, whose fiery words ignited the American Revolution, supported the French Revolution, and continue to inspire people around the world to this day. Paine’s major works - “Common Sense”, “American Crisis”, “Rights of Man”, “Age of Reason”, “Agrarian Justice” - are a required reading for many high school and college level courses in History, Political Science, and Literature.

In 2012, the Institute for Thomas Paine Studies (ITPS) - a collaboration between Iona College, NY and the Thomas Paine National Historical Association (TPNHA) – urged the development of a mobile application dedicated to the life and works of Thomas Paine. This application was intended to be an integral part of a wider educational effort, which included the development of a Thomas Paine curriculum and a research project on authorship authentication of Thomas Paine works [1]. The development of the “Thomas Paine Encyclopedia” (TPE) application was a collaborative effort between the author (a computer scientist) and the coordinator of ITPS, Gary Berton (a historian).

This paper describes the development process, the innovative features of the TPE application, and considers its international impact on Paine education and research.

## II. DESIGN GOALS

We set out to design the Thomas Paine Encyclopedia as a one-of-a-kind, interactive, mobile application meeting a number of design goals:

- Provide an exhaustive and complete set of biographical, literary and other resources on Thomas Paine, his life, times, and works
- Provide the highest level of historical accuracy
- Provide an immersive user experience capturing the historical nature of the material presented
- Ensure ease of use for all application users
- Ensure usability for both research and education

To achieve these goals we had to carefully consider the availability of historically accurate materials and literary texts, as well as the software architecture most appropriate for presenting these materials in a hardware-constrained mobile environment.

## III. HISTORICAL MATERIALS

The materials used in the application were methodically collected and cross-verified by Gary Berton – an expert on Thomas Paine studies, a historian for TPNHA, and the coordinator of ITPS. Mr. Berton used a large number of resources [2-12] to compile the most historically accurate biography of Thomas Paine based on facts that Paine scholars agree on and on the latest research results available. Next, the biographical material had to be scaled down to accommodate the mobile nature of the application. The material was then broken into a number of chronological pages, each devoted to a significant milestone in Paine's life.

A number of historical images and maps were also collected in support of the biographical write-up. The dates of these maps and images correspond closely to the actual dates of the events described in the biographical text. The maps and image were obtained from a variety of sources such as the TPNHA Collection, the Library of Congress, and the David Rumsey Historical Maps Collection.<sup>1</sup> Copyright permissions and waivers were obtained for all images and maps not in the public domain.

The literary works of Thomas Paine have been meticulously collected and archived by the TPNHA. Direct access to all of Paine's writings is available through the TPNHA website [13] or through the TPE application.

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<sup>1</sup> For a complete listing of the image/map resources, see the Acknowledgements section at the end of this paper.

#### IV. SOFTWARE ARCHITECTURE

In accordance with the goals set forth at the beginning of the project, the software architecture was designed to reflect the historical nature of the project and to provide an intuitive navigation and an easy access to the wide host of biographical and literary material in a hardware resource constrained mobile environment. The application is designed as a collection of components – Biography, Selected Works, Anti-Paine Cartoons, Quotes, and Credits – accessible through a common main interface.

##### A. The Main Interface

The main interface of the TPE application consists of a number of overlapping, semi-transparent, moving panels, which provide access to the specific application components.



Fig.1 The main application interface

The panels are moved by swiping to the left or to the right. The active panel is in the center, and tapping on it brings forth the specific application component. The motion of the interface is controlled through a physics-based software system, which uses friction and inertia to control the scroll speed of the panels based on the length of the swipe.

To provide a uniform look-and-feel to the overall application, the main interface is mirrored at the navigation levels of each of the application's sub-components. All components except "Biography" use a similar panel-based navigation, but the individual look-and-feel is different for each component so that they can be easily differentiated based on their appearance.

##### B. The Biography Component

The Biography component is designed around a multi-level, map-based navigation system. Its purpose is to combine the chronology of events in Thomas Paine's life with the specific locations where these events took place, thus providing a more immersive, visually stimulating, and true historical experience to the users. Accurate historical maps, dated very closely to the actual time of events, were

used to create the layered navigation system, which consists of three layers – "world", "country", and "city".

The top ("world") navigation level presents the user with a map of Europe, America, and the Atlantic Ocean – the locales upon which all events of Paine's life took place.



Fig.2 Top ("World") level of the Biography navigation system

The locale of the next chronological event is denoted with a blue star on the map. Locations that have already been visited are marked with a faded blue star. Tapping on an event star brings up the next level of the navigation controller – a specific country map. There are separate maps for each country that Paine lived in or visited – England, US, France, and the Caribbean.

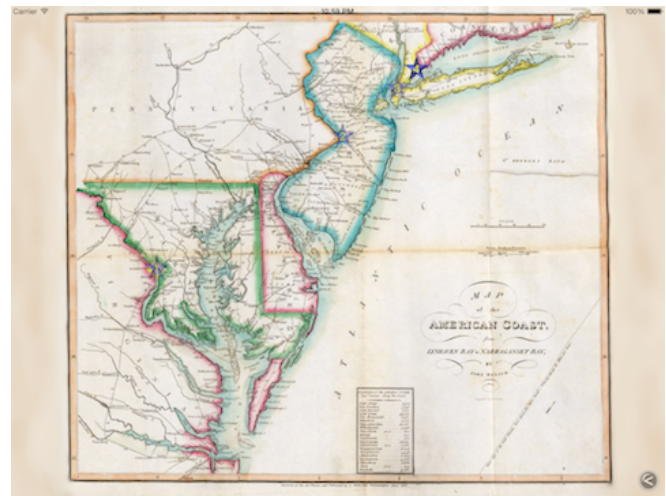


Fig.3 Second ("Country") level of the Biography navigation system

The country level of the biographical navigation interface geographically and chronologically localizes the events to a city or an area of a country denoted by a numbered blue star. One further localization occurs at the lowest level of the biographical navigation controller – the city level. At the city level, events are localized to actual physical addresses from the time of the events within the city or other locale. Tapping on the stars displayed on city maps brings up the

biographical page related to the specific locale, date, and event in Thomas Paine's life. The pertinent biographical information is presented in a scrollable/zoomable format, and illustrated with appropriate historical images.



Fig.4 Third ("City") level of the Biography navigation system with a biographical page open

Closing the particular biographical page automatically displays the next "event star" on the city map. When the events related to the particular city and time period have been exhausted, the "back" button in the bottom right of the city map blinks to remind the user to move to the upper level of the navigation interface in order to continue. Similarly, when all events related to a particular country/time-period have been exhausted, the user is prompted to return to the "world" map at the top navigation layer.

The biographical information can be traversed either chronologically or locationally. When using the default chronological traversal, the user is guided through the events in Paine's life one event at a time. The user has to navigate the multilayer map interface to locate the next event. If, on the other hand, the user is interested in locale-based information (e.g. which events in Paine's life transpired while he was in London), the "Clear Chronology" option displays all events pertaining to a particular locale without reference to a specific time period. The "Reset Chronology" option restores the default chronological traversal.



Fig.5 Biography component options

### C. Selected Works Component

Thomas Paine was a true "Renaissance-man": a philosopher, a political thinker and activist, a revolutionary, a writer, an inventor, and even an engineer.<sup>2</sup> Of all his numerous accomplishments, the ones that his legacy is most firmly cemented on are his literary works. They ignited the American Revolution, supported ideas of the French Revolution, and continue to inspire people around the world to this day. Among Paine's most famous works are "Common Sense", "The American Crisis", "Rights of Man", "Age of Reason", and "Agrarian Justice". In addition to these, a large collection of over 350 of Paine's essays, letters, and other major works is stewarded by TPNHA, and is available through their website [13].

The limited hardware resources of a typical mobile device preclude the possibility of effectively storing the entire collection of Paine's writings – in proper format - as part of the TPE app. It was, therefore, decided to include in the application only the most significant and famous works of Paine, and to provide access to the entire TPNHA collection through a web-based interface embedded directly in the TPE application. The texts are accessed using the familiar moving-panels interface, which mirrors the main application interface. Tapping on the centered panel displays the full, historically-accurate text of the selected work, formatted to maintain the overall immersive look-and-feel of the app.



Fig.6 The Selected Works component interface

### D. Anti-Paine Cartoons Component

Thomas Paine was an inherently controversial figure. Though admired by many, he was also deeply hated by rivals and political opponents, and considered a traitor by the British Government for supporting the American and French Revolutions. Paine's deist arguments against institutionalized religion and in favor of reason and free-thinking earned him enmity on both sides of the Atlantic Ocean, and especially in America.

<sup>2</sup> Paine designed bridges in England and in Philadelphia, US. He also worked on developing steam engines.



As a result, a large number of anti-Paine propaganda cartoons were created and published in the printed media of the time. TPNHA and other organizations and museums around the world archive the surviving engravings and paintings, and provide restricted access to them for educational and research purposes. The TPE application includes a relatively large sampling of the anti-Paine propaganda cartoons archived by TPNHA. The familiar moving-panels interface provides an overview of the available images.



Fig.7 The Anti-Paine Cartoons component interface

As always, tapping on the centered image reveals the actual content – in this case a split panel with the selected image on the left and a write-up explaining the historical significance and circumstances of the image on the right.

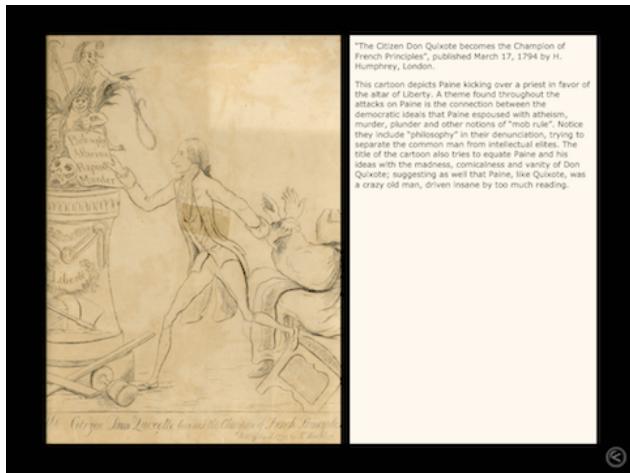


Fig.8 A sample Anti-Paine Cartoons content page

### E. The Quotes Component

Thomas Paine is renowned both for his witticism and for his profound, deep statements. Many of these statements have become widely popular, and are often used by literary researchers, authors, journalists, politicians, and common people alike. Gary Berton compiled an extensive set of Paine quotes for inclusion in the TPE application.

The quotes are grouped into a number of categories:

- Right to Revolution
- The American Revolution
- The French Revolution
- Citizenship
- War
- America
- Equality and Redistribution of Wealth
- Government and Rights
- Religion and Philosophy
- Monarchy
- Reason

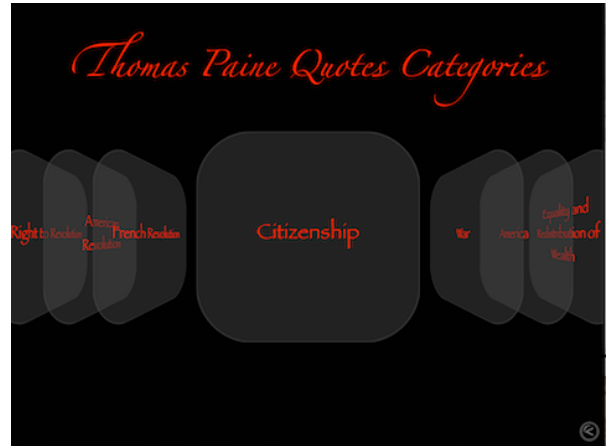


Fig.9 Paine Quotes component interface

Each category contains dozens of the most famous quotes by Thomas Paine. This categorization of quotes is unique to the best of our knowledge, and is extremely valuable for research purposes since it provides a direct access to the most topic-relevant quotations, avoiding the need for an exhaustive search through the entire collection.

The quotes in each category are presented using yet another variant of the familiar moving-panels interface. However, each panel is displayed full screen, and contains a single quote inscribed in golden letters. Swiping left or right slides the next/previous quote onto the screen using a modified version of the physics-based navigation system.

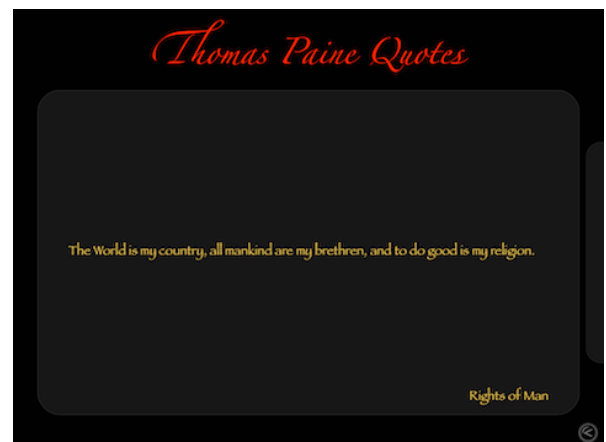


Fig.10 A sample Paine quotation

## V. ACADEMIC IMPACT

The application was deployed for free download on Apple's app store and has so far generated over 400 downloads. Understandably, the largest number of downloads comes from the US, Canada, and Europe, but a significant number of downloads originate in numerous other countries around the world - China, Australia, the Philippines, Indonesia, Japan, Cambodia, Nigeria, Ghana, India, Egypt, to name but a few. This in itself is a testament not only to the success of our project and the usefulness of the TPE application, but to the undying legacy of Thomas Paine whose ideas continue to inspire and move people in all corners of the globe.

The application was also well received in academic circles. Researchers studying the life and works of Thomas Paine have commented positively on the usefulness, completeness, and accuracy of the application. ITPS and Iona have recently introduced a new academic minor in Thomas Paine studies at Iona College, NY, and the TPE application will undoubtedly be a useful tool in many courses within the minor.

We are working hard to reach an even wider audience at universities and high schools, and to encourage the use of the TPE application in classes on American/World History, Political Science, Philosophy, and American Literature.

## VI. CONCLUSION

In this paper we discussed the development of a unique and innovative mobile application, "The Thomas Paine Encyclopedia", devoted to the life and works of Thomas Paine. The application provides students and researchers with a complete collection of historically accurate materials presented in a visually attractive and easy to navigate format.

Directions for future work on the TPE application include:

- Providing access to the Paine works from within the biographical map interface, cross-referencing the literary materials with the location and time period of its creation on the appropriate historical map.
- Providing an expanded set of tools within the app, specifically intended for classroom use.
- Adding to the application a detailed and historically accurate section about the American Revolution, and cross-referencing it with the events in Paine's life.

A long term goal of our team is the development of similar applications devoted to other leaders of the American Revolution, and integrating the various applications into a educational and research suite available to scholars and students around the world.

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- Harvard Map Collection
- American Philosophical Society
- TPNHA Collection at Iona College
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- Sussex Archaeological Society
- Educational Technology Clearinghouse
- Geographicus Rare Antique Maps
- Wikipedia Commons
- Margate Local History

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