

Enhancing Financial Literacy Through a Web-Based Compound Interest and Investment Calculator for Young Investors

Introduction

Compound interest is a powerful financial principle which rewards long-term investing, starting early can result in years of compound growth.

Despite its importance, current calculators fail to engage users, offering basic functionality, lack of interactivity and no real-world data.

Studies have confirmed low financial literacy among younger generations [1], and that financial tools can help demonstrate abstract concepts to improve comprehension [2].

This project aims to address these gaps and findings by implementing a modern Single Page Application (SPA) to help young users visualise and realise the long-term impact of investing, through this interactive, real-world driven and responsive SPA.

This SPA allows users to dynamically explore different financial scenarios using real data to show how consistent investments could grow over time.

Objectives

- Develop engaging SPA to visualise compound interest
- Use 3rd party APIs to show real-world investment data
- Implement usability logging
- Evaluate effectiveness using quantitative methods

Research Methodology

A quantitative, deductive approach was taken to evaluate the usability of the SPA. All user interactions were logged and store in a PostgreSQL database, the data was then used for analysis against pre-defined hypotheses.

A Trello Personal Kanaban board was maintained, allowing an Agile-inspired development. Tasks were split up and prioritised, the smaller tasks allowed flexibility while facing multiple technical challenges during implementation and deployment.

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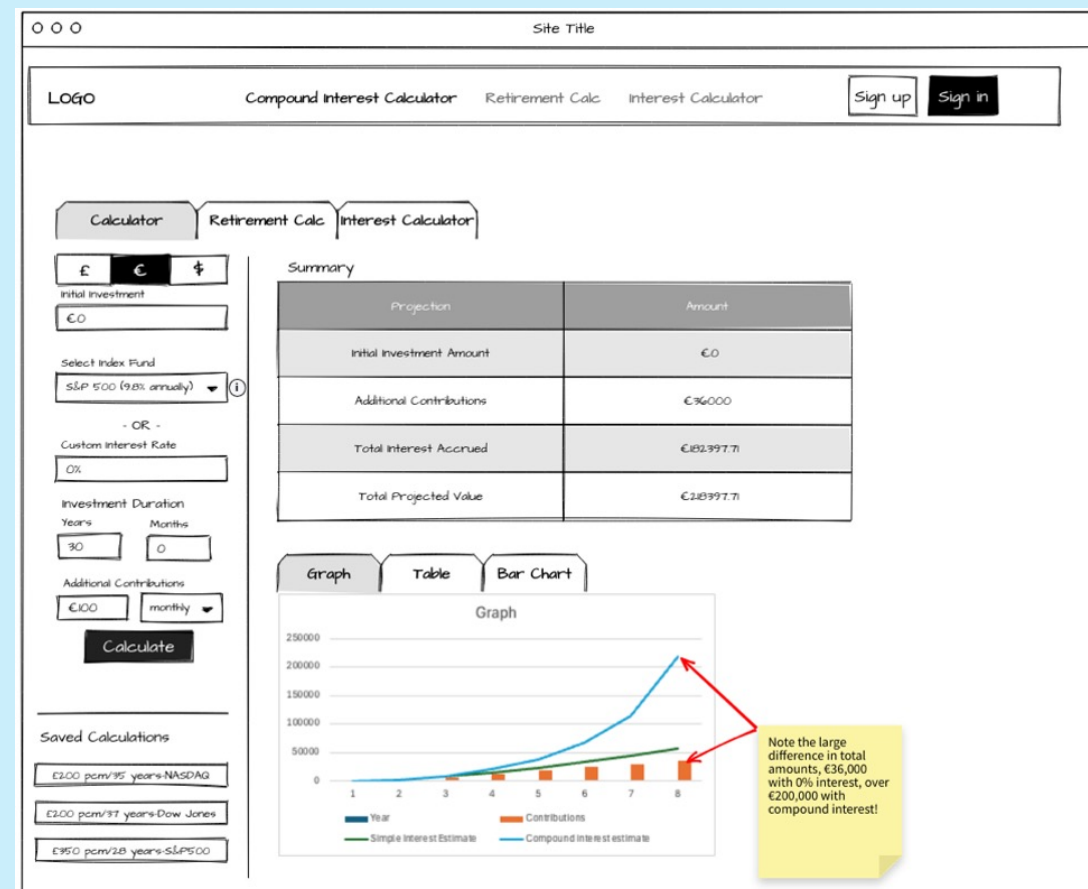


Figure 1 – Wireframe showing initial layout containing all main Investment Calculator features

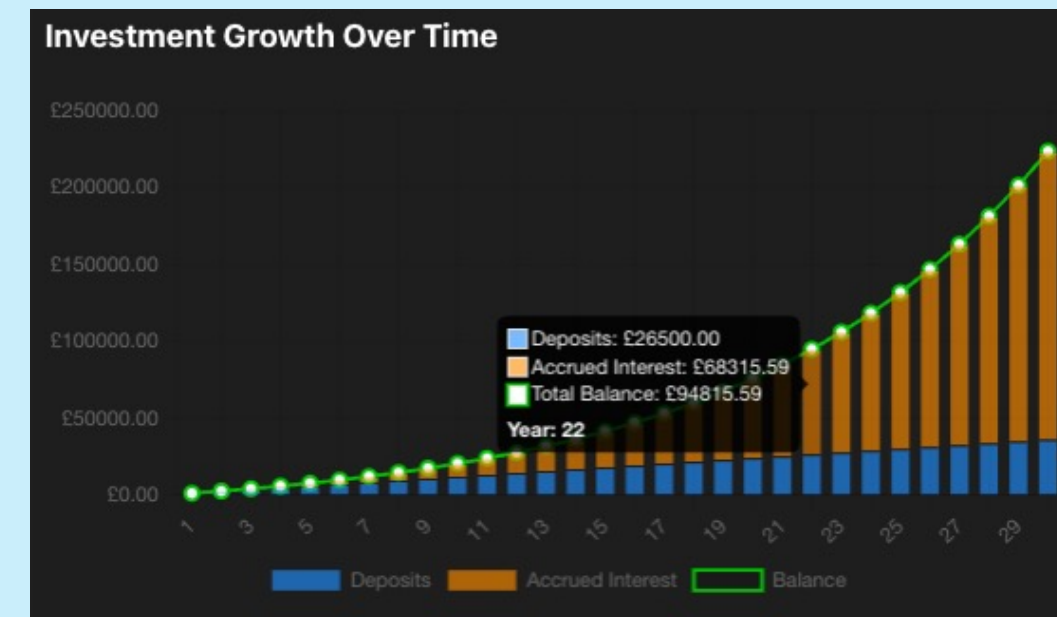


Figure 2 – Interactive graph updates as users adjust inputs

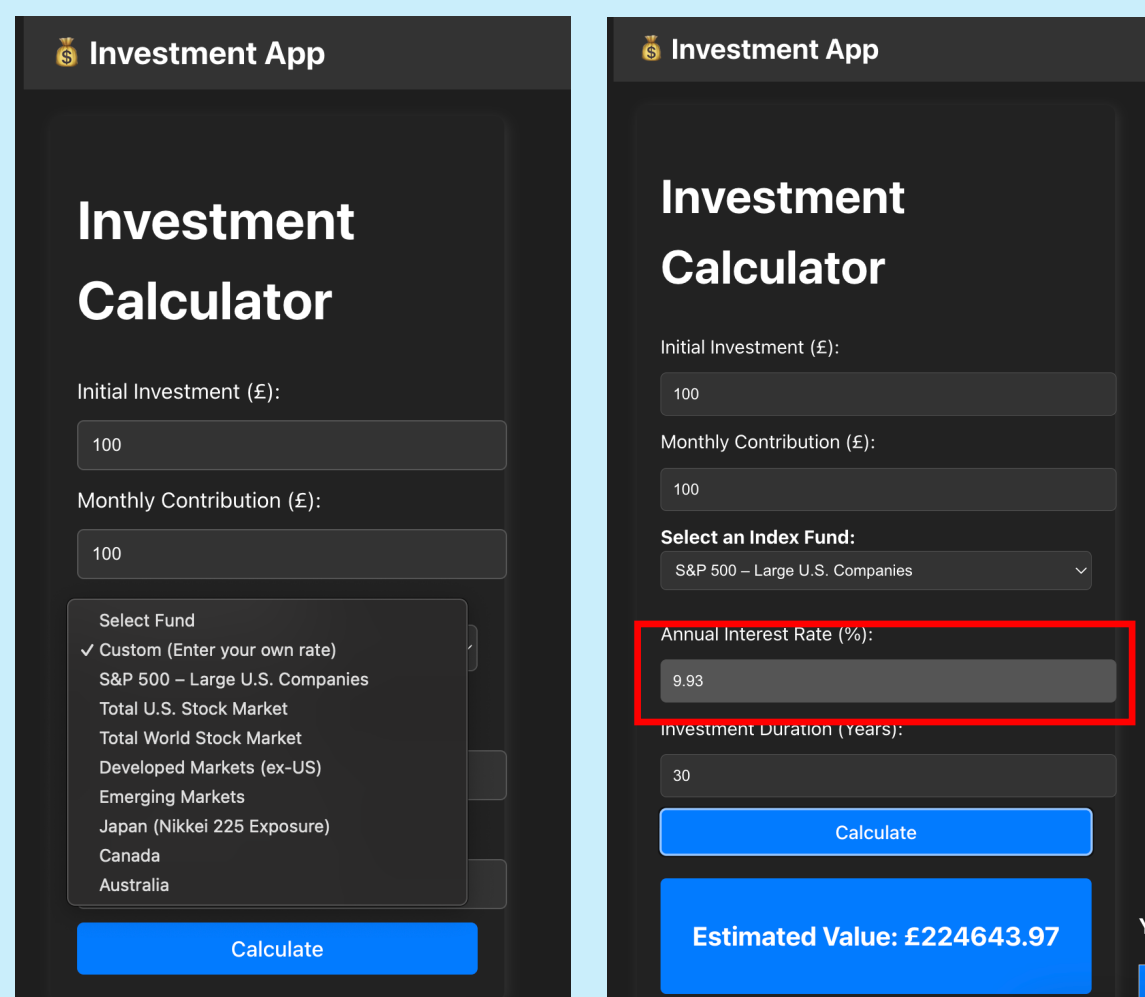


Figure 3 – Auto-updating dropdown to fetch data and automatically update interest rate

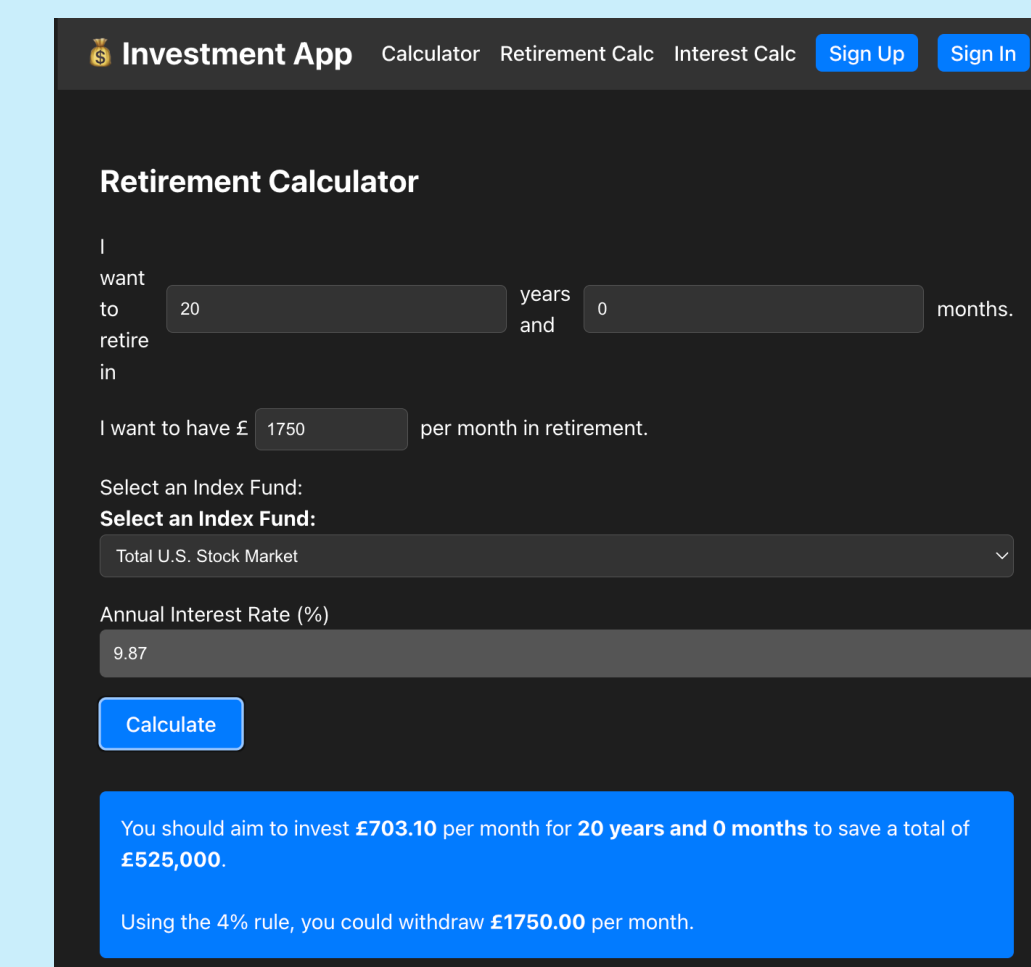


Figure 4 – Retirement Calculator

symbol	date	adj_close	open	high	low	close	volume
[PK] text	[PK] text	double precision	double precision	double precision	double precision	double precision	bigint
1	EEM	2023-04-14	7.411374568939209	11.144444445637207	11.222222328186035	11.144444445637207	11.222222328186035
2	EEM	2023-04-15	7.49942684173584	11.29111099243164	11.38888931274414	11.29111099243164	11.35555534362793
3	EEM	2023-04-16	7.586018085479736	11.477778434753418	11.533332824707031	11.477778434753418	11.486666679382224
4	EEM	2023-04-17	7.640317916870117	11.550000190734863	11.57221755981445	11.529999732971191	11.568888664254605
5	EEM	2023-04-21	7.637383937835693	11.582221984863281	11.583333015441895	11.555556297302246	11.564443588256836
6	EEM	2023-04-22	7.6630682945251465	11.56333257678223	11.603333472020566	11.527777671813965	11.603333472020566

Figure 5 – Historical Price Data fetched from Yahoo Finance API and cached in PostgreSQL database

id	timestamp	data
[PK] integer	timestamp with time zone	data
1	2025-04-15 17:06:25.215162+00	["page": "RetirementCalculator", "event": "pageVisit", "sessionId": "bf0d059-233e-47d3-bf6d-d177d451791", "timestamp": "2025-04-15T17:06:24.725Z"]
2	2025-04-15 17:06:25.216888+00	["page": "RetirementCalculator", "event": "pageVisit", "sessionId": "bf0d059-233e-47d3-bf6d-d177d451791", "timestamp": "2025-04-15T17:06:24.725Z"]
3	2025-04-15 17:06:26.450151+00	["page": "InvestmentCalculator", "event": "pageVisit", "sessionId": "161a1607-682b-48c6-8db-ea2c186ffcd", "timestamp": "2025-04-15T17:06:26.418Z"]
4	2025-04-15 17:06:26.452455+00	["page": "InvestmentCalculator", "event": "pageVisit", "sessionId": "161a1607-682b-48c6-8db-ea2c186ffcd", "timestamp": "2025-04-15T17:06:26.418Z"]
5	2025-04-15 17:06:31.463931+00	["page": "InvestmentCalculator", "event": "dropdownInteraction", "sessionId": "161a1607-682b-48c6-8db-ea2c186ffcd", "timestamp": "2025-04-15T17:06:31.463931+00"]
6	2025-04-15 17:06:33.919143+00	["page": "InvestmentCalculator", "event": "interactionEfficiency", "sessionId": "161a1607-682b-48c6-8db-ea2c186ffcd", "timestamp": "2025-04-15T17:06:33.919143+00"]
7	2025-04-15 17:06:33.919242+00	["page": "InvestmentCalculator", "event": "taskCompletionTime", "sessionId": "161a1607-682b-48c6-8db-ea2c186ffcd", "timestamp": "2025-04-15T17:06:33.919242+00"]

Figure 6 – Usability logs, automatically captured and used to quantitatively evaluate usability

Evaluation

Usability was evaluated through quantitative analysis of the user logs stored in PostgreSQL. The data was tested against hypotheses from 11 user testers.

- Hypothesis 1 – 60s Calculation without errors: Partially supported - 7/11 sessions had no input errors, of these 4 users completed a calculation within 60s, with 2 users slightly missing the 60s.
 - Hypothesis 2 - 75% of users use multiple tools: Partially supported - 7/11 users used multiple calculators (63%), tracking limitation may have affected results.
 - Hypothesis 3 – Recalculation after input change: 72.7% met this criteria, close to the 75% target, this showed solid engagement.
 - Hypothesis 4 – Graph Hover Tooltip interactions: Inconclusive. Despite frontend implementation of hover graph logs, logging failed.
- Overall, the logs showed that users generally had good engagement and used the app intuitively. Key areas for improvement were also highlighted, such as persistent session IDs and complete logs (hover logs).

Conclusion

This Final Year Project successfully delivered an interactive and engaging SPA which helps young users understand the benefits of long-term investing coupled with compound interest. Factors such as real-world data for calculations, clear visualisations, and a responsive user interface made this abstract concept understandable and engaging. By collecting user logs, quantitative analysis allowed for objective usability evaluation and showed that users actively explored multiple areas of the SPA, including all 3 available tools (Investment, Retirement & Interest Calculators), as well as adjusting scenarios to generate new results.

This is a solid foundation for further development and improvements can be built.

References

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- [2] E. Hubbard, P. Matthews, and A. Samek, "Using online compound interest tools to improve financial literacy," vol. 47, no. 2, pp. 106–120, 2016.
- [3] J. Nielsen, "10 Usability Heuristics for User Interface Design." Accessed: 2025. [Online]. Available: <https://www.nngroup.com/articles/ten-usability-heuristics/>
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Further references available in full report