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**London Campus**

# Fund Raising Web Application Using Digital Payment

**Submitted in accordance with the requirements for the degree of**

**Master of Computer Science**

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# Chapter 1 - Introduction

## 1.1 Background

Nonprofit organizations together with individuals and charitable initiatives need fundraising as their primary activity. Digital platforms now control fundraising practices by integrating new effective solutions which substitute door-to-door efforts and charity events (Altexsoft, 2021). Digital fundraising solutions enable organizers to engage with wider groups of donors through which they make transactions faster while securing donations.

Fundraising website portals function as crucial tools which help people and organizations gather financial support for their different purposes. Users of these platforms create custom fundraising initiatives and establish monetary targets which they distribute through digital promotional channels. The system combines PayPal with Stripe and credit cards for easy payment options which provide donors with an efficient donation experience (Paddle, 2022). The online fundraising method successfully breaks down geographical constraints which permits donors to come from every part of the world.

Digital fundraising comes with three main drawbacks which include the shortage of technical experience combined with unclear donor awareness and security fears (Donorbox blog, 2021). A carefully designed user-friendly website serves as an effective prevention method against donation obstacles because it provides both security features and easy navigation tools to generate trust and boost donor participation.

The creation of a successful fundraising web application includes essential features such as mobile responsiveness along with automated receipts plus multiple payment methods and encryption and tokenization security measures (Vyas, 2021). The introduced features lead to an efficient fundraising process with transparency which drives up both donor engagement levels and donations.

The research design implements a easy-to-use fundraising website platform to resolve prevalent problems encountered during both donation and fundraising processes. The project adopts contemporary web technologies along with safe payment integration systems to boost digital fundraising efficiency and enhance access for multiple groups of funders working toward worldwide causes (Abrol, 2022).

## 1.2 Problem Statement

Nonprofit organizations together with individuals need fundraising as their vital component to accept the financial backing required for different charitable purposes. The existing fundraising approaches encounter substantial barriers to fund acquisition because they perform poorly and reach limited audiences and donors avoid contributions following safety concerns and difficulties with donations. The fundraising methods of in-person gatherings along with bank wire transfers fail to reach a wide range of donors because they provide limited convenience for contemporary donors (Donorbox blog, 2021).

Unknown technical issues with new digital fundraising platforms continue to burden organizations because these platforms provide difficult interfaces and insufficient payment methods as well as security risks that make donors hesitant to donate. Some possible donors will choose not to donate because donation procedures take too long, they lack transparency or they worry about their financial data safety (Vyas, 2021). The lack of technical expertise among nonprofits hinders their ability to create and administer a secure fundraising platform which restricts their funds-raising efficiency.

This research establishes that developers should build a user-friendly as well as secure web application for fundraising to remedy current difficulties. The platform contains several payment methods in combination with automated donor relations features along with encryption and tokenization security measures to minimize complications in donations and maintain donor confidence. The research goal is to connect fundraisers with donors using modern web technology for a successful fundraising program (Abrol, 2022).

## 1.3 Research Aim and Objectives

The main goal of this research project involves developing a secure web application featuring user-friendly functionality to reduce barriers that enhances donor accessibility and clarity and advances engagement through contemporary web platform implementation along with secure transaction methods.

**1.3.1 Research Objectives:**

* The research examines the existing fundraising platforms to understand their restrictions together with usability difficulties and security problems as well as donor participation barriers.
* We will create a fundraising web application that incorporates PayPal and Stripe together with credit card payment features for creating a smooth donation process.
* The platform requires implementation of encryption and tokenization and fraud detection methods for secure transactions and donor information safety.
* Users will get a better experience when the application integrates mobile-friendly design with automated receipt generation and automated thank-you messages for better donor interactions.
* A usability test and feedback collection will assess the developed platform through the survey of potential fundraisers together with their donors.
* This research aims to develop an efficient trustworthy digital fundraising system which fulfills the requirements of fund raisers and donors through accomplishing these goals.

## 1.4 Research Questions

1. What are the main challenges faced by nonprofit organizations and individuals in securing funds through traditional and existing digital fundraising platforms?
2. How can a fundraising web application enhance user experience and donor engagement through improved design and functionality?
3. What are the best practices for integrating secure and user-friendly payment gateways into a digital fundraising platform?
4. How can advanced security features, such as encryption and tokenization, be implemented to protect donor transactions and personal information?
5. What impact does mobile optimization and automated donor engagement features have on the effectiveness of an online fundraising platform?
6. How can the success and usability of the developed fundraising web application be evaluated through user testing and feedback?

## 1.5 Significance of the Study

For charity organizations, people, and nonprofits wishing to improve their fundraising efforts, this report is extremely valuable. The goal of this project is to offer a workable solution to the problems with both traditional and digital fundraising techniques by creating a safe and intuitive fundraising web application. Several stakeholders will gain from the study's conclusions and results in the following ways:

* **Nonprofit Organizations and Fundraising Campaigns** – The recommended online application enables the organization to reach more people therefore raising more donations. Nonprofits gain their donors' faith by improving security standards and offering multiple payment methods.
* **Donors** – By including automatic interaction elements and secure payment mechanisms, the study highlights donor convenience and security. This guarantees that contributors may make contributions with ease and that their transactions and personal data are secure.
* **Technology and Web Development Community** – By investigating best practices in user experience design, payment integration, and cybersecurity, the study adds to the expanding field of web-based fundraising solutions. These information can be used by developers to produce creative online fundraising solutions.
* **Academia and Future Research** – The research findings from this study create a foundation for future investigations of donor actions and electronic fundraising and online non-profit platforms affecting charity donations. Researchers using this study along with students focused on digital finance and nonprofit technology can find it as a valuable resource.
* **Policy Makers and Financial Regulators** – Exclusive analysis of security concerns and compliance problems related to online fundraising provides knowledge that can help develop protective laws and standards for donors as well as fundraisers.

The project focuses on enhancing online donation operations through resolved digital fundraising challenges to create an efficient open fundraising environment that ensures security and accessibility.

# Chapter 2 – Literature Review

Development and subsequent adoption of fundraising web applications that incorporate digital payment systems changed the face of how people and institutions go about raising and handling charitable donations. The rapid rise of internet technologies and the proliferation of digital payment gateways has made the procedures of raising fund more convenient, accessible and safe. This literature review examines the fundamental themes such as the development of online fundraising, the place of digital payment integration, user experience design, donor involvement, and safety of data.

## 2.1 The Shift Towards Digital Fundraising

The traditional methods for fundraising like events, mail campaigns, door-to-door canvassing have been in use. Nonetheless, the digital age has brought innovative concepts, and primarily through online and mobile platforms. The rise of crowdfunding and web donation platforms including GoFundMe, Kickstarter and Just Giving demonstrates the change in fundraising model (Danielkievich, 2022). These platforms enable the fundraisers to contact the international audience with little logistical front-end.

Digital fundraising tools not only increase reach but also sow transparency, tracking campaigns and engagement. Abrol (2022) indicates that organizations that make use of digital platforms experience better donation rate because access to the platforms is convenient and there are various methods of communication. Apps integration, email marketing, and search engine prominence also play a part in wider reach and influence.

Moreover, COVID-19 pandemic served as a trigger for the increased rate of development of online fundraising that indicated the necessity of contactless, efficient, and secure systems for fund donation. Altexsoft (2021) remarks that digital tools proved to be adopted rather quickly by non-profits during the pandemic, and so digital infrastructure remained continually invested post-pandemic.

## 2.2 The value of User Experience in Fundraising platforms.

The User Experience is a theme of modern development of web applications. In a fundraising set up, a user-friendly interface is not only desired but necessary if a sought success is to be achieved. According to Vyas (2021), digital platforms that look good, are easy to navigate, and adapted to devices, lead to increased donor engagement and conversion rates.

UX design also involves many aspects, such as page load speed, readability of content, and clear call to action. Fundraisers’ platforms sometimes have such elements as donation progress bars, sections for testimonials, and campaigns highlights, which make the process of fundraising more trustful and emotionally attractive (Skillcrush, 2020). Moreover, mobilization optimization is no longer a choice. The fact that most users visit websites on mobile devices means that it is of paramount importance for the design to be mobile–responsive to ensure accessibility and ease in use from smartphones and tablets (Altexsoft, 2021).

In addition, the adoption of principles of Human-Computer Interaction (HCI), and User-Centered Design (UCD) framework ensures the platform is custom-made to the expectations, preferences, and behaviors of users.

## 2.3 Digital Payment Gateway Integration

Online fundraising applications are based on digital payment integration. Payment gateways such as PayPal, Stripe, Mobile Pay, and Apple Pay provide secure, quick, and convenient transaction experience. These services allow several payment options, such as credit/debit cards & digital wallets, which guarantees flexibility to donors (Ly, 2023).

From Diverse payment options it has been revealed that conversion rates increase. Paddle (2022) compared Stripe with PayPal and came up with the conclusion that using both enhances trust in donors and lowers the rate at which donors leave at the checkout step. Moreover, the use of APIs to integrate payments grants the developers an opportunity to personalize the donation flow and have real-time monitoring on the status of transactions.

One of the key things to consider is back-end integration that is seamless when handling refunds and currency conversions, recurring donations. Systems that provide an API documentation, and sandbox testing environment (such as PayPal Developer Sandbox), simplify the development process to increase the payment’s security and reliability (Danielkievich, 2022).

## 2.4 Security and Data Protection in e-Transactions

The digitalization of fundraising has also led to a lot of issues of concern regarding personal and financial details security issues. Two of the most popular techniques that have been widely implemented include the encryption and tokenization that offer vital protection for traversing and stationed data. Encryption converts a sensitive piece of information into unreadable material that cannot be decrypted without a decryption key, alternatively, tokenization mutates sensitive material into a unique identifier (Encryption Consulting, 2020).

The SSL (Secure Sockets Layer) certificates are now day-to-day for safe data interchange between web servers and users’ browsers. In addition, adherence to the PCI DSS is also required for platforms that process card transactions (Vyas, 2021).

Modern payment systems utilize advanced fraud detection systems and machine learning algorithms to detect dubious activity and to prevent fraudulent transactions on a real-time basis. According to Long (2022), tokenization remarkably reduces the incidence of data leakages, especially in the customer’s payment details storage.

Two-factor authentication (2FA) is also an emerging normative practice applied to prevent the unauthorized entry. 2FA, even though not followed in small systems, adds another layer of security by making the users authenticate their identity through another device or token (Abrol, 2022).

## 2.5 Donor Engagement and Automated Communication

Relationship building with donors is very crucial for long-term fundraising. Auto generated receipts, thank you messages as well as periodical updates increases donor satisfaction and trust. According to Donor box (2021), automated messages not only send acknowledgment of contributions but also allow visibility on how the same is spent.

Personal communication helps to promote repeat donations. Such characteristics as dynamic email campaigns, recognition badges, and donor milestones strengthen the association between a cause and a donor (Donor box, 2021). In such cases, gamification, i.e., implementation of game-like functionality (progress bars, leaderboards, rewards systems) has been successfully implemented to encourage donors and interaction.

Additionally, analytics tools that are embedded in fundraising platforms give insights on donor behavior, best times for donation and performance of campaigns. Such metrics make the campaign organizers sharpen their strategies and perform better.

## 2.6: Pockets in the extant literature and future directions

Although the existing literature points out the advantages and attributes of digital fundraising applications, some gaps are present. There are many platforms that are not customizable to small or local non-profits because of high transaction fees or inability to adjust them. In addition, the issue of the donor fatigue is rapidly becoming a significant problem due to the over-saturation of the campaigns at popular platforms.

There is an insufficient foray into the potentials of new technologies such as blockchain, AI, and augmented reality that could reshape digital fundraising in the areas of transparency, traceability, and immersive storytelling. Subsequent studies should aim at looking into ways these technologies can be used for increased donor trust and campaigns engagement.

## 2.7: Summary

According to reviewed literature, it is very clear that the success of a fundraising web application through digital payment depends on five key factors. user centered design, secure and versatile payment integrations, robust data protection protocol, effective donor engagement mechanism, real -time analytics. With the advancement in technology, future fundraising can only be carried out through innovative technologies keeping them easily available for use, safe, and easy to understand. Resolving these aspects will not only provide the technical functionality of the platforms but also create long-term trust and loyalty amongst donors.

# Chapter 3 – Methodology and Implementation

Development of web-based fundraising platform with digital systems of payment requires a systematic approach that combines principles of software engineering and user-centric design with safe transaction technologies. In this part, the methodology utilized for the work has been discussed and the technical implement process, architecture, tools, technology, and security process involved in the system have been explained.

## 3.1 Development Methodology

The project used agile and iterative development techniques of development, which were highly flexible in design choice, continuous testing and incorporation of users’ feedback during development process. Agile methodology fits perfectly to web application projects where user experience and responsiveness are extremely important (Skillcrush, 2020). The development was organized as a sequence of iterative sprints where each one was concerned with developing and testing the main features like user authentication, campaign creation, and payment integration.

The project had five main steps, which included:

1. **Requirement Analysis**

During this phase, it was necessary to identify key user groups. campaign creators (fundraisers) and donors. Their needs were evaluated based on the relevant literature and competitive analysis of such platforms as GoFundMe and Donor box (Donorbox, 2021). Major features like secure donations, tracking of a campaign and automatic receipts were given top priority.

1. **Design**

User-Centered Design (UCD) was adopted to guarantee that the interface matches up with the expectations of users, attention to detail on accessibility, lucidity, and mobile responsiveness being paid (Preece, Rogers & Sharp, 2015). Figma was used to do wireframes and prototypes before development.

1. **Implementation**

This entailed development of a front end and back-end components using a modern web stack. Two possible descriptions of the technical implementation details are given in Section 4.3.

1. **Testing**

Functional, usability, and security testing included both the automated (Jest, Cypress) and manual approaches to maintain quality across devices and browsers.

1. **Deployment and Maintenance**

The final product was released in the cloud storage with the secure HTTPS protocols, and the documentation was prepared for future maintenance and new feature addition.

## 3.2 Tools, Technologies, and Frameworks

A great variety of tools and technologies was chosen according to its performance, community support, compliance with the current development practices.

**Frontend:** For front-end, React.js and Next.js were used to construct component-based and server-side rendered pages with fast load time and SEO compatibility in mind (Skillcrush, 2020).

**Backend:** Node.js was the backend runtime that supported asynchronous processing of API requests. RESTful API was developed to handle users, campaigns, and transactions.

**Database:** The scalability and document-oriented storage that is well suited for user profiles and donation records are the reasons why MongoDB was chosen.

**Payment Integration:** PayPal and Stripe APIs were used to provide donors various safe methods of money transfers (Ly, 2023).

**Security Tools:** SSL/ TLS encryption, tokenization (Long, 2022), and fraud detection methods were added to provide protection to sensitive data on the users and payments.

**Testing Tools:** Jest and Cypress were used in unit and end-to-end testing.

**Hosting:** The application was deployed to Google Cloud with HTTPS to guarantee secure transfer of data.

## 3.3 System Architecture and Implementation

The application architecture was based on three-tiered architecture:

**Presentation Layer**

The frontend (React.js + Next.js) included a UI to create the campaigns, look at donation pages, sign in, and manage profiles. Reusable components like buttons, modals, and forms were placed in a components folder which made development process efficient and reduced code repetition.

**Business Logic Layer**

The interaction with frontend and backend was handled by API routes. Express.js was used to list routes of user registration (/api/user), the posting of an advertisement (/api/donation), and payment authorization.

**Data Layer**

MongoDB collections were developed for the storage of user data and donation transactions, and campaign content. The schema was modelled for quick reads and indexing for easy query.

## 3.4 Key Functional Modules

**3.3.1 User Registration and Authentication**

A safe registration and login system was developed incorporating react-hook-form on the client-side validation of forms and hashed passwords in the server side. Axios was used to send data to the backend, and it was processed, stored securely in the backend. Error handling mechanisms guaranteed a graceful processing of invalid and duplicate registrations.

**3.3.2 Campaign Creation and Display**

Authenticated users could develop campaigns by providing titles, descriptions, images, and the goal amount of fundraising. These were shown in the dashboard dynamically through cards built with Bootstrap with custom CSS. Campaigns were fetched with Axios from MongoDB and were displayed in real-time.

**3.3.3 Payment Integration**

The use of the official SDKs and APIs of Stripe and PayPal helped to integrate them both:

Stripe was set up through the use of the checkout.sessions.create() method to make transactions. It accepted card payments and it offered a redirect-based confirmation (Paddle, 2022).

PayPal was rolled out using the PayPal Standard and PayPal Payments Pro, thus giving the donors the option to use redirect or embedded payments. During testing, it was a sandbox environment that was used (Ly, 2023).

After each successful transaction, the backend updated the raised amount of the respective campaign and sent a confirmation email with a receipt.

## 3.5 Security Implementation

Security was also majored on as financial and personal information had to be handled. The following measures were taken:

**SSL Encryption:** Made communication between client and server safe through HTTPS (Cloudflare, 2021).

**Tokenization:** Payment data that were sensitive were tokenized prior to storage or transfer and hence the risk of interception was minimized (Abrol, 2022).

**Encryption:** User data and passwords were secured using common algorithms (Vyas, 2021).

**Two-Factor Authentication (2FA):** Planned for future integration to improve the login security.

**Fraud Detection:** Stripe’s native fraud detection algorithms as well as PayPal’s security check used (Paddle, 2022).

**Security Audits:** Manual reviews and tests provided by tools were utilized to identify vulnerabilities in the code and logic flows (Encryption Consulting, 2020).

## 3.6 Testing and Evaluation

Complete testing was performed on unit and system level:

**Unit Testing:** Jest was used to test React components to see whether it works with mock data.

**End-to-End Testing:** Cypress mimicked user flows i.e. registration, campaign setting up and payment using several browsers.

**Responsive Testing:** Manual checks on mobile, tablet, and desktop devices made sure there was a uniform function.

**Security Testing:** Input validation was used to stop the attacks of XSS, CSRF, and SQL injections.

Feedback from the user was collected from a small group of beta testers with adjustments made to design of page layout, placing buttons, and error messages.

## 3.7 Deployment

The application was deployed at Google Cloud Platform (GCP) with the help of a Node.js server. Storing sensitive API keys and database credentials was done using environment variables. HTTPS certificates were set up using Let’s Encrypt to secure the application.

GitHub Actions was used to create a CI/CD pipeline to automate testing and deployment. Google Cloud Console and analysis of logs for errors were used to monitor the platform.

## 3.8 Challenges and Solutions

|  |  |
| --- | --- |
| **Challenge** | **Solution** |
| Payment API integration errors | Sandboxing environment for Stripe and PayPal were used. followed formal guidelines and forums of developers (Ly, 2023) |
| Cross-browser compatibility | Applied responsive design and cross-checked them on Chrome, Firefox and safari. |
| Security compliance | Applied encryption, tokenization and SSL. created documentation for the future PCI-DSS audits (Vyas, 2021) |
| User dropout during donation | Made donation form easier and added autofill as well as clear progress indicators |

## 3.9 Summary

The approach and implementation of the fundraising web application was created with keeping in balance the usability, performance, and the security. The platform can provide a scalable solution to the problem existing with the traditional fundraising systems by using the modern technologies such as React.js, Stripe, and MongoDB. With the help of agile methodology, secure payment integration and user-friendly design, the platform becomes available and trustworthy for both donors and fundraisers. Advanced features like donor analytics, blockchain integration, as well as AI-powered campaign suggestions to increase performance and transparency may be studied in further works.

# Chapter 4 – Project Outcomes

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