

# STELLAR U

PAYING TUITION THROUGH  
BLOCKCHAIN TECHNOLOGY



# OUR TEAM



**Jwalit**



**Devesh**



**Abdul Aziz**



**Dalya**

# Project Overview

StellarU is a decentralized web application that simplifies tuition payments for university students using Stellar blockchain technology. It abstracts the complexities of crypto wallets and blockchain interactions, providing a Web2-like experience for students, universities, and sponsors. Students can:

- Log in with a Student ID and School selection.
- Automatically generate a Stellar Passkey.
- Check tuition balances.
- Pay tuition in CADT tokens.
- View transaction history and download receipts.

All payments are processed on Stellar Testnet with transparent links to Stellar Expert.

# Main Components

## FRONTEND

- **login.html**: Handles student authentication (Student ID & School) and generates a mock Stellar Passkey.
- **index.html**: Main dashboard for tuition management, payments, and transaction history.
- **style.css**: Dark/Light mode theming, responsive design, UI enhancements.

## JAVASCRIPT MODULES

- **students.js**: Manages student data, balances, and renders payment summaries. Stores and retrieves data from LocalStorage.
- **send-cadt.js**: Handles Stellar payments via Stellar SDK. Builds and signs transactions, submits to Testnet, and updates history.
- **tx-history.js**: Renders payment history and provides download links for transaction receipts.

## BLOCKCHAIN INTEGRATION

- **Stellar SDK (v10.4.0):** For building, signing, and submitting payments.
- **Stellar Testnet & Horizon API:** For transaction submission and account querying.
- **Stellar Expert:** Provides transaction explorer links for transparency

## DATA PERSISTENCE

- **Local Storage:** Used to store student sessions, balances, and generated passkeys for demo purposes

# Design Choices & Rationale

To deliver StellarU within the hackathon's scope, we prioritized simplicity, clarity, and rapid development without compromising core functionality. For the frontend, we opted for a Vanilla JS, HTML, and CSS stack. This choice allowed for quick iteration and easy debugging, making it ideal for a fast-paced hackathon environment. However, we recognize this approach limits scalability for larger, production-grade applications. The user login flow employs a simple Passkey generation based on Student ID and School matching. This design abstracts away the complexity of blockchain wallets and private keys, ensuring an intuitive user experience. While effective for demonstration, it currently uses a mocked passkey and lacks real biometric authentication—an enhancement planned for future iterations.

For data storage, we used browser LocalStorage to persist student data and session information. This provided a lightweight, efficient solution for demo purposes, though it would require migration to a secure backend for real-world deployment. The payment flow leverages the Stellar SDK to build, sign, and submit transactions on the Stellar Testnet, providing a reliable and efficient blockchain integration. Naturally, its current limitation is being confined to the testnet, necessitating future mainnet deployment for production use.

In terms of transaction receipts, we enabled users to download the current page as an HTML file, offering a simple way to generate payment confirmations without backend dependencies. However, this method produces a static snapshot lacking official digital signatures. For user feedback, we implemented real-time status updates and displayed transaction hashes linked to Stellar Expert, providing transparency and boosting user trust. This design ensures users stay informed, though it currently relies on manual verification through Stellar Expert. Each of these choices was made deliberately to balance rapid delivery, user experience, and Stellar ecosystem capabilities, while keeping clear paths open for future enhancements and scaling.

# Component Interactions

## LOGIN FLOW:

- User inputs Student ID & School.
- If matched, generates and stores Passkey.
- Redirects to index.html with session stored.

## TUITION MANAGEMENT:

- students.js retrieves student data & tuition balance.
- Renders welcome message, balance, and Passkey.

## TRANSACTION HISTORY:

- tx-history.js updates UI with latest payments.
- Provides receipt download feature (HTML snapshot).

# Problem Statement

Students worldwide—especially those studying internationally—face substantial, often hidden barriers when paying university tuition.

Traditional payment channels, like bank wire transfers, are notoriously expensive, inefficient, and cumbersome. Students frequently pay exorbitant wire fees—often \$40 or more per transaction—which, compounded by poor exchange rates, significantly inflate their educational expenses. Transactions routinely take 3-7 business days (or even longer) to process, creating extended periods of uncertainty and stress. This delay isn't just an inconvenience—it directly impacts students' ability to register for classes, secure housing, or avoid late-payment penalties imposed by universities.

Moreover, the complexity doesn't stop with fees and delays.

International payments are notoriously opaque, leaving students and their families in a nerve-wracking limbo. Without clear tracking, students often find themselves anxiously contacting both their home banks and university offices repeatedly, desperately trying to confirm whether their payments have reached their intended destination.

This friction doesn't affect students alone—it also burdens university administrative offices with unnecessary manual reconciliation tasks, follow-up emails, and frequent misunderstandings caused by unclear or incomplete payment information. Universities are forced to dedicate valuable resources to untangling payment problems rather than supporting student success.

By highlighting these overlooked challenges—high transaction costs, prolonged uncertainty, and administrative inefficiencies—we clearly see the need for a simpler, faster, more transparent, and ultimately fairer payment solution. This is precisely the friction StellarU aims to eliminate, transforming the stressful, costly process of tuition payments into a seamless, instant, and reassuring experience powered by Stellar's blockchain technology.

# User Base

Our user base is diverse and global, comprising three key groups, each with distinct yet interconnected needs:

## 1. International and Domestic University Students:

Today's university students—whether from across town or across oceans—live in a digital-first world. They expect tuition payment experiences that match the seamlessness of ordering an Uber or streaming Netflix. Yet, tuition payments remain stubbornly behind the times: complex, slow, and frustratingly opaque. International students, often dealing with additional layers of complexity like currency conversions and cross-border fees, find traditional payment systems especially burdensome. They need and deserve a simple, reliable, and instant solution that allows them to focus on their education, rather than financial logistics.

## 2. Universities and Educational Institutions:

Universities spend significant resources managing the logistical nightmare of tuition payments. Administrative staff routinely grapple with manual reconciliations, unclear transaction records, delayed bank notifications, and frustrated student inquiries. These inefficiencies not only waste valuable administrative time but can directly affect institutions' financial stability due to delayed payments or errors. Educational institutions urgently require solutions that simplify payment tracking, reduce administrative overhead, and improve cash-flow predictability. StellarU directly addresses these needs, giving universities real-time transparency and automating processes previously bogged down by manual intervention.

## 3. Parents and Sponsors:

For families and sponsors supporting students financially, clarity and transparency are paramount. Traditional systems offer little reassurance, leaving parents uncertain about whether funds have arrived, and sponsors struggling to track how their contributions are being utilized. These stakeholders desire easy, instant verification of transactions, clear records, and the peace of mind that comes from knowing their investments in a student's future are securely and promptly delivered. StellarU uniquely empowers these families and sponsors, providing real-time blockchain verification of each payment, ensuring transparency, trust, and ease of mind.

Together, these groups represent a global community of stakeholders who share a critical need: a modern, intuitive, and transparent tuition payment system. StellarU is designed precisely to serve this community – removing barriers, reducing friction, and transforming a traditionally stressful experience into one that's simple, secure, and reassuringly efficient.

# Impact

The impact of StellarU extends far beyond simply improving tuition payment efficiency—it's transformative, touching the lives of hundreds of thousands of students who collectively transfer billions of dollars annually in educational fees. Every year, international students and their families endure enormous stress, grappling with opaque payment systems, unpredictable delays, and hefty fees that siphon crucial funds away from education. By moving tuition payments onto the Stellar blockchain, we're not just simplifying a financial process—we're fundamentally redefining financial fairness, accessibility, and trust. For students, StellarU translates directly into reduced anxiety, more predictable budgeting, and greater financial clarity. The ability to instantly verify that tuition has been paid eliminates days of stress-filled waiting, empowering students to immediately proceed with course registration, secure campus housing, or meet crucial deadlines without the fear of unexpected disruptions. Lower transaction costs mean fewer funds diverted away from their primary purpose: education itself. For educational institutions, the impact is equally powerful. Universities currently burdened by administrative bottlenecks, manual reconciliation tasks, and costly financial oversight gain immediate, transformative relief. StellarU automates tracking and verification, significantly cutting administrative hours spent chasing uncertain payments and fixing errors. Improved transparency and predictability of incoming funds mean institutions can manage budgets more confidently, focus resources more effectively toward educational goals, and strengthen financial resilience. At a broader scale, StellarU has the potential to reshape global access to higher education. By removing barriers associated with traditional financial systems, we enable students from diverse economic backgrounds to participate fully and equally, helping universities attract a wider, more inclusive student body. Families, parents, and sponsors gain peace of mind, reassured by transparent, verifiable, blockchain-based tracking that their financial sacrifices directly contribute to their students' success.

In essence, StellarU represents far more than technical innovation—it's a powerful step toward global educational equity, financial fairness, and peace of mind for students, institutions, and families worldwide.

# Why Stellar?

Stellar wasn't merely a convenient choice for StellarU—it was the ideal partner for realizing our vision of effortless tuition payments. Stellar's unique strengths precisely align with the critical demands of international and domestic education finance: affordability, speed, trustworthiness, and, perhaps most importantly, exceptional user experience.

## Low fees & instant settlement:

Traditional financial institutions frequently burden students with hidden fees, steep transaction costs, and unfavorable currency exchange rates. In stark contrast, Stellar's minimal transaction fees—often mere fractions of a cent per payment—dramatically lower the financial barriers to higher education. The network's nearly instantaneous settlement capabilities transform tuition payment processing from a multi-day anxiety-ridden ordeal into an instant, reassuring click. Students no longer need to worry about delays; institutions no longer need to account for payment uncertainty. Stellar's speed and affordability truly democratize global education finance.

## Transparency & trust:

The traditional financial systems' opacity creates unnecessary stress and uncertainty—students and families routinely spend days anxiously waiting to confirm tuition payments, with no clear visibility into the process. Stellar resolves this with radical transparency. Each transaction is permanently recorded on Stellar's open, immutable ledger, enabling immediate verification and easy tracking through platforms like Stellar Expert. This unprecedented transparency fosters trust between universities, students, and families, ensuring payments are clear, auditable, and unequivocally verifiable at every step.

## Seamless User Experience with Stellar Passkeys:

Perhaps Stellar's most compelling advantage for StellarU is the power of Stellar Passkeys. Leveraging familiar biometric authentication methods like Face ID and fingerprint scanners, Stellar Passkeys completely remove the complexity and anxiety traditionally associated with blockchain interactions. Students can securely authenticate themselves and authorize tuition payments with nothing more complicated than a simple glance or fingerprint.

# Our Experience Building on Stellar

Developing StellarU on Stellar's blockchain has been more than just a technical journey—it's been a genuinely enlightening and empowering experience. Coming into the project, our team had ambitious goals but limited hands-on experience with blockchain technology. Stellar's ecosystem turned out to be the ideal environment to rapidly learn, innovate, and bring our vision to life.

From day one, the Stellar SDK provided clarity and ease, significantly reducing the learning curve traditionally associated with blockchain development. Its intuitive and well-documented design enabled us to prototype our payment transactions within hours, not days. This rapid iteration cycle allowed us to focus more energy on the user experience, instead of struggling through technical complexities.

The integration of Stellar's Testnet was equally frictionless. It allowed us to experiment extensively and safely—sending payments, simulating scenarios, and validating ideas without any costs or real-world risks. The instant feedback loop provided by Stellar's Testnet environment gave us a powerful confidence boost, encouraging us to quickly test new features, fail fast, and continuously improve.

Additionally, tools like Stellar Expert were transformative, allowing our team to visually track, confirm, and audit transactions effortlessly. This transparency and immediate access to on-chain transaction data not only streamlined development and debugging processes but also fundamentally reshaped our understanding of what blockchain transparency means in practice. It vividly illustrated how blockchain can build genuine trust between users and institutions.

Looking ahead, our excitement continues to grow as we explore deeper integrations of Stellar Passkeys and Smart Wallets. Stellar Passkeys, in particular, offer a genuinely revolutionary user experience innovation—allowing us to replace intimidating blockchain terminology like “private keys” and “wallets” with seamless, intuitive biometric authentication. Similarly, the future integration of smart wallets promises automation and user-centric design that aligns perfectly with our vision of simplicity and ease-of-use.

Ultimately, building StellarU on Stellar reinforced our core belief: the true power of blockchain technology lies in its invisibility. Stellar uniquely embodies this ideal, providing developers like us with tools that allow us to mask blockchain complexity beneath a clean, effortless, and inviting user experience. Our journey with Stellar has been empowering and inspiring, convincing us beyond doubt that blockchain—when done right—can truly transform real-world finance in ways that feel intuitive, fair, and accessible for everyone