ELECTROTECA

A Hybrid Lending Platform for Laboratory Equipment

Team members:
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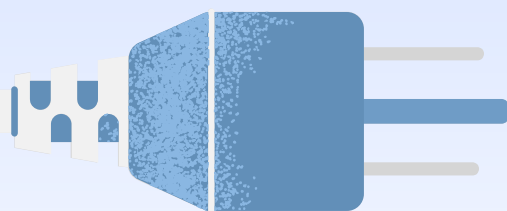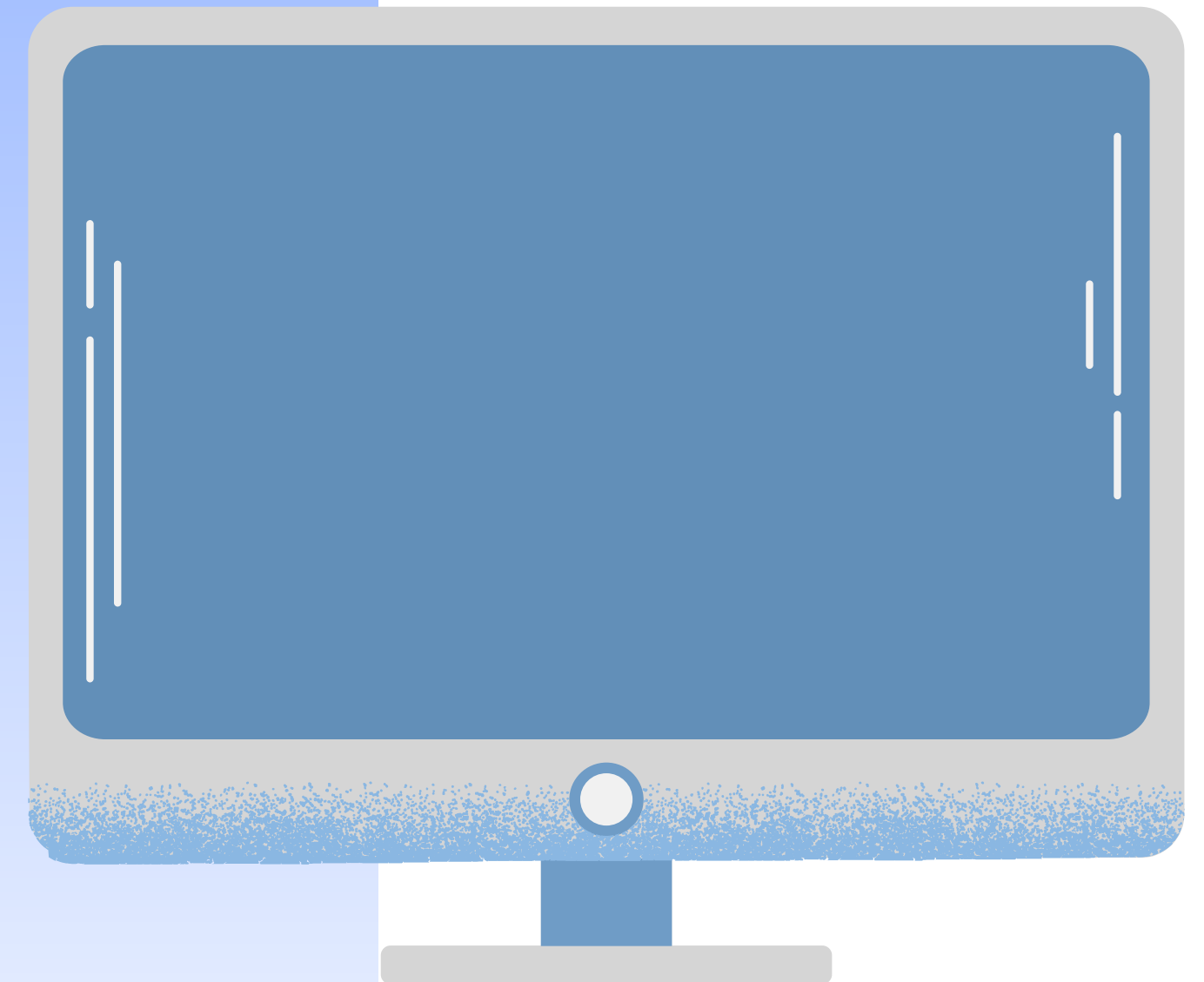Ploteanu Ionuț-Augustin, FAF-233
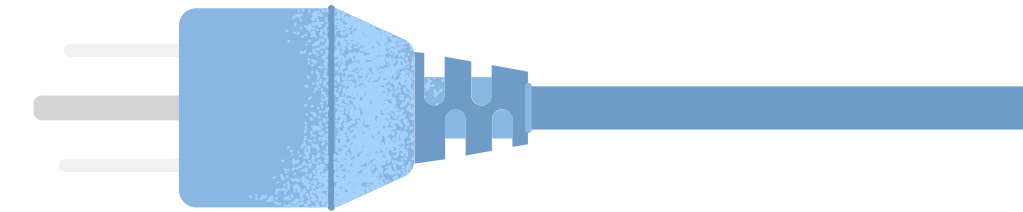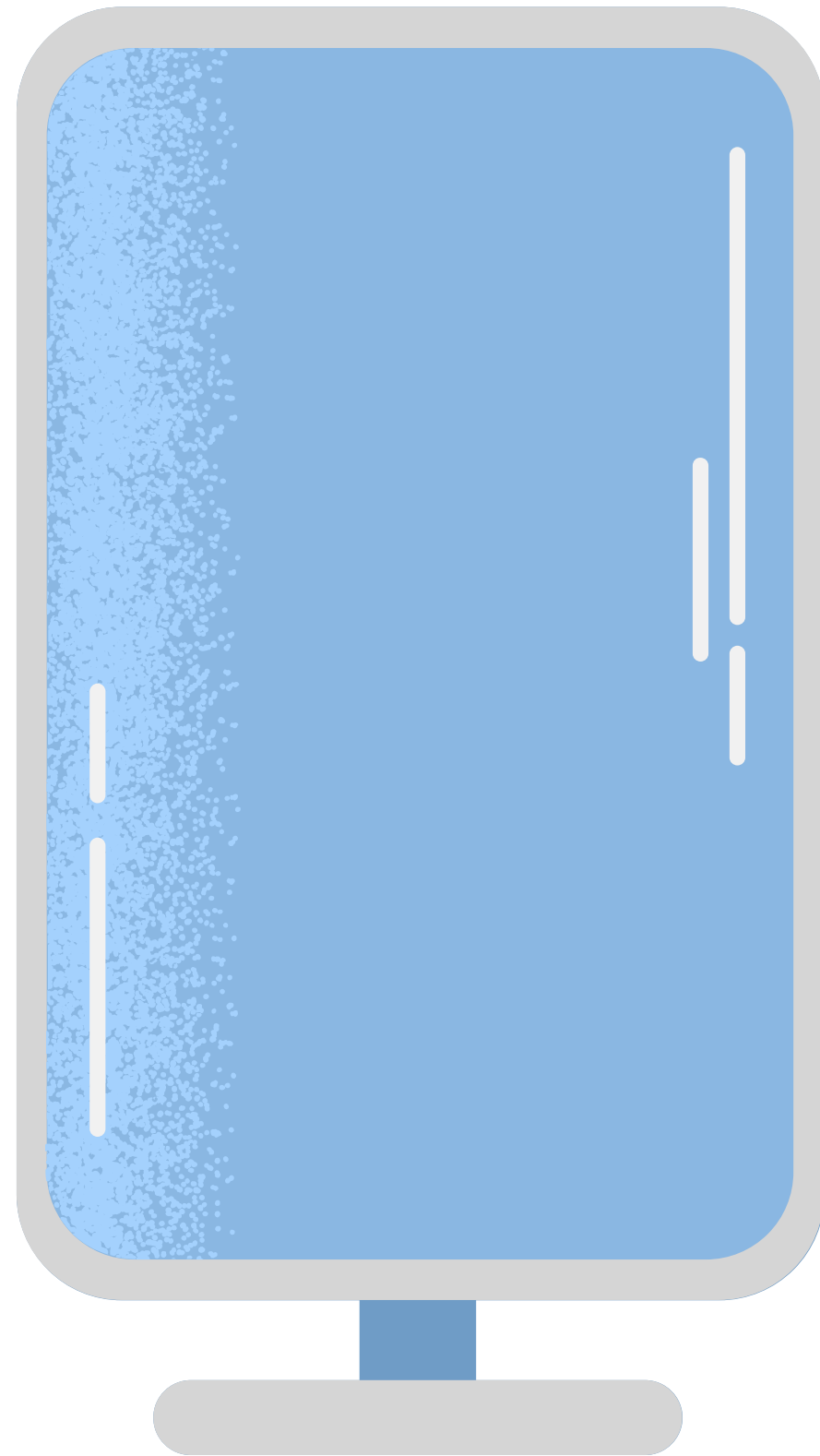Gancear Nichita, FAF-232
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Problem Statement

Access to laboratory and electronic equipment remains limited for students, professors, startups, and makers due to high costs and underutilization of existing resources. Valuable instruments often sit idle in institutions like Microlab, while learners and innovators struggle to obtain the tools they need for projects and prototyping. This mismatch reduces educational quality, slows innovation, and wastes financial and material investments.

Our Solution
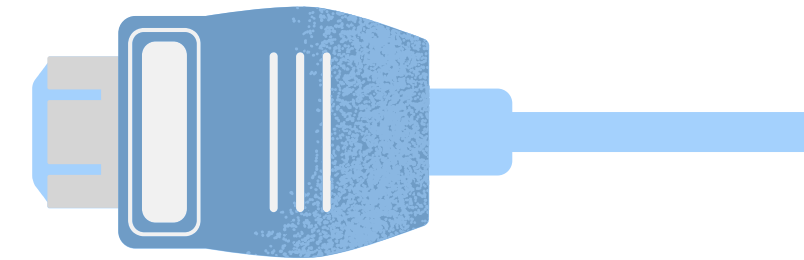
Electroteca is a digital lending platform that transforms idle laboratory instruments into shared resources. By combining institutional management with peer-to-peer contributions, it enables affordable, time-limited access to equipment through subscriptions, credits, and secure borrowing workflows. The platform increases resource utilization, lowers barriers to participation in STEM, and fosters a sustainable, collaborative ecosystem for education and innovation.

Target Audience
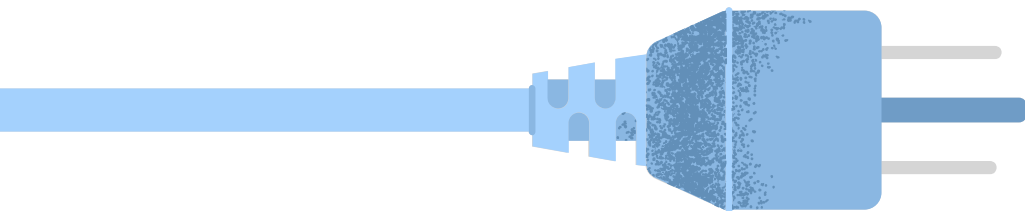
Engineering and technology students gain affordable access to the tools needed for coursework and projects.
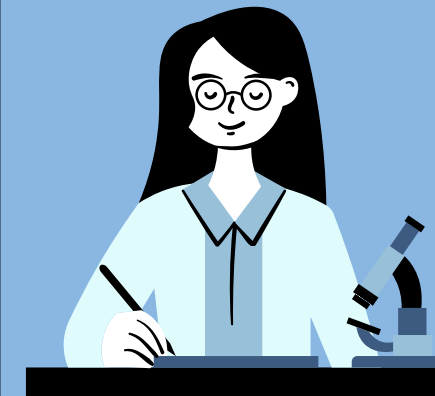
Research labs and makerspaces optimize equipment sharing across teams, and startups or small companies.

Independent makers and hobbyists can borrow kits for experiments without heavy costs.

Professors and universities maximize utilization of existing resources while enabling project-based teaching.

Technical Overview

Core Functionalities for Administrators
- **Equipment Management:** Add new items (with specifications and descriptions).
- **Issue Handling:** Add warnings, mark damaged items, and manage repair workflows.
- **Monitoring Dashboard:** Track usage rates, overdue returns, and flagged issues.
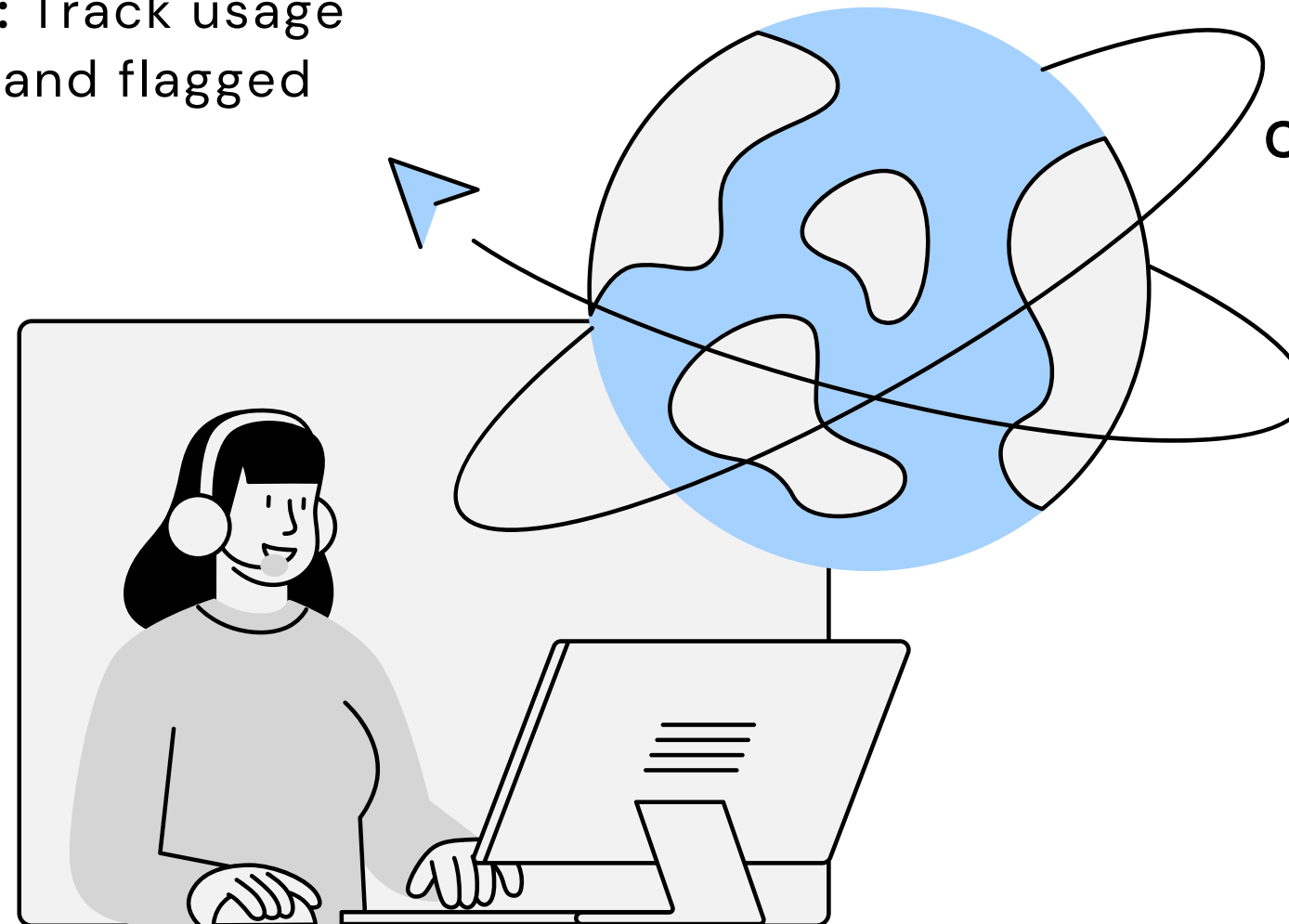
Core Functionalities for End Users
- **Browse and Search:** Filter items by category, specifications, or availability.
- **Booking System:** Reserve items via credits, membership, or subscription.
- **Authentication:** Log in / sign up, check membership, and extend membership if required.
- **Issue Management:** Submit issue reports with descriptions and optional image uploads.

What Electroteca Offers

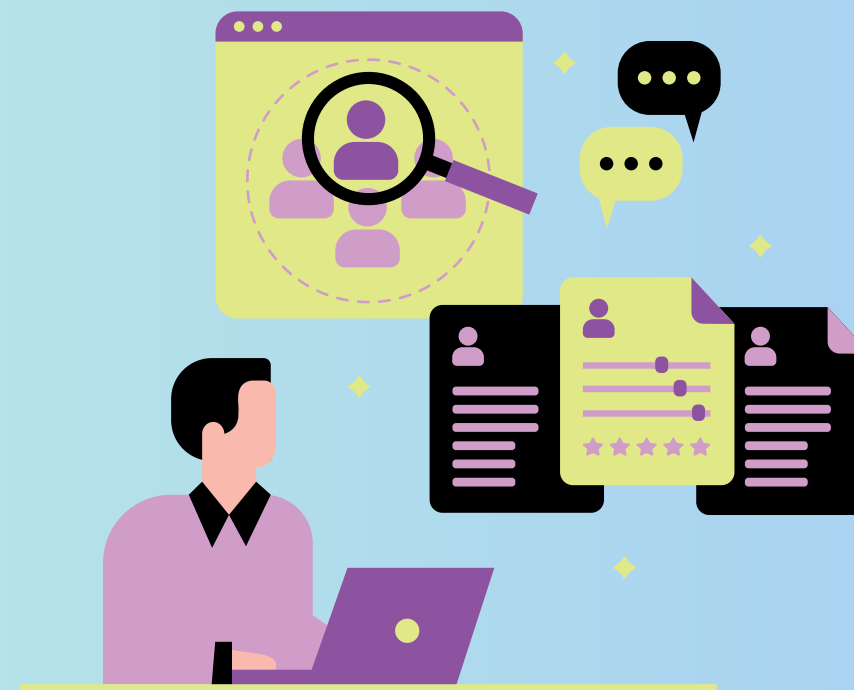## Affordability & Accessibility

Electroteca makes advanced tools affordable and accessible to a broader audience.

Maximizing Institutional Resources

Universities and labs raise utilization of idle instruments and protect their investments.

Automated Client Engagement

Students gain hands-on experience without high costs and Professors gain a reliable infrastructure to support modern teaching.

Technical Requirements

Administration
Robust account management includes password change and recovery options.

Issue Reporting
Broken or missing items are reported and flagged, updating availability instantly.

Secure Access
Registration, authentication, and identity verification safeguard all users, including external ones.

Inventory Management
Admins can add, update, or remove equipment, ensuring accurate catalog management.

Equipment Booking
Students can book electronic tools and instruments in advance to ensure timely project work.

Real-Time Availability
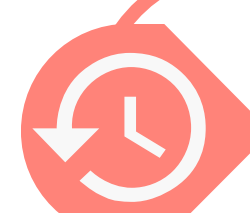The system displays live equipment status with filtering options by type.

Scheduling Management
Users reserve specific time slots with protection against double-booking.

Usage History
Detailed records of borrowing and usage are available for both students and administrators.

BORROW SYSTEM

E-wallet and funds credit System

Electroteca introduces an integrated e-wallet feature that allows users to securely top-up funds and manage balances directly on the platform.

Instead of paying for each transaction separately, users can load credit into their wallet, which can then be used for subscriptions, deposits, or equipment rentals.

This also supports the credit system philosophy for Electroteca

Payment Options in Electroteca

Electroteca provides users with flexible and secure payment methods to support equipment lending and subscription models.

The platform integrates **Visa Acceptance Solutions**, enabling safe card payments directly within the platform, and **PayPal Payments**, which allow PayPal accounts, Venmo (US only), and Pay Later options.

This ensures that both local and international users have access to trusted payment solutions that are already familiar, reducing barriers to adoption.
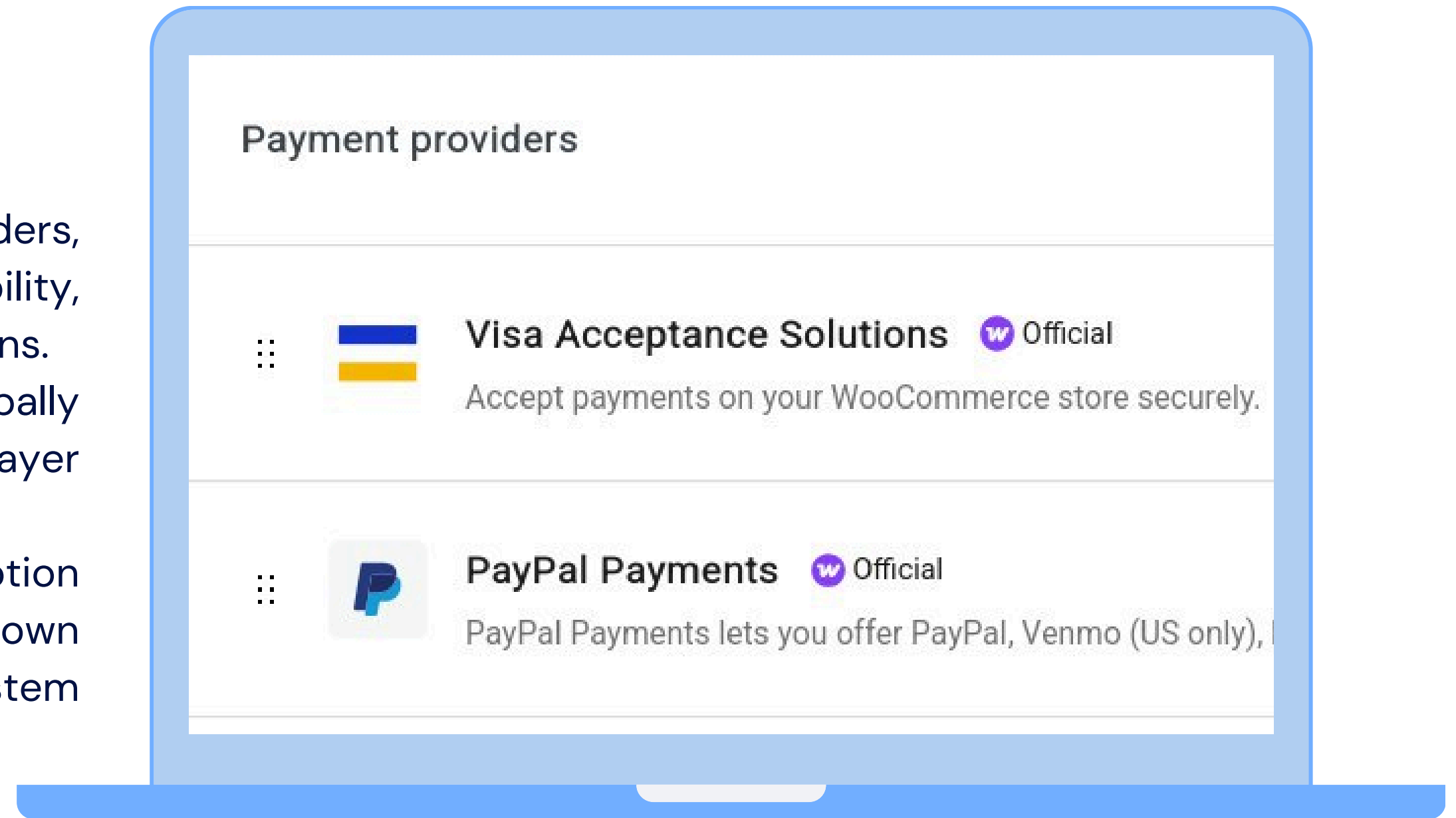
Benefits of Payment Integration

By offering multiple payment providers, Electroteca guarantees accessibility, flexibility, and transparency in all financial transactions.

Visa ensures fast, reliable, and globally accepted payments, while PayPal adds a layer of convenience for digital-first users.

This combination supports subscription models, deposit handling, and rent-to-own workflows, making the lending ecosystem sustainable and user-friendly

Payment providers

:: **Visa Acceptance Solutions** Official
Accept payments on your WooCommerce store securely.

:: **PayPal Payments** Official
PayPal Payments lets you offer PayPal, Venmo (US only),

Frontend Security
in Electroteca

Electroteca implements multiple safeguards to protect users during interaction with the platform.

Cross-Site Scripting (XSS) risks are reduced by escaping all user inputs and applying a strict **Content Security Policy** (CSP).

To prevent **Cross-Site Request Forgery** (CSRF), the system uses secure tokens in forms and actions.

Additionally, cookies are configured with **HttpOnly**, **Secure,** and **SameSite** attributes, ensuring that sensitive session data cannot be intercepted or misused.

IoT
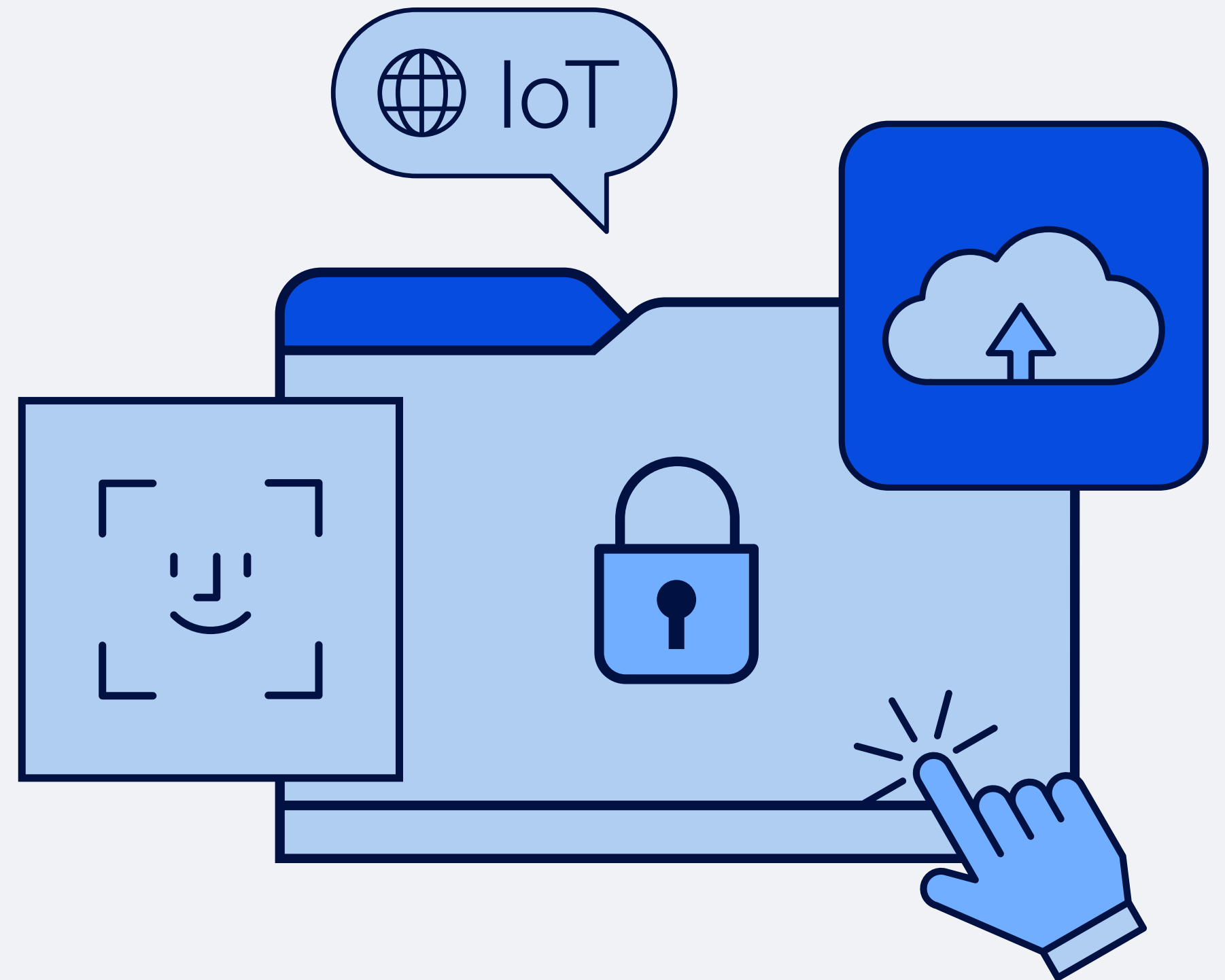
Backend Security
in Electroteca
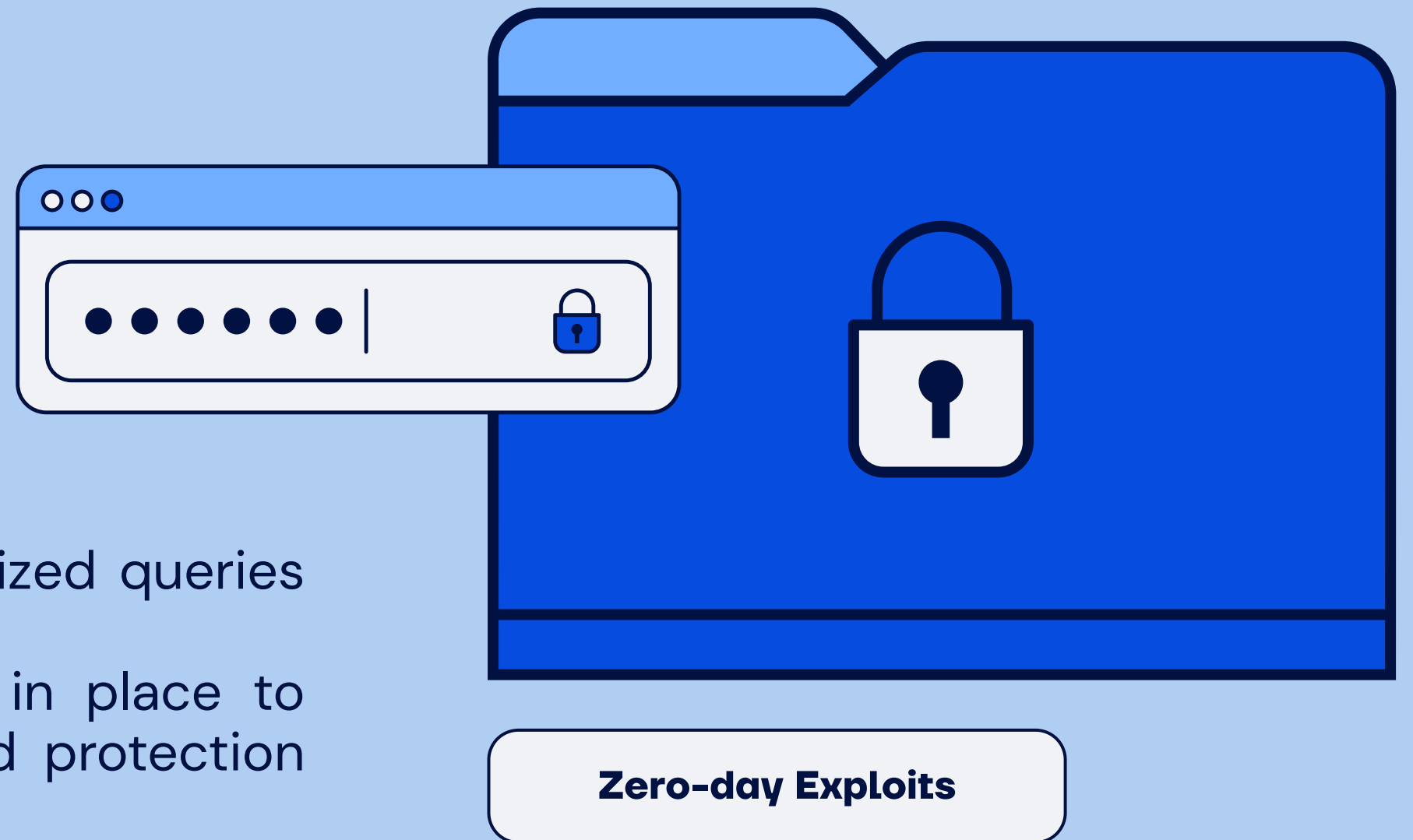
On the backend, Electroteca relies on parameterized queries and ORM frameworks to prevent SQL injection.
 Secure session management mechanisms are in place to enforce proper timeout, session invalidation, and protection against hijacking.
 Server software is regularly updated and patched to eliminate known vulnerabilities, while monitoring tools and plugins add an extra defense layer.
 Together, these measures ensure reliable protection of both user accounts and equipment data stored in the system.

Zero-day Exploits

Security & Two-Factor Authentication

Beyond payments, Electroteca prioritizes data security and user protection.

The platform uses Two–Factor Authentication (2FA), requiring not only a password but also a second verification step (such as an SMS/email code or authenticator app).

This ensures that only verified users can make bookings, manage equipment, or process payments.

Together with secure payment gateways (Visa & PayPal), 2FA creates a trusted and resilient environment, protecting both users and institutional partners.
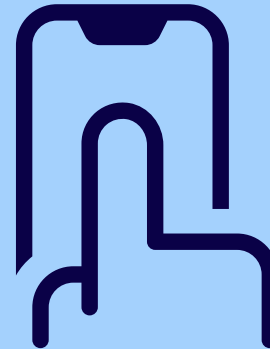
DATA PRIVACY

Future Implementations

AI Assistant

Suggests compatible or alternative tools based on user project requirements.

Website optimization

Speed up page loading time by optimizing wordpress

Data analytics

Usage trends, most borrowed tools, contributor recognition, and ROI analysisv