

PROJECT REPORT DOCUMENT

ElectriXI – Electrical Engineering Calculator

ElectriXI is a modern, AI-assisted Electrical Engineering Calculator, built as a team project using Bolt.new (Vercel AI coding environment). It provides a comprehensive digital solution for electrical engineering problems that were traditionally solved on paper using manual calculations. By leveraging React + TypeScript + Vite with TailwindCSS, ElectriXI delivers an intuitive, fast, and accessible platform for students, educators, and professionals.

The app is available both as a website and as a mobile application (APK File) (via WEBINTOAPP conversion).

Problem Statement :

Electrical engineering involves solving numerous **formula-based problems** such as Ohm's Law, AC circuits, transformers, and power systems. Traditionally, these problems were solved on paper or using basic calculators, which led to:

- Time-consuming manual work
- Error-prone calculations
- Difficulty in quick verification
- Lack of portability across devices
- No consolidated platform for multiple electrical subjects

Modern Digital Solution:

ElectriXI offers a paper-to-digital transformation by creating a web and mobile-based calculator platform that:

- ✓ Provides ready-to-use subject-wise calculators
- ✓ Shows formulas with inputs and results
- ✓ Reduces manual errors with automated calculations
- ✓ Works seamlessly on desktop and mobile
- ✓ Enables fast learning and experimentation for students
- ✓ Allows future scaling into advanced engineering tools

Features:

Multiple calculators covering major electrical domains:

- Ohm's Law
- AC Circuits
- Transformers
- Power Systems
- Control Systems
- Electromagnetics
- Network Analysis
- Electrical Machines
- Power Electronics
- Measurements & more...
 - ❖ Formula display with step-by-step inputs
 - ❖ Fast & responsive UI built with TailwindCSS
 - ❖ Cross-platform availability Web app + Mobile app
 - ❖ Icons powered by lucide-react
 - ❖ Team-contributed project built collaboratively
 - ❖ Modular structure – easy to extend with new calculators

Tech Stack :

Development Platform: Bolt.new (AI coding environment by Vercel)

- **Frontend Framework:** React (18.3.5)
- **Language:** TypeScript (5.5.3)
- **Build Tool :** Vite (5.4.2)
- **Styling:** TailwindCSS (3.4.1) + PostCSS
- **Icons:** Lucide-React
- **Linting:** ESLint
- **Mobile Conversion:** WEBINTOAPP Converter

Project Structure :

```
📦 ElectriXI
| + src
| | + calculators # Subject-wise calculators
| | | acCircuit.ts
| | | capacitance.ts
| | | circuitAnalysis.ts
| | | controlSystems.ts
| | | electricalMachines.ts
| | | electromagnetic.ts
| | | inductance.ts
| | | measurements.ts
| | | networkAnalysis.ts
| | | ohmsLaw.ts
| | | power.ts
| | | powerElectronics.ts
| | | powerSystems.ts
| | L transformer.ts
| + components
| | L SubjectPanel.tsx # UI for subject selection
```

```
| + components
| | L SubjectPanel.tsx # UI for subject selection
| + App.tsx # Root component
| + main.tsx # Entry point
| + types.ts # Shared types
| L index.css # TailwindCSS setup
| index.html
| package.json
| vite.config.ts
| tailwind.config.js
| postcss.config.js
| tsconfig.json
| eslint.config.js
L .gitignore
```

How It Works:

1. Each Calculator (e.g., acCircuit.ts) defines an array of Calculation objects.

- Includes id, name, description, formula, inputs, resultUnit, and calculate() function.
- Example:

```
{  
  id: 'impedance',  
  name: 'Impedance',  
  description: 'Calculates impedance in an AC circuit with resistance and reactance',  
  formula: 'Z = √(R² + X²)',  
  inputs: [  
    { id: 'resistance', name: 'Resistance', unit: 'Ω' },  
    { id: 'reactance', name: 'Reactance', unit: 'Ω' }  
  ],  
  resultUnit: 'Ω',  
  calculate: (inputs) => {  
    return Math.sqrt(Math.pow(inputs.resistance, 2) + Math.pow(inputs.reactance, 2));  
  }  
}
```

2. **SubjectPanel.tsx** → Displays categories (AC Circuits, Power Systems, etc.) with icons.

3. **App.tsx** → Imports all calculators, renders selection, and displays dynamic input/output forms.

4. **TailwindCSS** ensures a responsive, mobile-friendly UI.

1. Clone Repository:

```
git clone <repo-url>
```

```
cd electrixi
```

2. Install Dependencies:

```
npm install
```

3. Run Development Server:

```
npm run dev
```

4. website Link :

<https://rad-bienenstitch-4d382d.netlify.app/>

5.Build for Production:

npm run build

6.npm run preview:

npm run preview

7.Example Use Cases

- ❖ **Student:** Quickly calculate transformer turns ratio during assignments.
- ❖ **Teacher:** Demonstrate Ohm's Law or AC impedance live in class.
- ❖ **Engineer:** Verify power system values while designing circuits.
- ❖ **Hobbyist:** Experiment with different RLC circuit values instantly.

Website (Screen Shots):

The screenshot shows the ElectriXi homepage. At the top, there is a purple header bar with the logo "ElectriXi" and the text "Advanced Electrical Engineering Calculator". Below the header, a grid of subject icons is displayed under the heading "Select a Subject". The subjects include: Ohm's Law, Power, Capacitance, Inductance, Transformer, AC Circuits, Circuit Analysis, Electromagnetic, Control Systems, Power Systems, Electrical Machines, Power Electronics, Measurements, and Network Analysis. A central callout box contains the text "Welcome to ElectriXi" and "Select a subject above to start calculating electrical parameters." At the bottom of the page, a dark footer bar displays the copyright information "© 2025 ElectriXi | Advanced Electrical Engineering Calculator".

The screenshot shows the "Power Calculations" section of the ElectriXi website. At the top, there is a horizontal navigation bar with icons for AC Circuits, Circuit Analysis, Electromagnetic, Control Systems, and Power Systems. Below this, another row of icons includes Electrical Machines, Power Electronics, Measurements, and Network Analysis. The main content area features a title "Power Calculations" and a sidebar titled "Available Calculations" which lists "Power (V×I)" (highlighted in blue), "Power (I²R)", "Power (V²/R)", "Energy Consumption", and "Efficiency". To the right, there is a form for calculating Power (V×I) with fields for "Voltage (V)" and "Current (A)" and a "Calculate" button. A "Show Formula" link is also present. At the bottom of the page, a dark footer bar displays the copyright information "© 2025 ElectriXi | Advanced Electrical Engineering Calculator".

AC Circuits Calculations

Available Calculations

- Impedance** (selected)
- Phase Angle
- Power Factor
- Apparent Power
- Real Power
- Reactive Power
- Resonant Frequency

Impedance

$Z = \sqrt{R^2 + X^2}$

Calculates impedance in an AC circuit with resistance and reactance

Resistance (Ω)
0.4

Reactance (Ω)
0.2

Calculate

Result: 0.4472 Ω

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Mobile App (WEBINTOAPP Conversion)

ElectriXI is also available as a mobile app thanks to the WEBINTOAPP converter.

- ◆ Steps followed for conversion:
 1. Built the production-ready web app using npm run build.
 2. Hosted the app for online access.
 3. Used WEBINTOAPP to convert the web app into an Android/iOS application.
 4. The packaged app can be distributed via Play Store, App Store, or APK file.

This ensures cross-platform availability – run it on browsers or as a standalone app .

Future Enhancements:

- Step-by-step solution breakdowns
- Graphical representation of circuits & waveforms
- Save & export results (PDF/CSV)
- Multi-language support
- Dedicated React Native mobile app version

Team Contribution

ElectriXI was developed as a **team project**, where each member contributed to different parts of the system:

- **UI & UX Development** – React + Tailwind interface

- **Calculator Logic** – TypeScript modules for each subject
- **Testing & Debugging** – Ensuring accuracy of formulas
- **Mobile Conversion** – WEBINTOAPP integration
- **Documentation & Project Structuring** – Complete README & guides

Contributors:

Team ElectriXI – Developers & Maintainers

UI/UX Development:

-KADIYALA UDAY KIRAN

-ILLURI SWATHIKA

-KORAKALA SREE PRIYA

-K.DURGA SRAVANTHI

Calculator Logic:

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-ILLURI SWATHIKA

Testing & Debugging:

-KORAKALA SREE PRIYA

-K.DURGA SRAVANTHI

Mobile Conversion:

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Documentation & Reports

-KADIYALA UDAY KIRAN

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Mentor and Guidance:

-Dr.K Kumar

-Dr. V Lakshmi devi

Summary:

ElectriXI transforms traditional paper-based problem-solving into a modern, digital-first solution. By combining AI-assisted development (Bolt.new), modern web technologies, and cross-platform accessibility, this project provides a scalable and reliable calculator platform for the next generation of electrical engineers.