

MODULAR ARCHITECTURE, MATURE PROCESSES

INDUSTRIAL CLEANING ROBOT

ROBITI
INTERFACES FOR ROBOTICS

Project Vision

A global leader in industrial cleaning equipment engaged us to help develop the software for one of their flagship products—a new modular ride-along floor cleaner with touch-screen controls and smart features. Our goal was to improve the frontend architecture and align the product development process with best practices.

Project Details

12+ Months (ongoing) | Minnesota

- ◆ **Roles:** UX / UI Designer, UI Architect, UI Developer
- ◆ **Deliverables:** Wireframes, High Fidelity Prototypes, Process Documentation, Design Specs, API Specs, Architecture Diagrams, UI Code, CI/CD, Release Mgmt, QA/Support
- ◆ **Methodology:** Lightweight Scrum
- ◆ **Tools:** Figma, Jira, Confluence, Bitbucket, VS Code, LogRocket, OpenAPI, Zod
- ◆ **Software Architecture:** React, TypeScript, REST APIs, WebSockets, Python

Competencies Provided

User Interface Design

User Interface Development

System Integration / API Design

User Experience Research

Interim Software Leadership

Key Outcomes

Optimized design process to bridge UX and development. Improved standards for wireframes that are more optimized for web frameworks, including automated tools and modular components.

Helped to shift focus from screens to features, leading to efficiencies in product and development processes.

Enhanced codebase by rearchitecting the frontend to be fully decoupled from the backend, allowing for stable development of the UI independent of simulators and robotics work.

Leveraged our flexible and tailored approach to appropriately staff engineering resources and on-demand design expertise, as well as a blend of remote work and onsite visits.

Project Approach

A key part of this project involved sharing our expertise in the relationship between product, process, design, and technology. By streamlining the product management pipeline and highlighting the importance of right-sized upfront design, we were able to help our client reduce challenges later on in the process.

- ◆ Shifted the team's mindset from screen-based to feature-first development, aligning product goals with modular design principles.
- ◆ Worked with stakeholders to clarify feature requirements and ensure product alignment.
- ◆ Created a custom design library in Figma with reusable components and design tokens to ensure consistency across the UI.
- ◆ Streamlined design-to-development handoff processes, facilitating collaboration between teams through regular checkpoints and shared context.

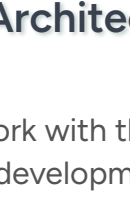
Meet the Users



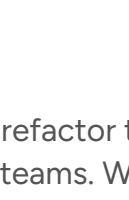
Operators: Operators require limited and curated access to necessary functionality in the UI, and prefer notifications and error messages written in plain language.



Supervisors: Supervisors are responsible for machine configuration, and have access to administrative settings and data.



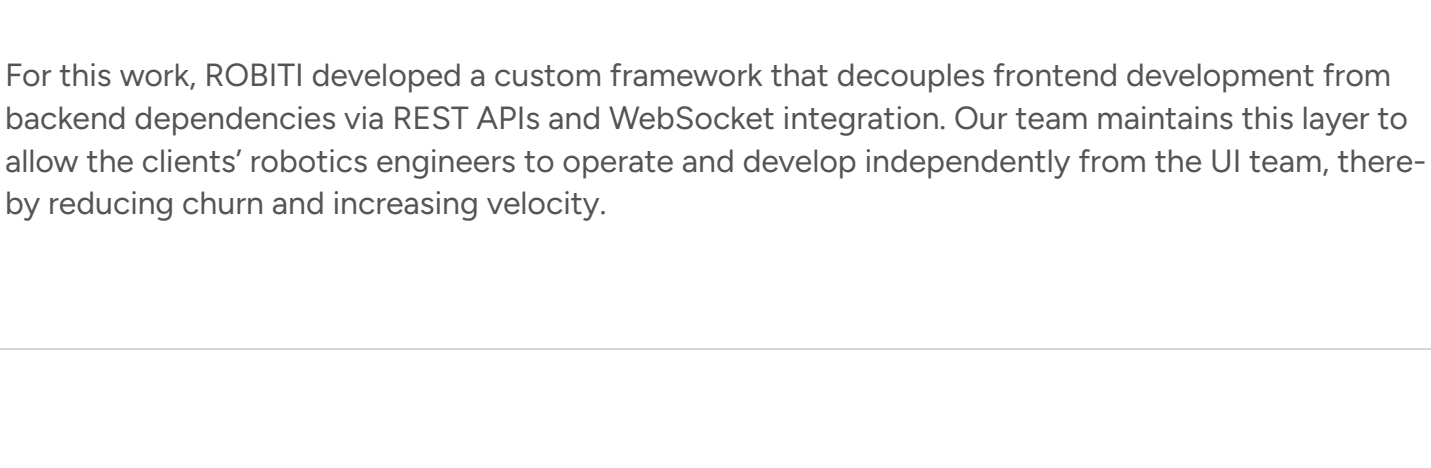
Service Technicians: Technicians maintain and repair the equipment as needed. They require detailed feedback on internal components in the form of a dashboard view.



Engineers: Engineers require broader access to technical functionality in the UI, and are able to parse more complex error messaging.

Excellence in Architecture

As part of our UI work with this client, we identified opportunities to refactor the frontend codebase to accelerate their development and reduce dependencies between teams. We helped the client to evaluate a greenfield approach using React and TypeScript to rebuild the frontend, drastically reducing their existing technical debt.



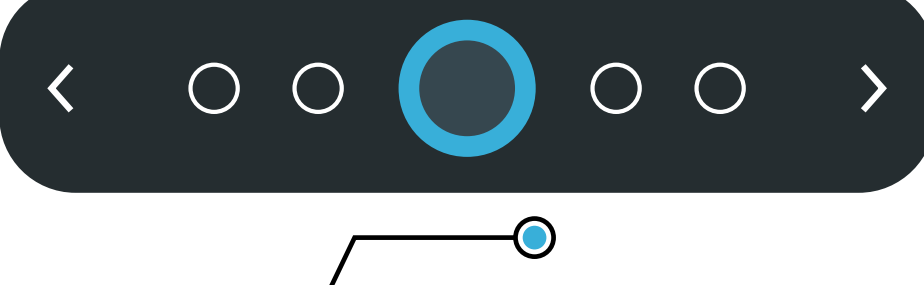
For this work, ROBITI developed a custom framework that decouples frontend development from backend dependencies via REST APIs and WebSocket integration. Our team maintains this layer to allow the clients' robotics engineers to operate and develop independently from the UI team, thereby reducing churn and increasing velocity.

UI Updates

Our team reviewed initial UI work and design specs, and applied a consistent set of evaluation criteria and design principles to yield consistent, intuitive screen designs that retained the essence of our client's look and feel, which was provided by an industrial design partner. **Here is one example of a gauge component that we helped to optimize for UX and development:**

CLIENT'S INITIAL CONCEPT

Gauge component does not reflect the optimal paradigm given the user and product context, and cannot scale to include additional icons.



* Details have been abstracted to meet client confidentiality requirements.

ROBITI'S DESIGN

Carousel component is a more appropriate design pattern and will scale to accommodate future features.

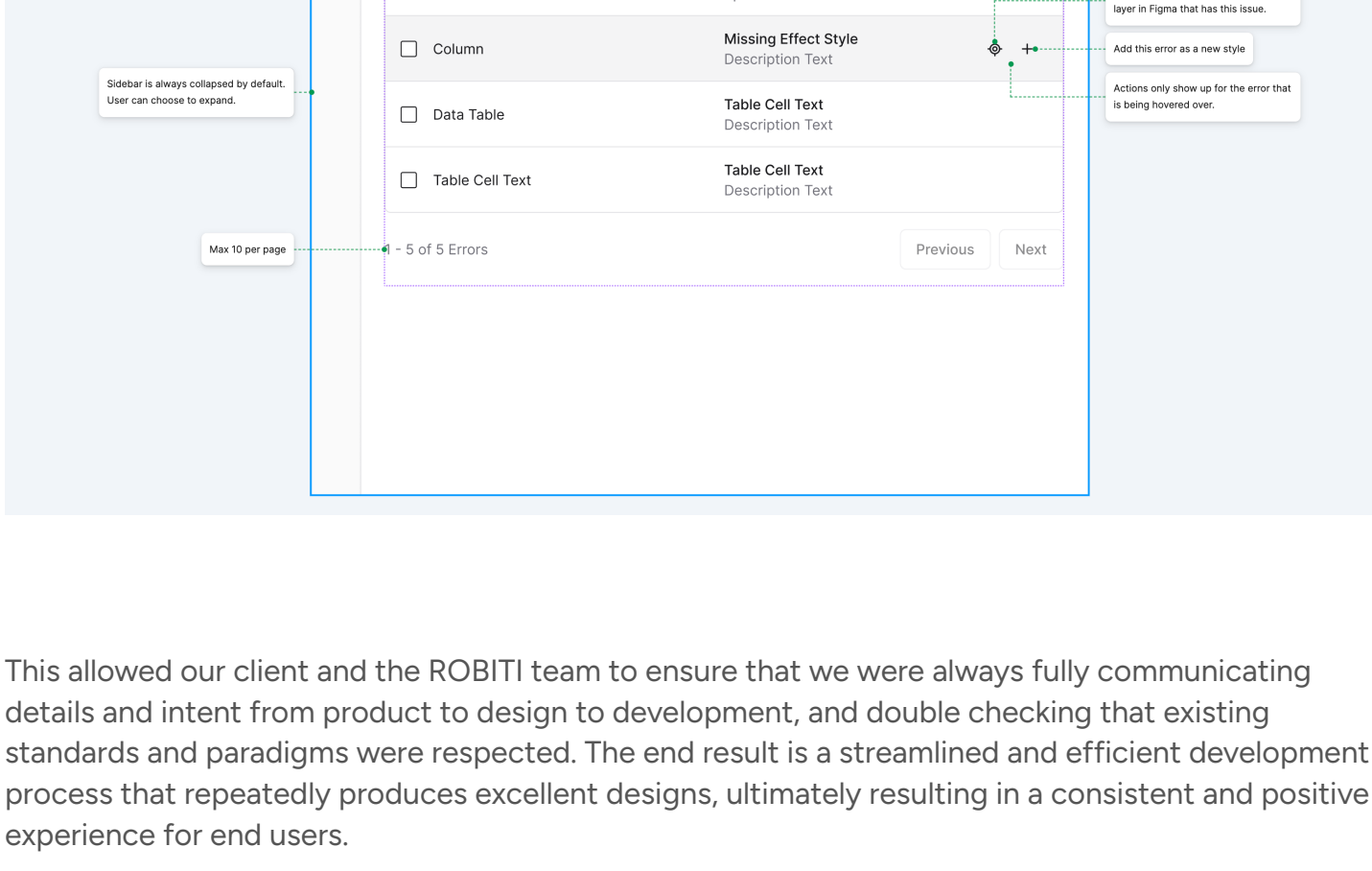


Other examples of optimizations that our team provided include:

- ◆ Ensuring consistency of positioning of elements on the screen to respect web design paradigms, allowing us to build the UI in a reusable, responsive, and scalable fashion.
- ◆ Bringing consistency in terms of sizing and spacing across elements, reducing friction during implementation and making things intuitive for the user.
- ◆ Providing a standardized set of design tokens.
- ◆ Analyzing components with regards to web technologies and potential difficulties to build and maintain particularly when deployed onto devices (not the cloud), making sure to account for edge cases and behaviors associated with the components.

Process Updates

To further ensure quality and consistency in design, our team used a proprietary set of processes, guides, and automated tools to deliver design specs.



This allowed our client and the ROBITI team to ensure that we were always fully communicating details and intent from product to design to development, and double checking that existing standards and paradigms were respected. The end result is a streamlined and efficient development process that repeatedly produces excellent designs, ultimately resulting in a consistent and positive experience for end users.

Results

ROBITI collaborated with our client to develop a new, API-based architecture that allowed the frontend team to develop features independently from backend constraints, accelerating delivery cycles and improving scalability. The design library improved UI consistency and supported future design iterations. By establishing a feature-first development process, our client achieved better alignment across teams, positioning their new modular flagship project for long-term success.

High Fidelity Screens / Prototyping

High fidelity screens were created in Figma and linked together into a clickable prototype. This prototype gave developers a working model to reference during development. Combining rich user stories with a clickable prototype proved to be an extremely powerful communication tool to bridge any context or communication gaps between designers and engineers.



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