Final Prototype Report

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HCD 501 - Human Centered Design | University of Michigan-Flint
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**Prototype: https://resilient-otter-d9d647.netlify.app/**

## 1. Problem Statement

Student clinicians at the HEART Clinic must monitor patients during exercise based sessions while simultaneously producing detailed clinical documentation. This documentation is currently split across multiple incompatible tools, including Polar devices, Excel based heart rate reserve calculators, printed HEART and MoveMore templates, and separate word processing software. None of these systems communicate with one another, which forces students to manually transfer data, remember HRR formulas, retype numbers, and reconstruct SOAP notes after the \session has ended.

This fragmentation creates significant cognitive load. Students must remember tasks that the system should carry for them. Norman explains that poor design often forces users to internalize what should be externalized, which increases the chance of confusion and error (Norman, 2013). This describes the HEART Clinic's environment exactly.

The clinic's goals include consolidating workflows, automating HRR calculations, integrating templates, introducing optional AI assistance, reinforcing educational goals, and simplifying the faculty review process. The objective of this project is to meet these goals by creating a coherent documentation system that connects device data, structured session information, user generated notes, and AI support without overwhelming the student.

## 2. Solution Overview

### 2.1 Summary of the Final System

The final design is a browser based documentation system that organizes the entire process into one continuous workflow. Students no longer move between Polar screens, paper forms, Excel

files, and Word documents. Instead, they follow a single path from login to faculty approval. The system unifies HEART and MoveMore documentation as template modes, rather than separate systems, and adapts its fields based on the session type.

The workflow is structured as follows:
Login, Device Connection, Live Session Tracking (including SOAP documentation fields), Session Data Review, AI or Manual Note Generation, and Submission for Administrator Review. Faculty supervisors access their own dedicated review interface that allows them to read submissions, use Smart Feedback, approve notes, or request revisions. System Administrators have a separate backend portal that manages platform level configuration, including AI API settings and administrative controls.

This structure aligns with Cooper's principle that systems should organize themselves around the user's goals rather than the tool's internal logic (Cooper et al., 2014).

## 3. Description of the Final Design

### 3.1 System Functionality

The system enables student clinicians to:

- Add, remove, rename, and reconnect Polar devices
- View device status and access built in troubleshooting guidance for connectivity issues
- Select session type (HEART or MoveMore)
- Automatically generate HEART or MoveMore specific data fields based on session type
- Track real time HR, HRV, HRR zones, and device signal quality
- View live HRR zone definitions through information icons
- Enter real time SOAP observations that auto-update and save
- Record activity type, patient responses, and any mid session changes
- Review combined session data (vitals, activities, RPE, step count, and time in zone)
- Create clinical notes manually or generate them using AI
- Use Smart Edits to insert structured clinical phrasing
- Edit notes directly in the text box, with autosave confirmation
- Toggle autosave on or off
- Track which parts of the note were AI generated
- Submit documentation securely through password re entry
- Navigate back to the main dashboard through clear back buttons and logo navigation
- Access previous sessions and confirm session completeness before submission

Faculty reviewers can:

- View all student submissions in a centralized review queue
- Read full session data, student edits, and AI assisted content
- Use Smart Feedback to deliver personalized, clinician style guidance
- Approve notes with a blue button that turns green upon success
- Enter their password to confirm approval
- Request revisions using structured prompts
- Update their display information, such as supervisor name
- Navigate through submissions using consistent back buttons
- Track student clinicians review history

System Administrators can:

- Access a separate backend settings portal
- Configure AI API settings and model behavior
- Manage system users and role assignments
- Update institutional branding, footer information, and compliance text
- Control which documentation templates are active for the semester
- Oversee device registration policies
- Manage server level or platform integration settings
- Maintain overall system stability for the clinic

### 3.2 Main Features and System Flow

#### Login and Accessibility

The login screen presents a clean form with HEART CLINIC and University of Michigan branding, an accessibility button, and correct institutional attribution. Accessibility options appear before any content is shown, which reflects Woolery's argument that inclusive design must be built into the earliest steps of an experience, not added as a late layer (Woolery, 2018).

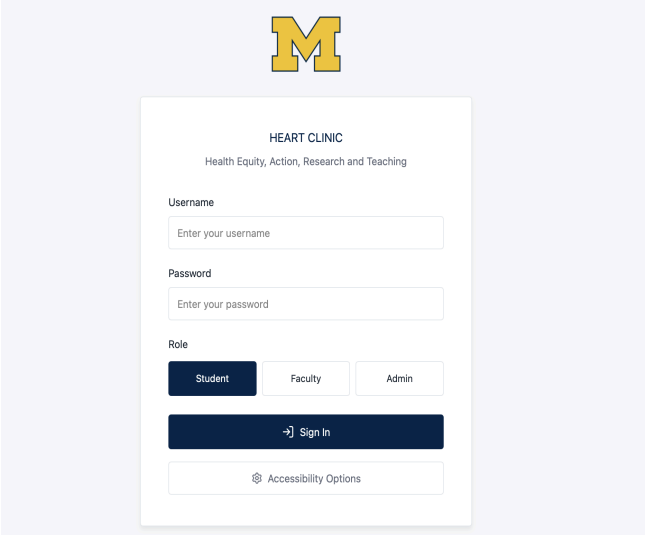



Figure 1: Login Screen

**Session Configuration**

A dropdown prompt allows students to choose between HEART and MoveMore sessions before they begin. This selection determines which data fields appear later in the workflow. This use of progressive disclosure follows Sharp et al.'s recommendation to avoid overwhelming users with unnecessary options until those options become relevant (Sharp et al., 2019).

**Device Management**

Students can add new devices, remove outdated ones, reconnect devices, and view real time status. Offline devices include an information icon that reveals troubleshooting steps. Ko emphasizes that good systems absorb cognitive load by supplying context and decision support, which this feature directly addresses (Ko, 2012).

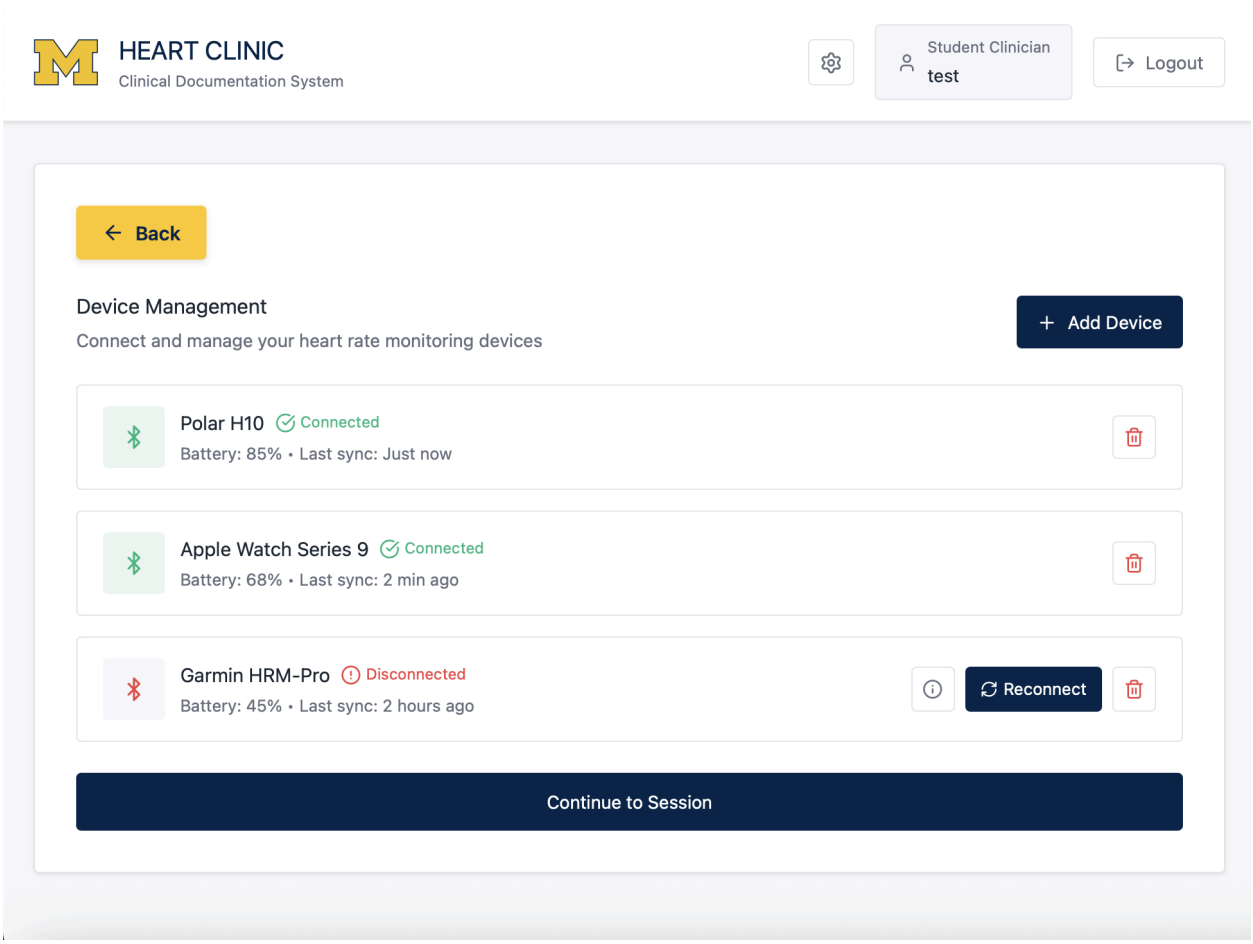



Figure 2: Device connection

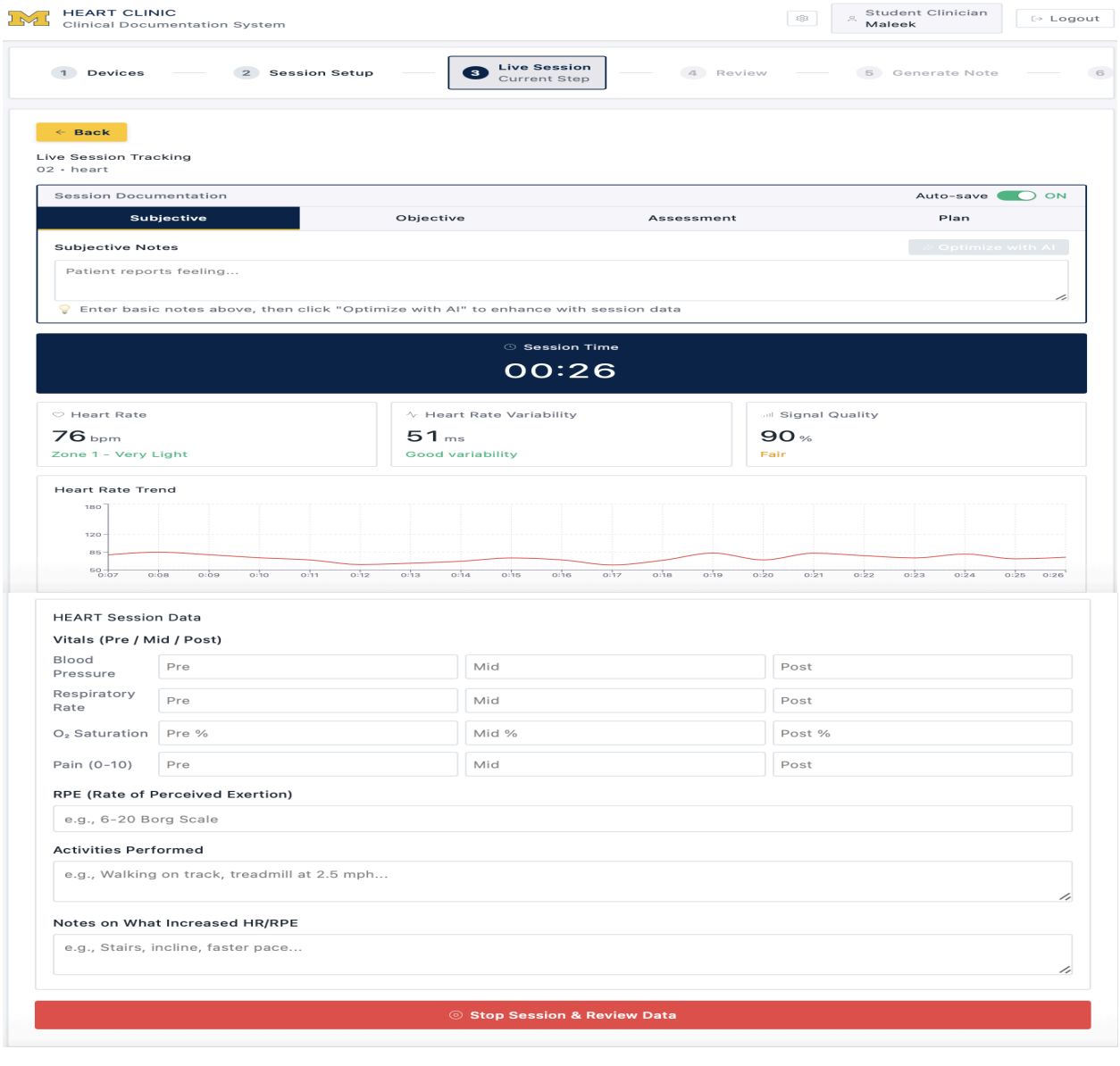
**Live Session Tracking**

This screen provides:

• HR, HRV, HRR, and signal quality
• HRR zone analysis with educational icons
• Activity trends
• Session timer
• Real time SOAP Observations for Subjective, Objective, Assessment, and Plan

The interface reinforces what students learn in class while externalizing data interpretation. Norman states that systems should support learning by showing state, action, and consequence clearly, which this screen accomplishes (Norman, 2013).

Figure 3: Live session tracking



**Session Data Review**

This page consolidates all captured information. It displays pre, mid, and post vitals, HRR calculations, time in zones, RPE ratings, activity key items, activity by HRR zone tables, and step counts. For MoveMore sessions, PT progression notes appear in collapsible sections. This design ensures that students do not need to mentally reconstruct the session from memory, which supports Norman's principle that externalized state reduces error (Norman, 2013).

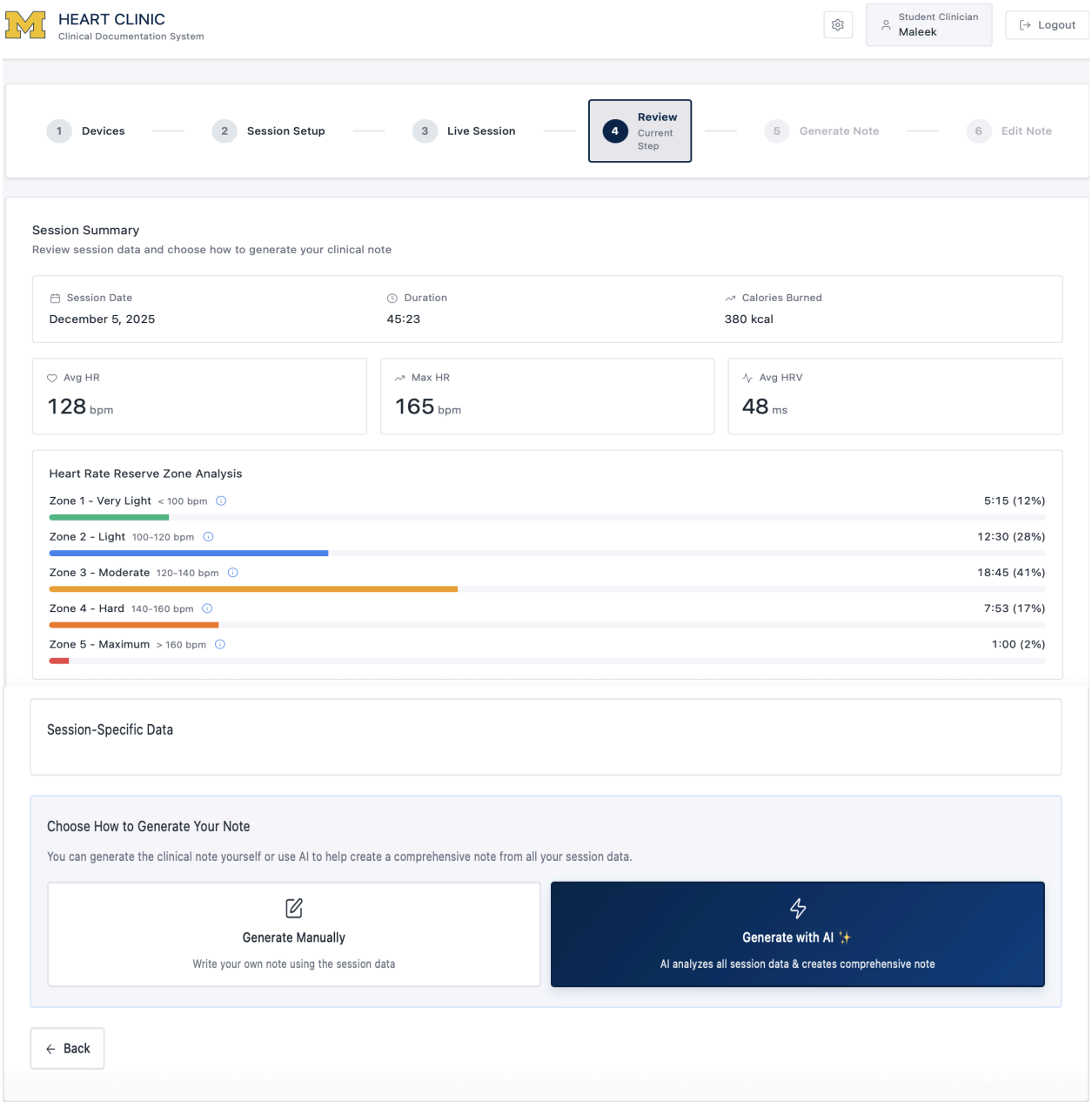



Figure 4: Session data review

### AI Assisted Note Generation

Students can write the note manually or generate it with AI support. Smart Edits provide structured insertions for testing results, assessments, prognosis, goals, and plans of care. These suggestions were inspired by the clinic's interest in systems like Zanda Bizzy AI. Autosave occurs continuously, and the label indicates when content has been saved. This follows About Face's argument that interfaces should prioritize direct manipulation and remove unnecessary modes (Cooper et al., 2014).

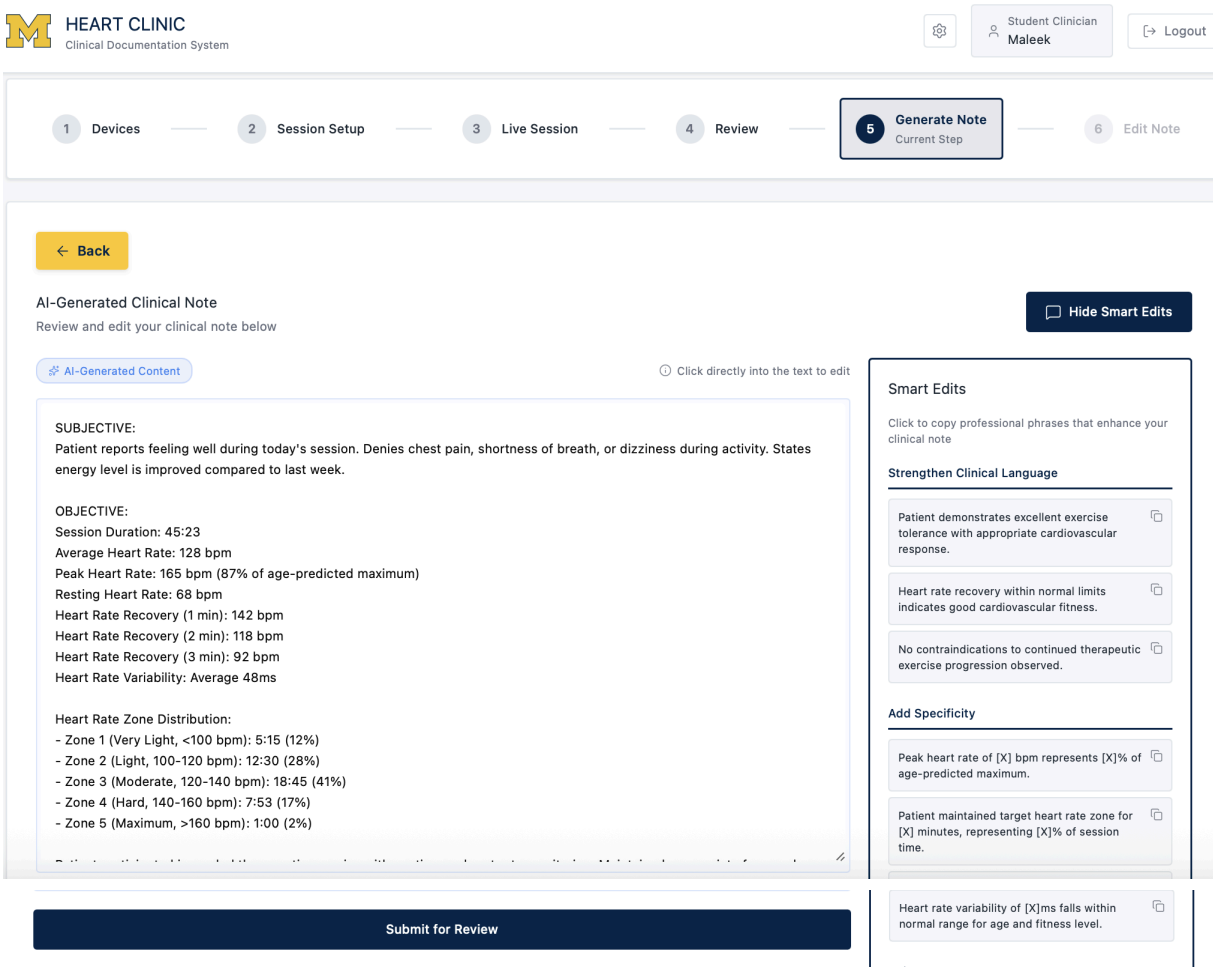



Figure 5: Note editor

### Secure Submission

Students must re enter their password to submit documentation. This reinforces accountability and ensures that clinical notes are intentionally finalized. After approval, the Approve button turns green and provides navigation options. Benjamin's ideas about accountable design influenced this feature, although she is not one of the six readings cited here.

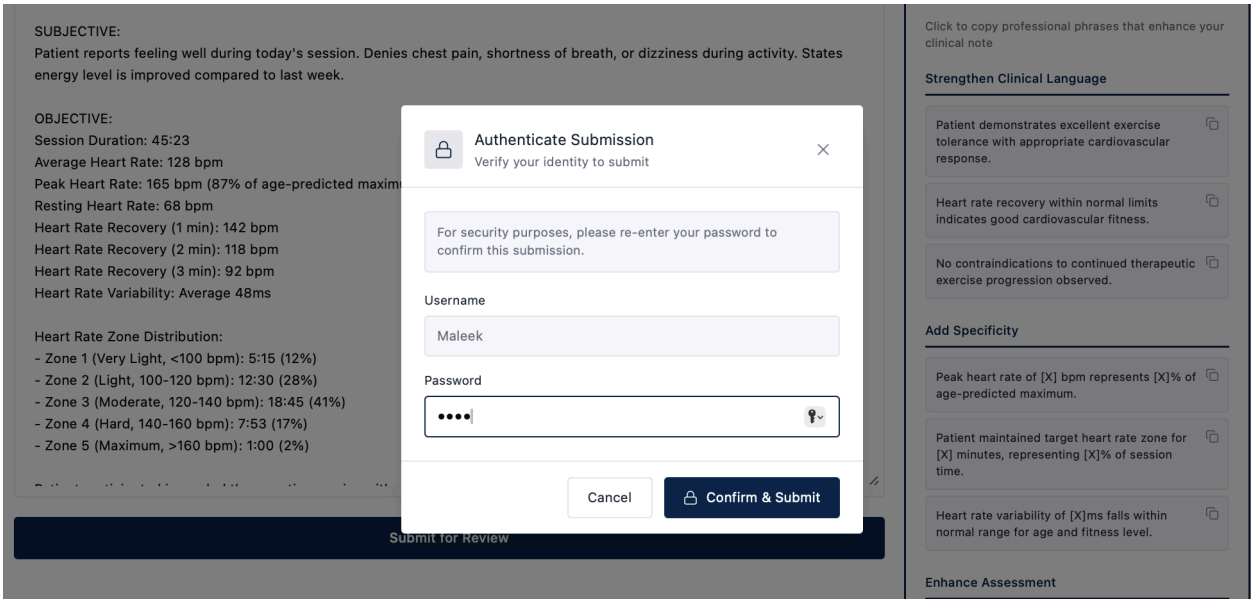



Figure 6: Submission screen

## Faculty Review

Faculty reviewers have access to a dedicated review interface that displays submitted student notes in a clear and organized dashboard. Within this view, faculty can open a student's documentation, read both AI assisted and student edited content, and examine all associated session data. Smart Feedback appears directly in the feedback area and allows faculty to provide tailored, educational comments that reinforce clinical reasoning. The Approve and Request Revision buttons use consistent visual hierarchy so that primary actions are easy to identify and difficult to confuse. These design choices reflect Sharp et al.'s guidance that interfaces should visually differentiate key actions to support clarity and user confidence (Sharp et al., 2019).

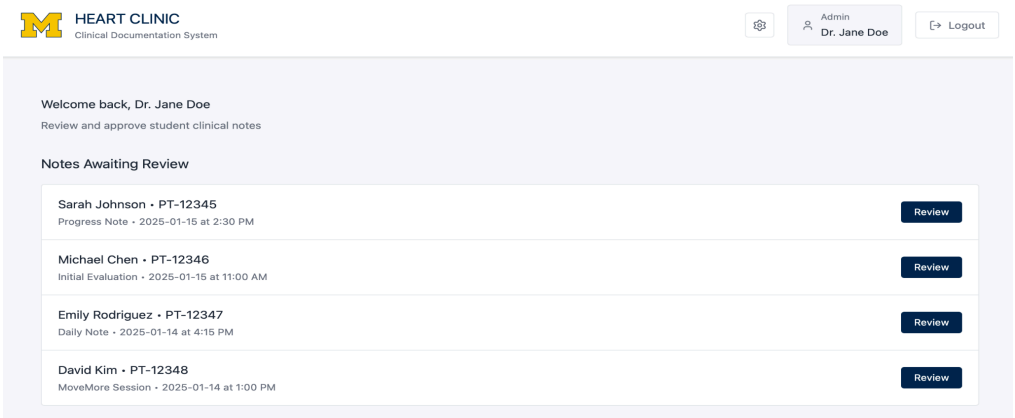



Figure 7: Faculty Review Homepage

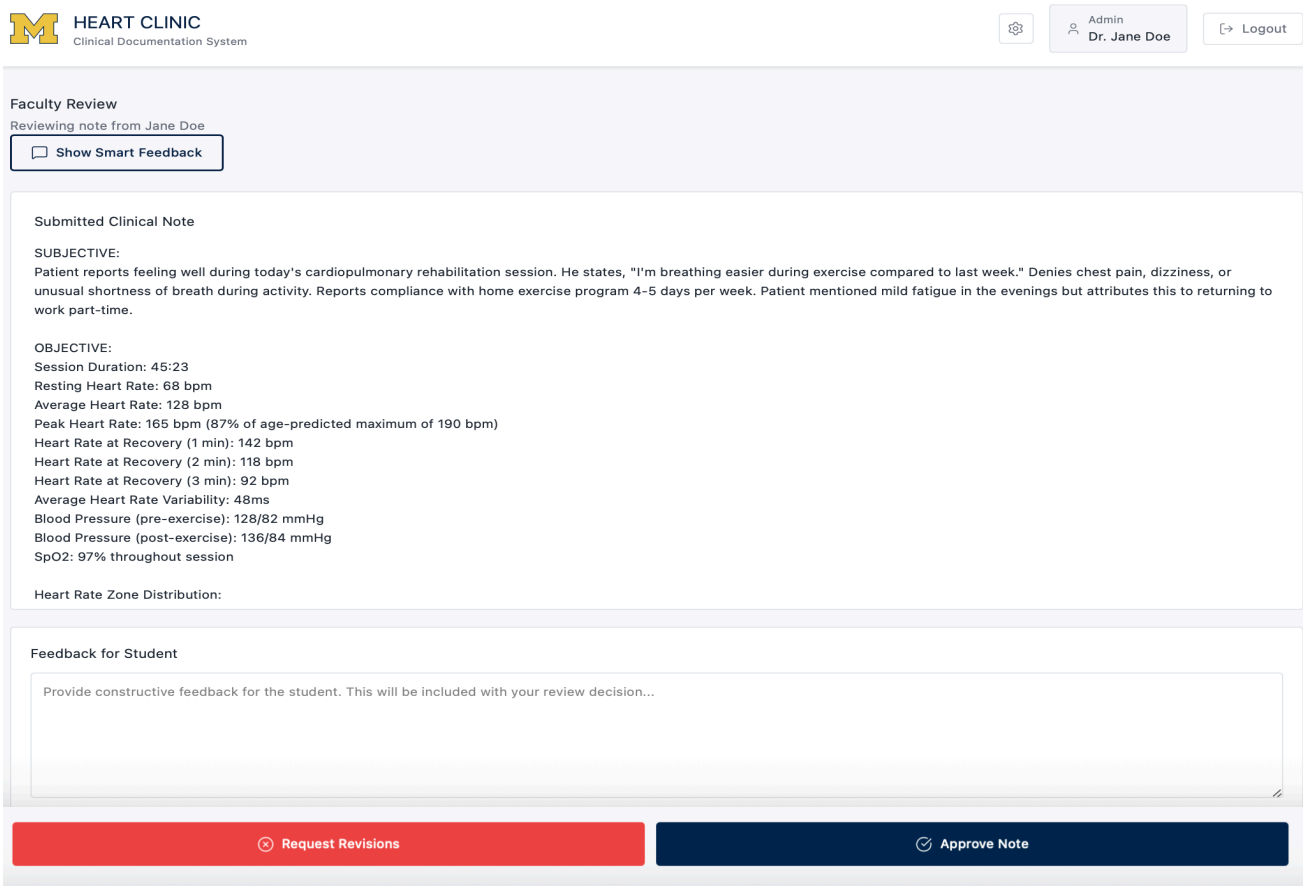



Figure 7.1: Faculty Review Note (With Smart Feedback)

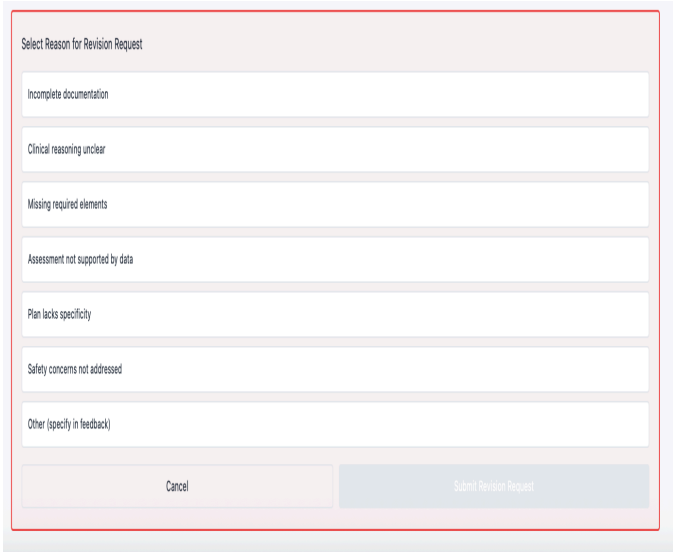



Figure 7.2: Revision Request Options

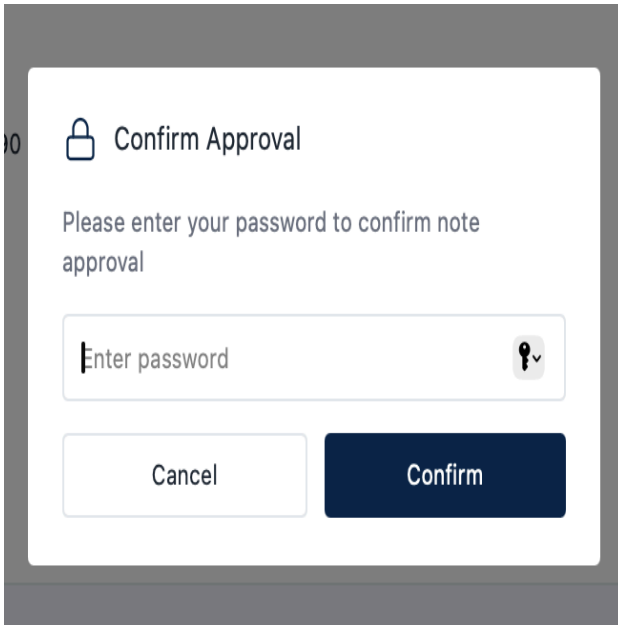



Figure 7.3: Note Approval Confirmation

System Administrators do not interact with the faculty review interface. They access a separate backend portal where they manage AI settings, platform configuration, user roles, and the technical environment that supports the system.

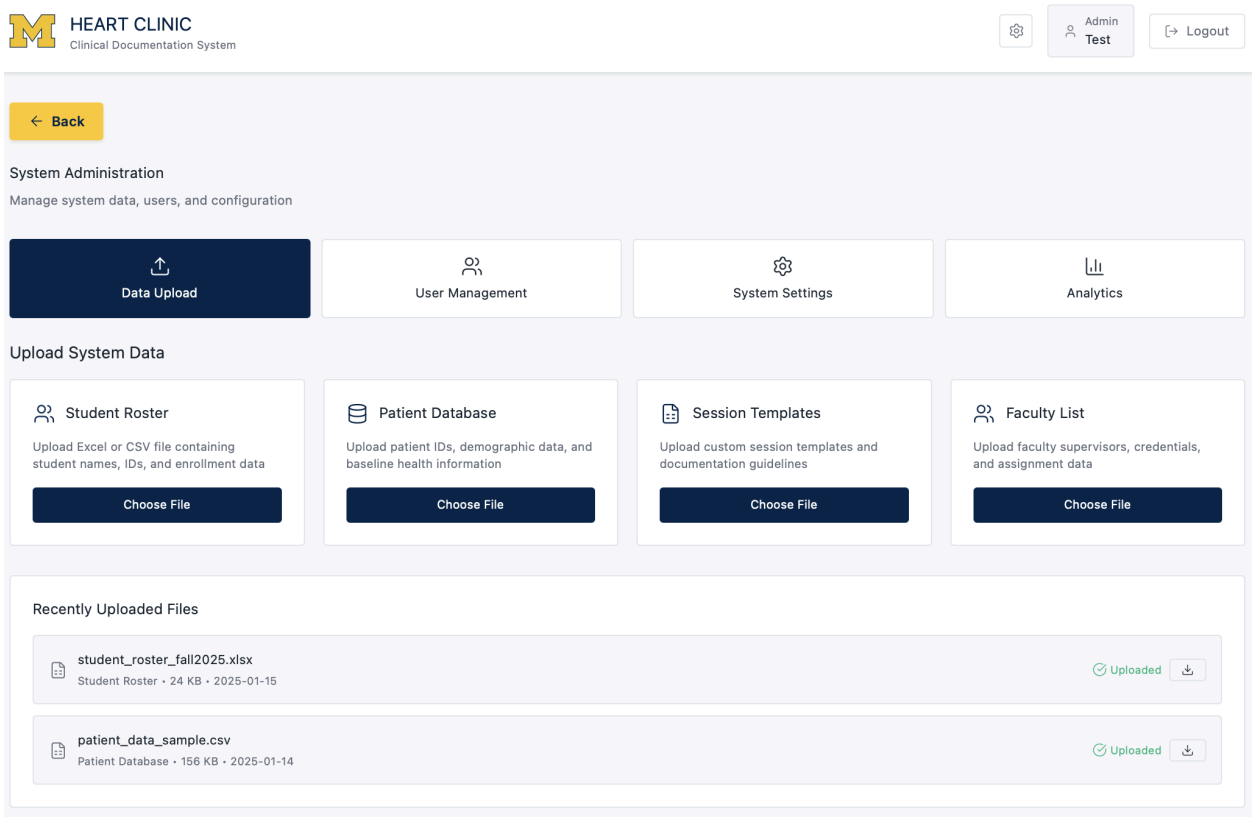



Figure 8: System Administrator Portal

## 4. Unimplemented Components

Because this course focuses on interaction design rather than full engineering, several technical features were left conceptual rather than functional. These include live API connections to Polar devices, HRR processing algorithms, encryption layers, a backend for AI model selection, and complete accessibility features. Ko emphasizes that appropriate scoping is part of good design and that not all aspects of a system must be implemented in early prototypes (Ko, 2012).

## 5. Tools Used and Evaluation

Tools included Figma, GitHub, VS Code, NodeJS, Netlify, Python3, the Mac Terminal, paper, pen, and Excel based HRR calculators. Figma supported rapid exploration, component creation, and interactive prototyping. GitHub, Netlify, and the Terminal allowed the design to be tested in a real browser environment. Although I have limited coding experience, some features required higher fidelity interaction than Figma could provide, such as autosave behavior and layout responsiveness. For these coded components, I collaborated with my close friend, who is a software engineer at Microsoft, to translate design intentions into functional prototypes. Sketching with paper aligned with Buxton's belief that early ideas should stay flexible and inexpensive to change during ideation (Buxton, 2007). This combination of tools also made it possible to evaluate how different layouts support user mental models, which Sharp et al. identify as an important factor in intuitive interaction design (Sharp et al., 2019).

Limitations included Figma's difficulty simulating live data or adaptive fields and the additional time needed to deploy to Netlify for each prototype update. Some interactions required coded prototypes because they could not be simulated in Figma alone.

## 6. Design Process

### Needfinding

Interviews, clinic wish lists, and analyses of current HEART and MoveMore templates shaped the requirements. Patnaik and Becker argue that design must uncover latent needs rather than only stated ones (Patnaik & Becker, 1999). The latent need at the HEART Clinic was relief from cognitive overload caused by fragmented systems.

### Sketching and Paper Prototypes

I sketched layouts using office supplies and templates, following Greenberg's recommendation to work at low fidelity to invite critique. Usability tests with three non classmates revealed confusion about buttons, unclear visual hierarchy, and lack of guidance for session flow. These findings validated Buxton's idea that sketching is valuable because it surfaces opportunities before commitments are made (Buxton, 2007).

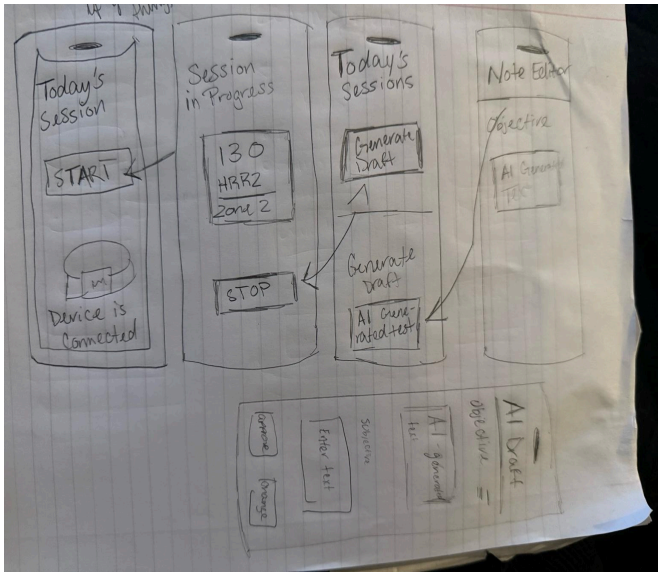



Figure 9: Early sketches

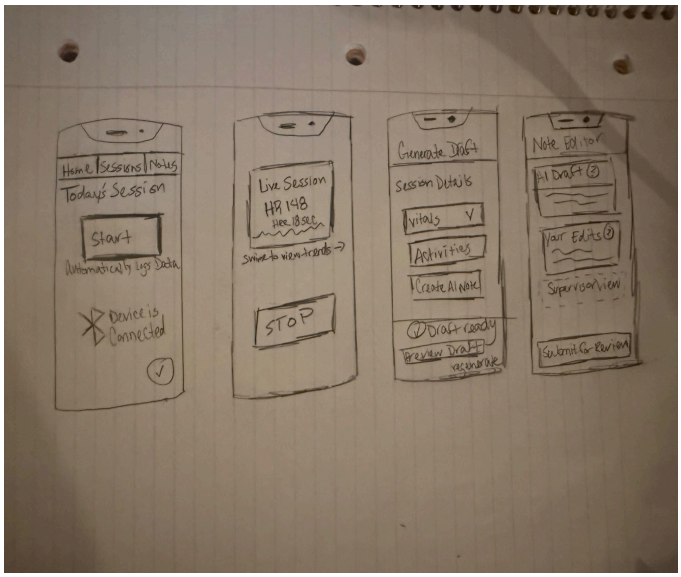



Figure 9.1: Paper Prototype

## Digital Prototype V1

The first digital version was functional but visually plain. Students had difficulty interpreting visual hierarchy, understanding AI involvement, and identifying the correct next steps.

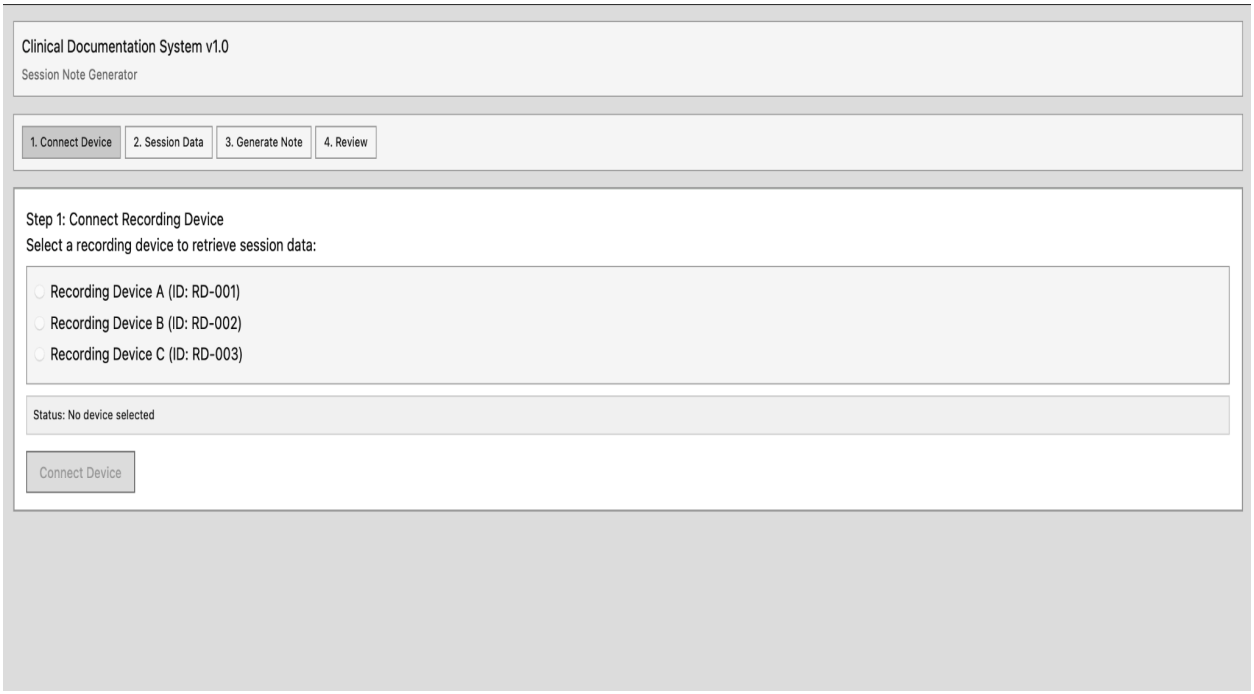



Figure 10: Digital Prototype V1

## Digital Prototype V2

I introduced HEART branding, reorganized screens, created a Live Session Tracking screen, clarified data groups, and improved the Note Editor. These changes support mental model alignment, which Sharp et al. describe as essential for usability (Sharp et al., 2019).

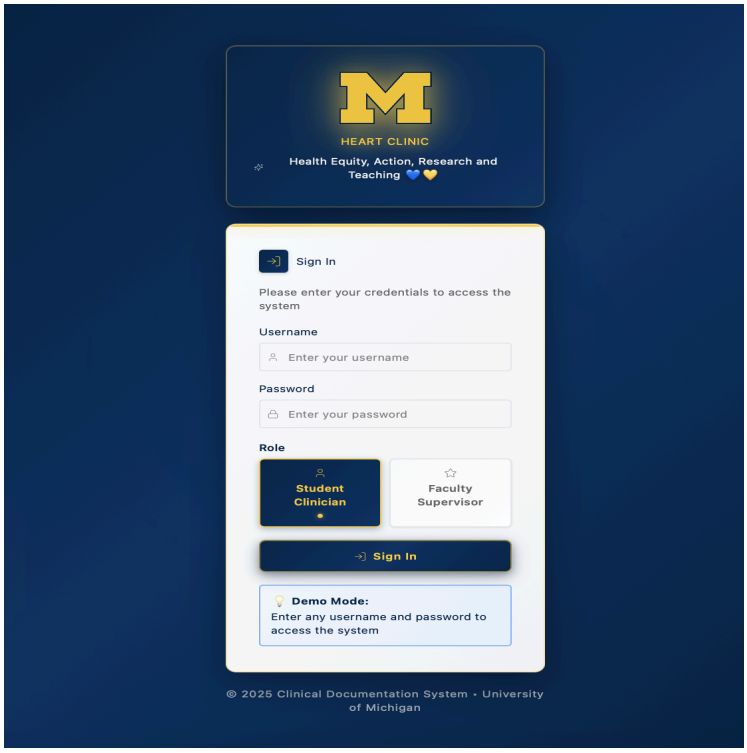



Figure 11: Digital Prototype V2

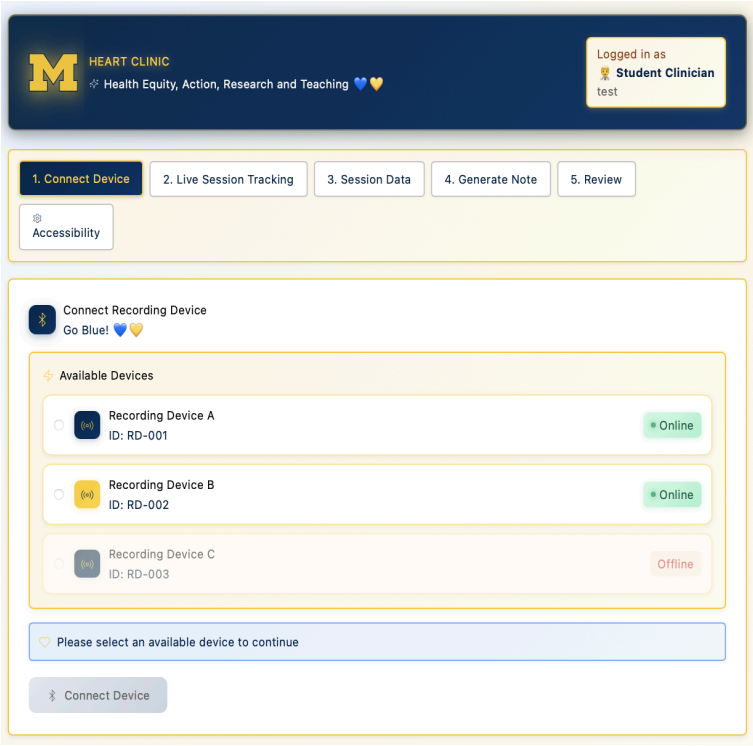



Figure 11.1: Digital Prototype V2 Homepage

## Final Prototype

The final version integrated HEART and MoveMore into a single flow, added real time SOAP capture, introduced Smart Edits and Smart Feedback, added clearer back navigation, emphasized required fields, included autosave indicators, and refined the Administrator interface. Woolery's design thinking model influenced this continuous cycle of iteration and testing (Woolery, 2018).

Throughout, I drew on Norman's principles of visibility and signifiers, Buxton's emphasis on sketching, Ko's clarity about problem framing, Woolery's iterative model, Sharp's guidance on interaction structure, and Patnaik and Becker's insight into human needs.

**7. Designer Reflection:**

My design philosophy rests on clarity, simplicity, and respect for the cognitive limits of users. I believe that systems should carry structural memory so that humans can focus on meaningful interpretation and decision making. The HEART Clinic context reinforced this belief. Students should not need to compute HRR zones manually or rebuild SOAP notes from memory.

Values embedded in the system include transparency, accountability, education, and accessibility. AI is optional and clearly marked. Supervisors have explicit control. Students receive reinforcement on HRR concepts. Accessibility appears on the login screen rather than being buried in settings.

I also challenged the assumption that documentation must be separate from the clinical session. By capturing observations in real time, documentation becomes part of the therapeutic process rather than a chore performed after fatigue has set in.

**8. Impact**

**Impact on the Clinic**

The system reduces documentation burden, lowers the risk of error, improves safety by making HRR interpretation immediate, and unifies HEART and MoveMore documentation. Supervisors benefit from consistent formatting and integrated Smart Feedback.

**Broader Impact**

The system models a responsible method of AI use in educational healthcare. It supports learning rather than bypassing it. It shows how human centered design can reduce cognitive load, strengthen accessibility, and embed equitable practices in clinical tools. Patnaik and Becker remind designers that solutions may evolve, but human needs remain constant. This system supports those needs through thoughtful integration rather than technical excess.

## References


Buxton, B. (2007). *Sketching user experiences*. Morgan Kaufmann.

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