



Capstone Design Project Abstract

Project Title: Timed Lab Ordering Simulation Platform

Sponsor: AU/UGA Medical Partnership

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Motivation:

Current medical simulation tools and Electronic Medical Record (EMR) simulators are often prohibitively expensive due to recurring subscription models, placing them out of reach for many programs. Furthermore, existing tools prioritize documentation and charting over the critical clinical workflow of diagnostic ordering and result interpretation. There is a need for a lightweight, standalone, one-time cost solution that allows students to experience realistic clinical delays. Our motivation is to enhance medical education by providing a platform where students must navigate the “wait time” of a laboratory, fostering better diagnostic reasoning and triage skills.

Design:

The system is designed as a cross-platform, web-based application utilizing a React frontend and a Firebase backend for real-time data synchronization. The design features two distinct interfaces tailored to simulation roles:

1. **Student-Facing Interface:** Influenced by industry-standard EMRs (such as Epic), this portal allows students to view patient demographics, search a comprehensive database of clinical labs, and place orders. The system implements custom time logic that “delays” results until a technician-specified delay has passed, simulating real-world lab processing times.
2. **Technician Control Panel:** This backend interface allows simulation staff to manage active “rooms,” assign specific medical cases, and control the timing and availability of results. A major design pivot includes a Diagnostic Imaging, allowing technicians to upload X-rays, CT scans, and EKG strips (PNG/JPEG/PDF) directly from their workstations to a Firebase cloud database. The architecture is built to be “future-proof,” including a Lab Authoring tool so instructors can expand the database with new test and reference ranges without requiring technical support.

Prototype:

The images illustrate the login interfaces for both the student and technician portals, which serve as the entry point into the simulation platform. Each interface is designed to route users to their respective roles, with technicians accessing authenticated controls and students entering the simulation environment. The technician login includes secure authentication fields to protect system controls, while the student login prioritizes quick access to active simulation rooms with minimal input required. Overall, these login interfaces establish a clear and secure starting point for both user roles while supporting the workflow of the simulation platform.

