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AL-Mustaqbal University / College of Science

Department of Intelligent Medical Systems



Hospital management system for patients, medicine and administrative staff

A Project

Submitted to the Department of Intelligent Medical Systems, AL-Mustaqbal University /College of Science, as part of the requirements for obtaining a Bachelor's degree in Intelligent Medical Systems.

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Abstract

This research presents the design and development of an integrated web-based Hospital Management System (HMS) aimed at digitizing and automating administrative and clinical processes in healthcare institutions. The study addresses the limitations of traditional paper-based systems still used in many Iraqi hospitals, including inefficient patient record retrieval, manual billing procedures, unstructured appointment scheduling, weak coordination between departments, and lack of centralized data management.

The system was developed using a structured methodology consisting of seven phases: analysis of existing hospital workflows, requirements gathering identifying six user roles (Administrator, Doctor, Employee, Pharmacist, Technician, and Patient), relational database design using Supabase (PostgreSQL), UI/UX design and responsive implementation using modern web technologies (Next.js and TypeScript), system architecture design with clear separation of layers, implementation of Role-Based Access Control (RBAC) with Row-Level Security (RLS), and comprehensive system testing.

The proposed system integrates patient management, Electronic Health Records (EHR), appointment scheduling, pharmacy inventory, laboratory management, billing automation, employee attendance tracking, and statistical reporting within a centralized dashboard. Results demonstrate improved operational efficiency, reduced human error, secure data management, and faster access to medical information. Performance testing showed stable system behavior and acceptable response times.

The developed HMS provides a practical solution for transitioning healthcare institutions toward digital transformation. It enhances service quality, strengthens data security, and supports modernization of healthcare infrastructure. Future improvements may include AI-based clinical decision support, telemedicine integration, predictive analytics, and advanced cybersecurity measures aligned with international standards.

Keywords: Hospital Management System, Electronic Health Records, Digital Transformation, Healthcare Information Systems, Role-Based Access Control, Web Application.