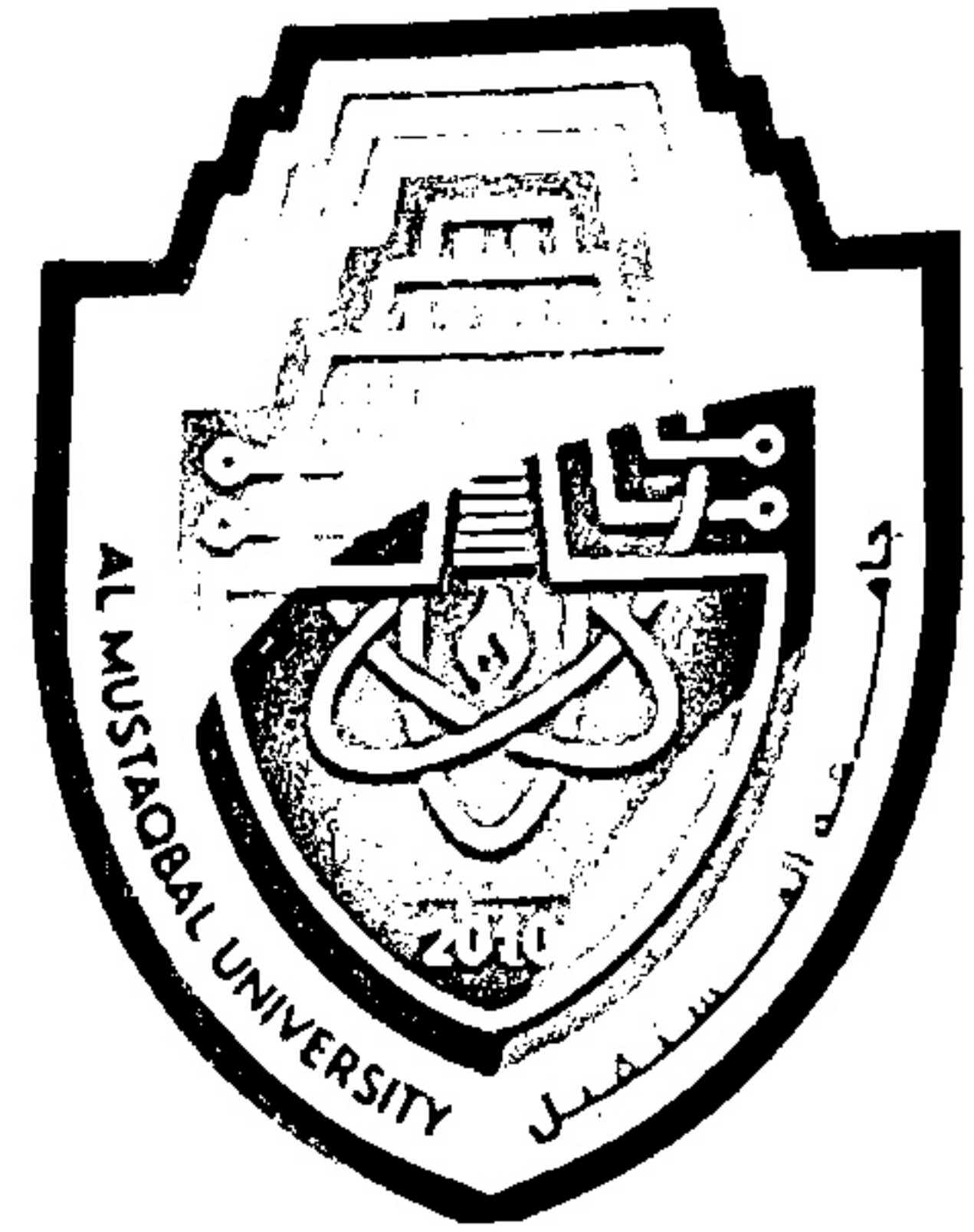


**Republic of Iraq**  
**Ministry of Higher Education and**  
**Scientific Research**  
**AL-Mustaqbal University / College of Science**  
**Department of Intelligent Medical Systems**



**Design and Implementation of RFID-Based Emergency Vehicle**  
**Access Control System for Hospitals**

**A Project**

Submitted to the Department of Intelligent Medical Systems, AL-Mustaqbal  
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Bachelor's degree in Intelligent Medical Systems

**By**

Abdullah Hussain

Ali Jabar

Ali Abass

Abdullah Jalel

**Supervised**

MSc. Reyam Thair Ahmed

## **Abstract:**

Emergency Medical Services (EMS) represent the vital lifeline of modern societies. However, the efficiency of these services often encounters logistical bottlenecks at hospital entrances, where traditional manual gate systems cause critical delays. This research provides an in-depth study and practical implementation of an advanced access control system based on the integration of Radio Frequency Identification (RFID) technology with embedded control systems.

The methodology focuses on innovating a wireless communication protocol between emergency vehicles and hospital gates. Vehicles are equipped with encrypted passive RFID tags, while a central processing unit—driven by an Arduino Uno microcontroller—is interfaced with a long-range reader and a high-torque servo motor. Beyond identification, the research engineered a comprehensive safety system using ultrasonic sensors guided by an advanced distance-measurement algorithm. This ensures that gate closure is inhibited in the presence of physical obstructions, guaranteeing a safe and uninterrupted flow of traffic.

Experimental results and statistical analysis of the prototype demonstrated exceptional performance; the response and waiting time at the gate was reduced