

## RFID-BASED IOT SYSTEM FOR WIRELESS IDENTIFICATION

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### ABSTRACT

This paper examines the development and application of integrated circuits for wireless communication in IoT networks, with a particular focus on their role in the design and implementation of practical low-power systems. The theoretical part of the paper addresses the fundamental concepts of IoT architecture, the principles of wireless communication, and the role of integrated communication circuits in device connectivity, data acquisition, and remote system control. Special attention is devoted to the analysis of the characteristics of low-power microcontrollers and communication modules, as well as their application in smart infrastructure solutions.

The practical part of the paper includes the design and implementation of a toll-gate system prototype based on the Arduino UNO R3 platform, representing an example of an IoT device with wireless user identification. The system uses an RFID integrated circuit for contactless communication and authentication, a servo motor for mechanical barrier control, and an LCD display for user interaction. Before the physical prototype was implemented, a system simulation was developed in the Tinkercad environment, enabling verification of the operating logic, sequence of actions, and system behaviour under controlled conditions.

Based on the simulation, a physical prototype was developed, confirming the correctness of communication between the integrated circuits, as well as the functionality of the system under real operating conditions. The obtained results show that it is possible to implement a reliable and energy-efficient IoT system using simple and widely available integrated circuits. The paper emphasizes the importance of integrating hardware and software components in the development of IoT solutions and indicates the potential application of such systems in smart traffic and automated infrastructure.

**Keywords:** Internet of Things, low-power integrated circuits, System-on-Chip, duty cycling, energy efficiency.