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MQTT-Enabled Smart Door Access System: Design and Implementation Using NodeMCU ESP 8266 and HiveMQ
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Abstract

The security of one's residence or property is an essential consideration that warrants careful attention to safeguard the premises and its contents. It has become increasingly apparent today that physical key door locks are susceptible to damage and can be compromised by unauthorized individuals. The inherent vulnerability of physical key door locks stems from their susceptibility to misplaced keys and duplication, as individuals are required to always carry them. This work presents a novel Internet of Things (IoT) enabled smart door access system designed to improve the security of homes or premises. The system offers keyless access to individuals who have been granted authorization. The system's architectural design incorporates the utilization of a NodeMCU ESP 8266 microcontroller to oversee door operations. Access control functionality is facilitated through the implementation of the Virtuino IoT application, which enables the unlocking of doors using smartphones. Additionally, a MQTT broker, specifically the HiveMQ, is implemented to facilitate effective machine-to-machine communication within the IoT components. The rationale behind the adoption of this IoT-based solution stems from the inherent weaknesses of traditional physical key door locks, which are prone to damage and replication, consequently jeopardizing security measures. The proposed system aims to address these limitations by rendering traditional keys obsolete, thereby improving both security and convenience for users. The system has undergone comprehensive development, testing, and operationalization, resulting in a highly functional system. The success rate of all functions has consistently achieved a 100% level, which serves as an indication of the system's robustness and effectiveness. In addition, the practical implementation of the system in the Centre of Excellence for Cybersecurity (CoExCys) office at Kuliyyah of ICT IUM exhibited smooth operation and the absence of any operational challenges throughout a trial period lasting one week. The findings highlight the potential of the system as a feasible solution for enhancing security and regulating access in diverse environments. © 2023 IEEE.

Author Keywords

HiveMQ; MQTT; NodeMCU ESP S266; Smart door access system; Virtuino IoT

Index Keywords

Authorization, Internet of things; Access system, Design and implementations, Essential considerations, Hivemq, MQTT, NodeMCU ESP s266, Property, Smart door access system, Smart doors, Virtuino internet of thing; Locks (fasteners)

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