Deggendorf Institute of Technology

Faculty of Electrical Engineering and Media Technology

*“Examination and Verification of Wireless Communication Protocols for Industry 4.0 Applications and Sensor Networks”*

Master’s thesis in fulfillment of the requirements for the degree of:

Master of Science (M.Sc.) Deggendorf Institute of Technology

Submitted by: Examiner:

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On: Date



Author’s Declaration

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Master’s thesis topic:

Measurement and transfer of atmospheric data via MQTT protocol

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This thesis presents the development and implementation of an IoT-based environmental monitoring system using Arduino Nano 33 IoT for measuring atmospheric data, including temperature, humidity, and pressure. The collected sensor data is securely transmitted via MQTT protocol over a WiFi network to a Node-RED dashboard hosted on a Raspberry Pi. Real-time visualization and local storage of atmospheric data in .csv format on an SD card are achieved, allowing remote access to the data through an IP address without the need for an external monitor.Security and reliability are fundamental aspects of this system. The MQTT protocol is utilized with encryption mechanisms to ensure the secure transmission of data, maintaining its confidentiality and integrity during transfer. Additionally, system reliability is emphasized to ensure consistent and accurate data collection and transmission. In addressing energy considerations, the thesis includes an analysis of power consumption patterns associated with the IoT devices used in the monitoring system. This analysis aims to optimize energy efficiency and sustainability in IoT deployments. The study showcases the practical implementation of IoT technologies for environmental monitoring, demonstrating a comprehensive approach to data collection, transmission, visualization, and storage. By integrating security, reliability, and energy efficiency considerations, this research contributes to advancing IoT applications in environmental science and underscores the potential for scalable and sustainable IoT solutions in various monitoring contexts. This thesis contributes valuable insights into the design and deployment of IoT-based environmental monitoring systems, highlighting the importance of secure and reliable data transmission, user-friendly data visualization, and energy-conscious IoT device management. The findings presented offer practical implications for researchers and practitioners interested in leveraging IoT technologies for environmental data collection and analysis.

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