DEVELOPMENT OF AUGMENTED REALITY APPLICATION FOR IOT-BASED ROOM LIGHT AND HUMIDITY CONTROL IN OFFICE AND BASEMENT AREAS

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ABSTRACT

A common problem faced in office and basement areas is the manual management of lighting and humidity, which poses a risk of energy inefficiency and reduced air quality. High humidity in enclosed spaces can also trigger the growth of pathogenic microorganisms that are harmful to health. In addition, the lack of an interactive visual interface to control electronic devices creates a gap for the development of new technologies. The purpose of this research is to develop an Augmented Reality (AR)-based application that can control lights and fans efficiently and visually, as well as display temperature and humidity data in real-time to support energy efficiency and healthy air quality. This research uses the Research and Development (R&D) method, starting from field observations, literature reviews, to the development of an AR-based system using Unity and Vuforia. The main hardware used includes an ESP32 microcontroller, a DHT22 sensor, a PIR sensor, and a relay. The AR application is connected to the device via a local network using the Blynk platform. Simulation tests were conducted to assess the accuracy of Marker detection, sensor readings, and automatic device control based on environmental conditions and time. The results showed that the system was able to accurately detect Markers, display an interactive control interface, and adjust devices according to schedules and environmental values. The system could also automatically turn off lights when no motion was detected and adjust fan speed based on humidity. In conclusion, this application successfully provides a practical, energy-efficient solution that improves comfort and air quality in office and basement environments.

Keywords**: **Augmented Reality, light control, humidity, smart office, IoT, NodeMCU.