

ABSTRACT

This final project develops an Internet of Things (IoT)-based system for digitizing analog data from altimeter and vertical speed indicator (VSI) instruments to support aircraft cockpit simulators. The system utilizes an MS5803-14BA pressure sensor to measure air pressure in a sealed vacuum chamber simulated using a vacuum pump and solenoid valve, then processed by an ESP32 microcontroller into altitude and VSI data using barometric formulas. The data is displayed in real-time on a 20x4 LCD and a Node-RED dashboard via the MQTT protocol. The system architecture integrates hardware components such as sensors, microcontrollers, relay modules, and actuators with cloud-based visualization software. Testing was conducted with target altitudes ranging from 3000 to 22000 feet, producing reading deviations between ± 0 and ± 162 ft compared to reference data from the UAMTC SIL-34P manual. The results show that the system responds stably to pressure changes, displays synchronized data across all interfaces, and operates as designed. This system is feasible for use as an educational and testing tool in laboratory environments and serves as a foundation for developing digital-based flight simulation instruments.

Keywords: Altimeter Digitization, VSI, ESP32, Pressure Sensor, IoT, Flight Simulator