College of Engineering
UNIVERSITY OF GEORGIA

Capstone Senior Design Project Abstract

Project Title: EcoGuardian AI - Real Time Environmental Monitoring Using Agentic AI
Sponsor: Capgemini
Team Members: Anna Greenhut, Victoria Garay-Moreno, and Hadiza Sarr
Faculty Mentor: Victor Philippe

EcoGuardian AI is an agentic, Azure-enabled system designed to monitor, interpret, and provide actionable steps to improve indoor air quality (IAQ) in environments such as classrooms, laboratories, and office spaces. The system ingests high-frequency environmental data, including CO_2, temperature, humidity, and particulate matter (PM2.5), generated through a Python-based simulator or collected from physical sensors. While IAQ data is widely available through sensing technologies, it is rarely integrated with intelligent software systems that enable real-time analysis and decision-making. EcoGuardian AI addresses this gap by transforming raw sensor data into clear, actionable insights through a user-friendly platform accessible to non-technical users.

The system generates/collects IAQ data at intervals of 5 to 30 seconds, combining simulated data with real sensor inputs for selected metrics such as temperature and humidity. This data is transmitted through Azure IoT Hub, enabling seamless communication between devices and cloud services, and then processed through a streaming pipeline that structures and prepares the data for analysis. The processed data is then evaluated by four agents: a Sensor Monitor Agent that validates data quality, an Anomaly Detector Agent that identifies abnormal patterns, a Recommender Agent that generates corrective actions, and a Summary Agent that produces concise natural-language reports.

The outputs from these agents are consolidated into an interactive Azure Grafana dashboard, where users can view real-time environmental metrics, anomaly alerts, and recommended actions. Additional features include downloadable reports and SMS-based notifications for critical conditions, ensuring timely intervention. By combining real-time data pipelines with agentic AI orchestration, EcoGuardian AI enables proactive and intelligent management of indoor environments.

All content should be limited to 1 page. Text should be 11pt Times New Roman font. Images and figures can be included.