

Introduction

The rising concern for air quality has driven the development of advanced sensors for accessible gas monitoring. Among the critical gases to monitor, carbon dioxide (CO₂) stands out due to its environmental and health implications. This paper presents an innovative CO₂ sensor prototype designed to revolutionize real-time concentration measurements. Our primary objective is to create an affordable CO₂ detection solution using Internet of Things (IoT) technology, enabling continuous monitoring for environmental and industrial applications.

The prototype utilizes three MQ2 sensors for ppm CO₂ measurements. An Arduino microcontroller collects and

Method

transmits data to a cloud platform with clear and accessible presentation. Figure 1 shows the architecture comprises two embedded systems, each equipped with three MQ2 sensors to measure CO₂ levels. Within each system, the sensors provide raw data, which is then processed by an Arduino Nano, this is a compact and versatile development board that offers numerous technical features.

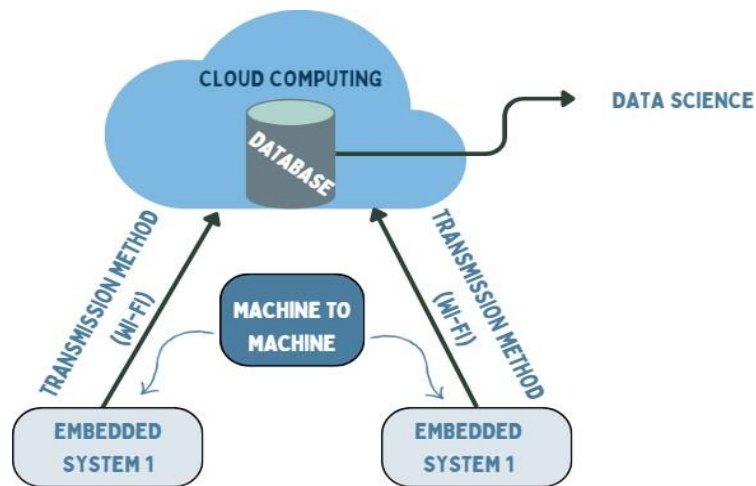


Fig. 1. IoT Architecture

Results

Figure 2 is a visual representation of the functional prototype of the IoT economic CO₂ sensor being tested in the Alvarado Lagoon, Puerto Cortes. This image exemplifies the prototype's ability to fulfill its previously established functions, which include measuring the parts per million of carbon dioxide and maintaining it on the water surface. During testing, the measurement of CO₂ concentrations at the surface of the lagoon was successfully achieved, validating the desired performance of the prototype.

Conclusion

The effective integration of an Arduino microcontroller and the use of an ESP32 module have optimized data management, ensuring seamless transmission of information through IoT connectivity. These results represent a significant contribution to the field of study and have practical and theoretical implications for future research.



Fig. 2. Field Test Puerto Cortes

Contact: mmtzt@uaem.mx

none

Conflict of interest: