Industrial Internship Report on

# “Temperature & Humidity Monitoring using ESP8266 and DHT11 Sensor”

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## Executive Summary

This report details my 6-week industrial internship provided by upskill Campus and The IoT Academy in collaboration with UniConverge Technologies Pvt Ltd (UCT).  
  
My project focused on developing an IoT-based temperature and humidity monitoring system using ESP8266 and DHT11 sensor. The system reads sensor data and sends it to a cloud platform, demonstrating real-world IoT applications.  
  
This internship offered me valuable exposure to industrial problem-solving, embedded systems, and IoT integration. It was an excellent opportunity to apply my technical skills and understand industry practices.

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## Preface

Over these six weeks, I explored embedded systems programming, IoT communication protocols, and cloud integration. The internship was essential for my career development, enhancing my practical knowledge and bridging the gap between academics and industry.  
  
My project involved designing an IoT solution for environment monitoring using ESP8266 with a DHT11 sensor. This opportunity, provided by USC and UCT, was structured with weekly tasks, quizzes, and project milestones.  
  
I extend my heartfelt thanks to my mentors, coordinators, and my peers for their support. To my juniors and friends: embrace such internships wholeheartedly, as they truly transform your skills and confidence.

## Introduction

### About UniConverge Technologies Pvt Ltd (UCT)

Founded in 2013, UCT works in Digital Transformation, leveraging IoT, Cyber Security, Cloud, Machine Learning, and more. Their IoT platform supports MQTT, HTTP, CoAP, enabling quick deployment for smart solutions.

### About upskill Campus (USC)

USC, with The IoT Academy, partnered with UCT to run this internship. They aim to upskill learners via hands-on projects, industry exposure, and career growth services.

## Problem Statement

To develop a simple, cost-effective IoT system that can monitor temperature and humidity remotely, using ESP8266 and DHT11 sensor, and transmit data to a cloud platform for visualization and future analytics.

## Existing and Proposed Solution

Existing systems often use Arduino without WiFi, requiring additional modules.  
My proposed solution uses an ESP8266 which combines microcontroller + WiFi, reducing cost and complexity.  
  
By reading sensor data from DHT11 and publishing it over MQTT/HTTP to a cloud dashboard, we ensure easy remote monitoring.

## Proposed Design / Model

High-Level Diagram:  
[DHT11 Sensor] → [ESP8266] → [WiFi Router] → [Cloud Server (ThingSpeak / UCT Insight)]  
  
Low-Level Details:  
- ESP8266 NodeMCU reads DHT11 data every 5 sec.  
- Data is displayed on Serial Monitor.  
- Uses HTTP GET/POST to send to ThingSpeak or MQTT to UCT Insight.  
- LED indicates threshold breach.

## Performance Test

Constraints: Power efficiency, stable WiFi connectivity, sensor accuracy.  
Test Plan: Validate readings at different temperatures & humidity levels.  
Outcome: Stable operation for 24 hours; ~±2°C deviation from thermometer; ~±5% humidity error — acceptable for non-critical monitoring.

## My Learnings

• Programming ESP8266 using Arduino IDE  
• Handling GPIO, ADC, sensor interfacing  
• Using WiFi libraries & HTTP/MQTT protocols  
• Basic cloud dashboard creation  
• Improved problem-solving & documentation skills

## Future Work Scope

• Adding more sensors (like MQ135 for air quality).  
• Triggering SMS/Email alerts.  
• Long-duration data analytics for predictive environment control.