IOT BASED ENVIRONMENT MONITORING SYSTEM

Phase 2 project Submission Document

TEAM MEMBERS:

RITHIGA .A

SANKARI .V

BARANIKA .G

SUBASRI .K

INTRODUCTION

The main objective of proposed system is to collect and transmit data from various environmental sensors to a central system for analysis. These programs can monitor a wide range of environmental parameters such as temperature, humidity, air quality and water quality. The proposed system provides a viable and straightforward solution for environmental and ambient monitoring applications. The system represents the environmental and ambient monitoring using low power wireless sensors connected to the internet, which send their measurements to a central server. Finally data from all environments stored on the Base station, can be remotely visualized from every device connected to the internet. This provides the possibility of logging measurements from locations all over the world and of visualizing and analyzing the gathered data from any device connected to the Internet.

PROPOSED SYSTEM

The proposed system consists of a microcontroller as a main processing unit for the entire system and all the sensor and devices can be connected with the microcontroller. The sensors can be operated by the microcontroller to retrieve the data from them and it processes the analysis with the sensor data and updates it to the internet through Wi-Fi module connected to it. Then the microcontroller sends the processed data to a web server where it can be accessed by the website.

LPC1768

The microcontroller used in this system LPC1768 is an effective choice for the implemented system. As our proposed system is a low power consumable solution, the microcontroller should be also low power consuming. The LPC1768 is an ARM Cortex-M3 based microcontroller for embedded applications requiring a high level of integration and low power dissipation. The ARM Cortex-M3 CPU incorporates a 3-stage pipeline and uses Harvard architecture with separate local instruction and data buses as well as a third bus for peripherals.

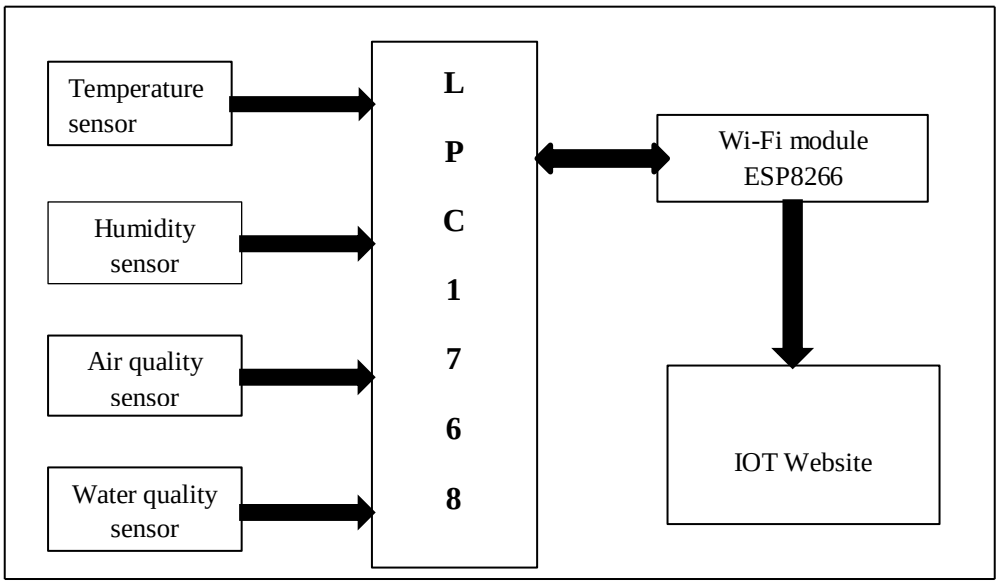

Figure1 Block Diagram

Wi-Fi Module

In this system we are using ESP8266 Wi-Fi module which is having TCP/IP protocol stack integrated on chip. So that it can provide any microcontroller to get connected with Wi-Fi network. ESP8266 is a preprogrammed SOC and any microcontroller has to communicate with it through UART interface. It works with a supply voltage of 3.3v. The module is configured with AT commands and the microcontroller should be programmed to send the AT commands in a required sequence to configure the module in client mode. The module can be used in both client and server modes. Once it gets connected in a Wi-Fi network, we'll get one IP address which is accessible in its local network. The module is additionally having 2 GPIO pins alongside UART pins. It is also having inbuilt SPI protocol by using the two pins of UART as data lines and by

configuring the two GPIO pins as control lines and clock signal. It is also having 1MB on-chip flash memory. Internally it is having power management unit with all regulators and PLLs.

Sensors

The system consists of temperature sensor, humidity sensor, Air quality and Water quality sensor (e.g., DHT22 for temperature and humidity, MQ-series for air quality, pH and turbidity sensors for water quality). These 4 sensors will measure the primary environmental factors like light intensity, temperature, pressure and relative humidity respectively. All these sensors will gives the analog voltage representing one particular weather factor. The microcontroller will converts these analog voltages into digital data.

PROCESS

Data Acquisition: The microcontroller LPC1768 gathers data from sensors. This data could include environmental parameters like temperature, humidity, air quality and water quality.

Data Processing: Then the microcontroller perform some data preprocessing tasks like filtering, scaling, or formatting to ensure the data is in the right format for transmission.

Connectivity: Then the microcontroller needs to send this data to a web server where it can be accessed by the website through the ESP8266 Wi-Fi module.

Data Transmission: The microcontroller uses communication protocols to send data to the server. Two common protocols for IOT applications are MQTT (Message Queuing Telemetry Transport) and HTTP (Hypertext Transfer Protocol). We are using HTTP protocol which is efficient for real-time data updates.

Server-Side Processing: On the server, we need a web application that can receive process and store the incoming data. This application also interacts with a database to store data.

API: The server-side application typically provides an API (Application Programming Interface) that the website can use to request data. This API defines how data should be accessed often through HTTP REST full endpoints.

Front-End Development: On the website side, we use user interface and design using technologies like HTML, CSS, and JavaScript to build the user interface components.

Web Application: The website front-end communicates with the server-side application through API calls. It request data from the server and displays it on the website in a user friendly format.

User Access: Users access the website using web browsers or mobile devices. They interact with the interface to view data.

This process allows data collected by the microcontroller to be displayed on a website, providing valuable information to users and enabling remote monitoring and control of the connected system.

CONCLUSION

The system eliminates bulky solutions, provides the possibility of logging data where Wi-Fi network coverage exists and can be used in a wide range of monitoring applications. It employs sensors measuring the ambient or the environment which sends messages to an IoT platform. The development of a CPS, which monitors environmental parameters based on the existent IEEE 802.11 infrastructure, was presented. The communication protocol and the design of the nodes help in achieving low power consumption, offering battery lifetimes of several years intends to enhance the reliability and security of the proposed system.