Original Research Paper

Engineering

DESIGNING A PORTABLE HUMIDITY MEASURING STATION USING PIC 16F877A

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ABSTRACT
With every passing day we are battling a serious and dangerous challenge, Pollution. It is increasing at an alarmingly rate. There's an urgent need to exercise counter measures to curb it. To come up with an effective counter measure, we need to have accurate and useful data of weather parameters that will show the rise in levels of pollution. The weather parameters give us a comparative data as to which parameter hits the most due to rise in pollution and in what pattern.

I have chosen my city Ahmedabad as test city to deploy my design to capture these data and use it in aiding authority to curb pollution issue. Drawback of the current pollution stations is that they were located in laboratories and at very distant places from each other. Moreover, being bulky in size they couldn't be installed at junction places where there was a dire need of monitoring the air. Hence, Ahmedabad Municipal Corporation took up the responsibility to install 10 Poll drones as a pilot project across the city to determine the pollution at key junction points. They began setting up digital sensors around the entire city area for measuring various weather parameters.

My job is to design a small, portable device for collecting weather report of various parameters. Out of a set of many parameters I have chosen humidity to begin with. I will be designing a device that just on plug-in into a laptop or PC would start collecting data off the environment around and generate reports in Excel format for further analysis and decision making.

KEYWORDS : Weather station, portability, PIC16F877, sensor SHT2x, Wi-Fi (IoT), data logger, USB.

OBJECTIVES

Old Weather station is being bulky size they couldn't be installed at junction places more difficult. So I am try to design a small, portable device (like to pen drive type) for collecting weather report of various parameter. This product is operated by battery (Battery operated life 1 to 3 year)

as well as power supply. Here, digital sensor is used so we do not required amplifier. In form of relay we get digital output. PIC 16F877 microcontroller is programmable, easily upgradable and compact in size. On-site input is possible using key-board. Data is transfer Wi-Fi and USB through. Data storage in inbuilt memory 10,000 storage data. By making this product IoT based, open system connectivity.

FORMAL DEFINITION

Having analyzed the existing system and the following activities that are important in generating an accurate weather report with all the challenges taken into consideration, I have come up with an idea to design a simple portable humidity measuring device that can be easily operated by anyone who wishes to use it.

It should be having characteristics like smart sensing, data logging, battery based operation and having a USB as well as Wi-Fi interface supporting IoT environment. USB can enable the device to easily connect to Laptops or PC via necessary software. This makes easy and quick access to weather parameters.

I. PROPOSED TECHNIQUE

I am planning to design a product to be put into market as my project. I will be using an open source software for core programming, will do testing for hardware & software, perform analysis from reading of various outputs will design an algorithm that will handle all the critical situations.

The data generated will be in EXCEL format using SAS software that will be used by ma algorithm for analysis purpose.

I will provide a room for expansion in future in incorporating it with IoT network once the Government starts developing

Wi-Fi networks across the cities enabling me to cover larger area by setting up an IoT network.

PROPOSED MATHODOLOGY OF EVALUATION

The system is divided into four main parts, namely, the sensor circuit, the data-logging circuit, Wi-Fi and the USB interfacing circuit.

The sensor circuit contains the IC digital humidity sensor. The analogue outputs from these sensors are converted into digital signal by an ADC before being fed into the data-logging circuit which encompasses a microcontroller.

The current time for data-logging purposes is provided by the Wi-Fi while the USB interfacing circuit facilitates the data transfer between the data logger and a PC. The block diagram of the overall system is depicted in following block diagram.
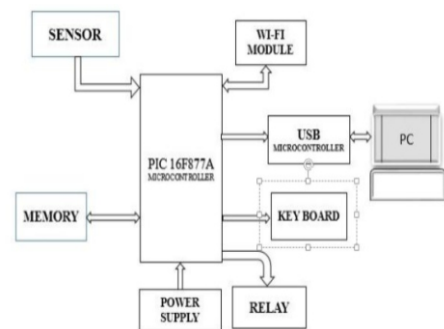
BLOCK DIAGRAM

Figure 1. Block diagram

The remote weather station measures the weather data and wirelessly transmits the weather data to the main weather station for display and logging. PIC16F877, the microcontroller used for this work, is the main controller on the remote station which interfaces with all the sensors. It handles data acquisition and data transmission using the transmitter unit.

PROPOSED TOOLS TO BE USED

PIC 16F877, Sensor SHT2x, USB, Wi-Fi Module, Key Pad, LCD, Battery, Power Supply, Relay.

PROPOSED EXPERIMENTAL SET UP

The data generated in graph format will be in EXCEL format using SAS software that will be used by ma algorithm for analysis purpose. The data generated graph a specific slope is divided in time format of data than after transfer data. Because battery life is long.

Wi-Fi networks across the cities enabling me to cover larger area by setting up an IoT network.

III. EXPECTED OBSERVATION

After completing all the set-up, from starting of the test to the end of the test sensors working and data transmission will be observed. It should be having characteristics like smart sensing, data logging, battery based operation and having a USB as well as Wi-Fi interface supporting IoT environment. USB can enable the device to easily connect to Laptops or PC via SAS software. This makes easy and quick access to weather parameters.

Compare figure 2 and figure 3
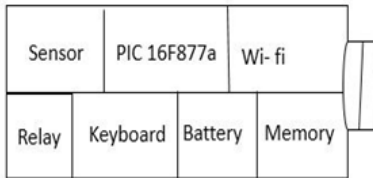

Figure 2 Bulky weather station

Figure 3 Design portable small size chip

IV. CONCLUSION

Study shows that that data received from the device will be available on theself power memory as well as it can beexport via USB and also export via WiFi (IoT). To save battery and optimise connectivity, smart algorith will be applied on node itself internally to have minimise encrypted data once upload in a day and will be displayed on the data graph slope in PC With a Excel / SAS software.

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