

Construction of an Automated Weather Station for Ground Level Weather Measurements

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Abstract: Development of an automated weather station with remote data transmission capability is presented. The complete system consists of three separate modules for data collection, data storage and data communication. The modules communicate with each other serially and are controlled by three separate PIC18F452 microcontrollers. The data collection module is interfaced to a set of sensors to collect weather parameters such as temperature, humidity, wind speed, wind direction, pressure and rainfall. The data storage module saves the captured data in real-time to a micro SD card. The data transmission module transmits data to a central station through a GSM or GPRS network. The selection of the network takes place automatically before transmitting data. The weather data can be viewed in real-time through a graphical user interface (GUI) located at central station. The modular nature of the design allows user to replace the data transmission module by RF link for transmitting data to locations within 100 meters.

Keywords: Rainfall, Humidity, Temperature, Wind speed

1. Introduction

An automated weather station is an instrument that measures and records meteorological parameters using sensors without intervention of humans. The measured parameters can be stored in a built-in data logger or can be transmitted to a remote location via a communication link. If the data is stored in a data logger, recorded data must be physically downloaded to a computer at a later time for further processing. However, this is not a viable option especially when the weather station is located at a remote unattended location. Therefore, the communication system is an essential element in an automated weather station.

Today, automated weather stations are available as commercial products with variety of facilities and options [1-3]. Although automated weather stations can be built and implemented in remote parts of Sri Lanka to bring down the cost of maintaining weather stations, until recently, not much emphasis has been given for building and using such instruments locally.

Automated weather stations have been developed in universities by interfacing meteorological parameter monitoring sensors to microcomputer/commercially available data loggers with communication devices or through serial and parallel ports to obtain hard copies of weather data [4-6].

Recently, the University of Colombo developed an automated weather station with USB communication facility and a built-in data logging facility. The system used wired communication to transfer data to the monitoring station through the computer's built-in USB interface [7]. However, in real situations, it is not feasible to have wired weather stations which require physical cable links to be established between the monitoring station and the weather station. The Industrial Technology Institute (ITI) extended this design and developed their first commercial level weather station. The present work is a further extension of the earlier developments.

The main objective of this work is to develop a standalone modular weather station with a remote communication facility to capture and transmit meteorological parameters.

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