A Low-Cost Microcontroller-based Weather Monitoring System

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ABSTRACT

The measurements of temperature, atmospheric pressure and relative humidity remotely by using the appropriate sensors is not only important in environmental or weather monitoring but also crucial for many industrial processes. A device for weather monitoring has been developed as described in this paper to monitor and display the temperature, pressure and relative humidity of the atmosphere, using analogue and digital components. The analogue outputs of the sensors are connected to a microcontroller through an ADC for digital signal conversion and data logging. An LCD display is also connected to the microcontroller to display the measurements. For analysis and archiving purposes, the data can be transferred to a PC with a graphical user interface program through a USB link. The interface program allows sampling parameters such as the date and time of the data-logging operation to be configured. The device has many advantages as compared to other weather monitoring systems in terms of its smaller size, huge memory capacities, on-device display, lower cost and greater portability.

Key words: Weather monitoring, Temperature, Relative humidity, Pressure, Sensors; Microcontroller

INTRODUCTION

Sensors are essential components in many applications, not only in the industries for process control but also in daily life for building's safety and security monitoring, traffic flow measuring, weather condition monitoring and etc. In weather monitoring, for instance, parameters such as temperature, humidity and pressure need to be measured (Ong et al., 2001), thus sensors have always been given the task for doing so.

Weather or climate plays an important role in human life. The thermal comfort of human being is known to be influenced mostly by six parameters, i.e., air temperature, radiation, air flow, humidity, activity level and clothing thermal resistance (ISO 7730, 1984; Bu et al., 1995). The advancement in technology has made these small and reliable electronic sensors capable of monitoring environmental parameters more favourably. Kang and Park (2000) and Odlyha et al., (2000) have developed monitoring systems, using sensors for indoor climate and environment based on the parameters mentioned.

Combination of these sensors with data acquisition system has proved to be a better approach for temperature and relative humidity monitoring (Moghavvemi et al., 2005). Ong et. al., (2001) and DeHennis and Wise (2005) introduced wireless sensing microsystem for