Design Presentation of a Solar Powered Microcontroller-Based Weather Station for the Acquisition of Atmospheric Parameters

Ughanze I. J, Ibrahim A. G and Eichie J. O.

Department of physics, Federal University Of Technology Minna, Niger State – Nigeria

E-mail: ughanzeifeanyi@yahoo.com

Abstract

Accessing real time weather information is still a challenge to atmospheric researchers. This work developed a solar powered Arduino microcontroller weather station that will measure atmospheric temperature, relative humidity, pressure and wind speed and wind direction using appropriate meteorological sensors such as DHT22 sensors for atmospheric temperature and humidity measurement, BMP180 sensors for pressure measurement, a three cup anemometer with reed switch sensor for wind speed measurement and a wind vane with a variable resistor for wind direction measurement. An Arduino Atmega 2560 microcontroller processes the output of the sensors, transfer them to the LCD for display and also transmit it to the Wi-Fi module which uploads the data to an online server to enable out-of-site end users to access the measured weather information.

Keywords: Weather station, Microcontroller, Monitoring Sensors, Wi-Fi module, solar panel.

1.0 INTRODUCTION

Weather tracking is of great importance in agriculture, communications, air transportation, industries and to atmospheric physicist (Anthony et al.,2017). For example in agriculture, weather determines how much success that can be recorded, because crop yield depend on weather in providing energy and water for it sustenance (Abubakar and Sulaiman,2018). Research has proved that climate change will have great effect on agricultural yield and human activities in the next century (Walthall et al.,2018). Hence there is need to have an effective means of monitoring atmospheric parameter at all times. Such a weather station should have an independent power source such as solar energy, for all time weather monitoring. A microcontroller weather station reads and records atmospheric parameters using sensors without any external intervention (Tajedinn and Abdelrasoul, 2015). The recorded atmospheric parameters can be processed as wired information, which means that it will be