Microcontroller-based Consumer Level Weather Prediction System

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Declaration

I declare that this thesis is my work and has not been submitted in any form for another degree or diploma at any university or other institution of tertiary education. Information derived from the published or unpublished work of others has been acknowledged in the text and a list of references is given.

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Mr B. H. Sudantha ……..……

Date:

Dedication

I dedicate this research thesis lovingly to the followings.

Mr B. H. Sudantha, my research supervisor for dedicating his valuable time with me even though he is busy with his workload and the guidance provide me to follow the correct path.

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Abstract

Weather conditions are important to people in planning their activities. Since weather conditions changed unexpectedly, monitoring weather conditions are very important these days. Weather stations are built to fulfil that purpose. But, if your area is not covered by that kind of weather station, you will not get accurate weather forecasts. Therefore, it can be caused to facing unexpected weather conditions. A system proposed in this paper will collect weather-related data and a live preview of those data can be seen on a display. All the outputs will display in a Nextion Display, which provides a smooth and fast response due to its internal microcontroller. Then those captured data will be logged in to a remote server. Also, this outdoor unit is powered by solar energy as a sustainable energy source. From this unit, temperature, humidity, atmospheric pressure, precipitation, wind speed and direction will be measured. Upcoming weather can be determined using the changes in atmospheric pressure. Based on those data, by using the zambretti algorithm, the upcoming weather condition will be predicted. This weather prediction system will be developed with microcontrollers which come affordable yet more powerful to handle this kind of system. Therefore, weather data will be captured by using Arduino Mega 2560 microcontroller board. Then it will be transmitted wirelessly to the indoor unit that handles the processing of those data, displays predicted data and the data logging to an Adafruit IO Internet of Things (IoT) cloud service. Those tasks will be handled by the ESP32 microcontroller board.

Keywords: Arduino, ESP32, Weather Prediction, Data Logging, Weather Station

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