Weather Station

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Abstract : The climate change is one of the most important factors affecting the quality of life and the activity of the increasingly population. The current means of meteorological parameters data collection are indeed rather limited and make use of some very expensive weather stations, leading to a lack of comprehensively monitoring due to cost constraints and inconveniences. In this paper we have proposed and developed a low cost hardware module based on microcontroller, which measures the meteorological data, including air temperature, atmospheric pressure, relative humidity, dew point temperature, wind speed and wind direction. The idea behind this program is to monitor, condition mapping, weather forecasting and further to warn the people from its isastrous effects. It will be highly useful in landing the aircraft, navigational and the ship borne effects, tornado, tsunami,cloud bursts and in healthcare alerts

***IndexTerms* – Bluetooth, Climate control.**

I. 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. Therefore, the communication system is an essential element in an automated weather station. In this project Bluetooth technology is used for transmission of data. Today, automated weather stations are available as commercial products with variety of facilities and options. Although automated weather stations can be built and implemented in remote parts 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.

The current means of meteorological parameters data collection are indeed rather limited and make use of some very expensive weather stations, leading to a lack of comprehensively monitoring due to cost constraints and inconveniences. Nevertheless, the acquisition of omprehensive meteorological data is the prerequisite condition for the accuracy of weather forecast. If there is not enough data gathered of meteorological parameters, the publicly available information about weather forecast would be inaccuracy

Warm days have become warmer and cold days colder. The average temperature of earth has risen by 0.5 C over the past century. The rains have also become erratic. The seasons have started overlapping, warm weather during winter and cold conditions during spring or summer. The seasonal climatic variations have been converted into daily variations. These weather conditions strongly affect the health of plants and animals. The changes in climate are perceptible, as is their effect on agriculture.

The changing climatic conditions have baffled meteorologists as well, for whom it has become really difficult to predict the seasonal or daily weather conditions. Considering the importance of agriculture in national food security and livelihood security of about 16 million people dependent on agriculture and its vulnerability to climate change, it is important that efforts be made to carry out extensive research on developing adoption technologies in relation to climate change. In this scenario it has become very important to have good monitoring over weather conditions.

The design and implementation of weather monitoring controlling system is the model with the ability to perform data acquisition on temperature, wind direction, humidity and vibration sensors attached. And it can give these sensors data to ADC Port of microcontroller and send to PC via Bluetooth.

II. PROBLEM IDENTIFICATION

Climate change is now a global concern because of its wide-ranging effects on the environment and on socio-economic and other related sectors, including water resources, agriculture and food security, human health, terrestrial ecosystems and biodiversity. Changes in rainfall patterns and rising temperatures cause a shift in crop growing seasons and affects food security in low income and agriculture based economies. Agriculture is the main source of the Ethiopian economy that supports 52 percent of the Gross Domestic Product (GDP) and covers 80 percent of total mployment and produces more than 85 percent of exports. Despite its high contribution to the overall economy, this sector is the most vulnerable sector to climate variability and change. Thus, adaptation of the agricultural sector to adverse effects of climate change will be imperative to protect the livelihoods of the poor and to ensure food security. Adaptation can greatly reduce vulnerability to climate change by making poor farmers better able to adjust to climate change and variability, moderating potential damage, and helping them cope with adverse consequences. Seasonal rainfall forecasts are thus crucial for the provision of early warning information to be used by farmers. The accessibility and usefulness of weather information as one factor that affects a farmers ability to adapt to climate change. The region is highly

affected by inter annual rainfall variability and associated climate risks . This calls for a need for weather information utilization by farmers to adapt the impacts of climate change at local level . Therefore, the objective of this study is to find out how farmers perceive impacts and causes of climate change and whether or not farmers have access to weather information to mitigate potential impacts of climate change in the study areas.

III. DESIGN METHODOLOGY

An automatic weather station usually consists of a number of outdoor weather sensors which communicate with an LCD display unit indoors, which can in turn often be linked into a PC to store and display data. Once the preserve of the professional, or at least the rich amateur, recent advances in technology and production mean that simple (sometimes called ”family” or ”hobby”) weather stations are well within the reach of most amateurs and schools. The price will depend upon how many weather elements are measured; for example, just outdoor temperature (including maximum and minimum) might be around 15, just rainfall around 30,temperature and humidity around 40. Even a station which displays the six main weather elements (temperature, humidity, wind speed and direction, rainfall and pressure), can now be bought for about 100. In addition to giving the basic measurements, quite often the display unit will also calculate quantities such as wind chill, dew point, etc. Sometimes it will also give a weather forecast, though based as it is on only local conditions, this must be taken with a big pinch of salt. The link between the instruments outdoors and the display inside may well be by wireless, removing the need to feed a wire into the house or school, although the range will be 100m at best, and often well below this. At the sort of prices quoted above it is not surprising that the manufacturer does not give details of accuracy, so this might be quite modest, although perfectly adequate for many applications in teaching or for the interested amateur. (Note that precision is often quoted, which is very different; for example, outdoor temperature might be displayed with a precision of 0.1degC whereas its accuracy may be no better than a degree or more).

A professional automatic station reading six elements may well cost 500 or more, but you will get the benefits of a known accuracy for all the measurements, and probably higher reliability and longer lifetime. There are many advantages to an automatic weather station. Weather bservations can be made more quickly and conveniently, which might mean they can be taken four times a 11 day in schools instead of just once. The sensors can be placed well out of the way and reduce the chances of vandalism - and (in the case of wind measurements, for example) in a better exposed location than would be possible with hand instruments. If a PC link is available this opens the door to using the data for all sorts of projects, from simple averaging ones to looking at correlations between different measurements such as wind direction and temperature – although of course manual readings could be entered into a PC and the same sort of projects undertaken. The main disadvantage of an automatic weather station is that it removes the observer from the real elements being measured, and thus the experience of what minus 5degC temperatures or 30 knot winds feel like, is lost. And actually seeing the liquid in a thermometer contracting in cold weather, or pouring rain from a collector to a smaller-diameter measuring cylinder, for example, naturally leads to discussion of these topics and the maths and physics behind them. There is also some satisfaction in having braved bitter winds or lashing rain to get the results. The RMetS doesn’t actually recommend specific instruments or manufacturers, but some well known makes are Oregon Scientific, TechnoLine/LaCrosse, Irox and (at the more professional end)

3.1 Design

In our project analog sensors are connected to analog port of Microcontroller and digital sensor are connected to digital port. Microcontroller read the data from all sensors and sends all the parameters (temp/hum/wind speed etc.) to PC serially. A max232 use to match cmos and TTL level between microcontroller and PC By using visual basic we design a program to monitor all the sensors value and we record the entire parameter in Excel file By using the software we watch all the parameter (temp/hum/wind speed etc.) live without any delay. And record as per our requirement(every minute or every 10 minute or every hour etc.)

IV Project Design & Implementation

The design and implementation of weather monitoring controlling system is the model with the ability to perform data acquisition on temperature, wind direction, humidity and vibration sensors attached. And it can give these sensors data to ADC Port of microcontroller and send to PC via Bluetooth

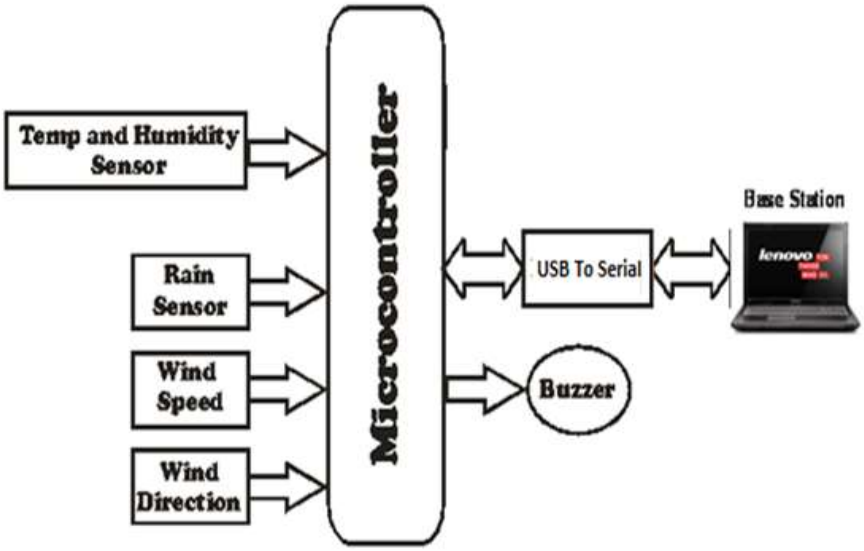


Figure 1: Block Diagram

The block diagram of the proposed work âA.Automated Weather StationâAI is as shown in the figure above. This system consists of various sensors for the monitoring the meteorological parameters. The system consists of a microcontroller, which is the main block of the system and acts as brain of the system. A PIC microcontroller is used and programmed to perform desired operation of the system. In this system a DHT11 sensor is interfaced with the microcontroller. This sensor is used to monitor the humidity and temperature of weather. Rain sensor is designed by using two wires. This sensor is used to get the signal during the rainfall. When water drop falls on these two wires these wires get shorted and microcontroller gets the signal for the rainfall. A wind vane sensor is also interfaced with the microcontroller to monitor the direction of the wind from which direction it is coming towards the station. To monitor the speed of the wind a Hall Effect sensor is interfaced with the microcontroller. This sensor will give the speed in km/hr after processed by the controller. A vibration sensor is also connected in the system. This vibration sensor is used to monitor the vibrations in the earth which causes earthquake. Hence this sensor is used to alert about the danger of earthquake

Flowchart:-

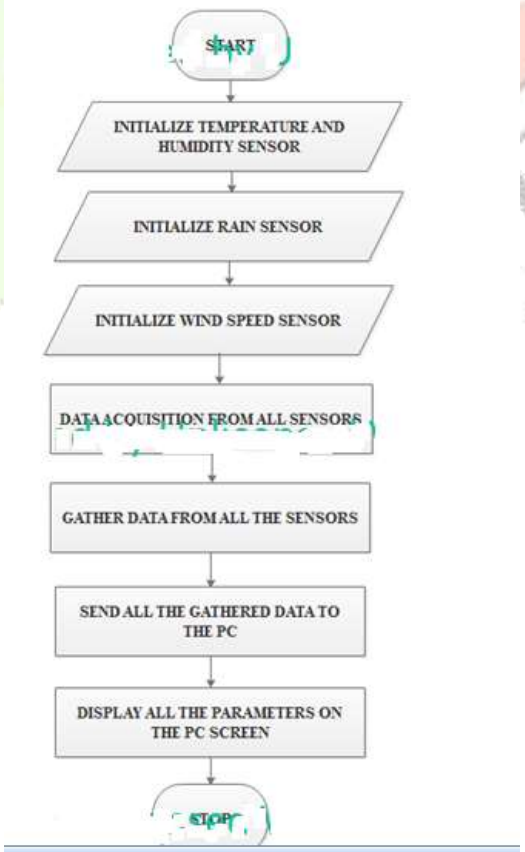
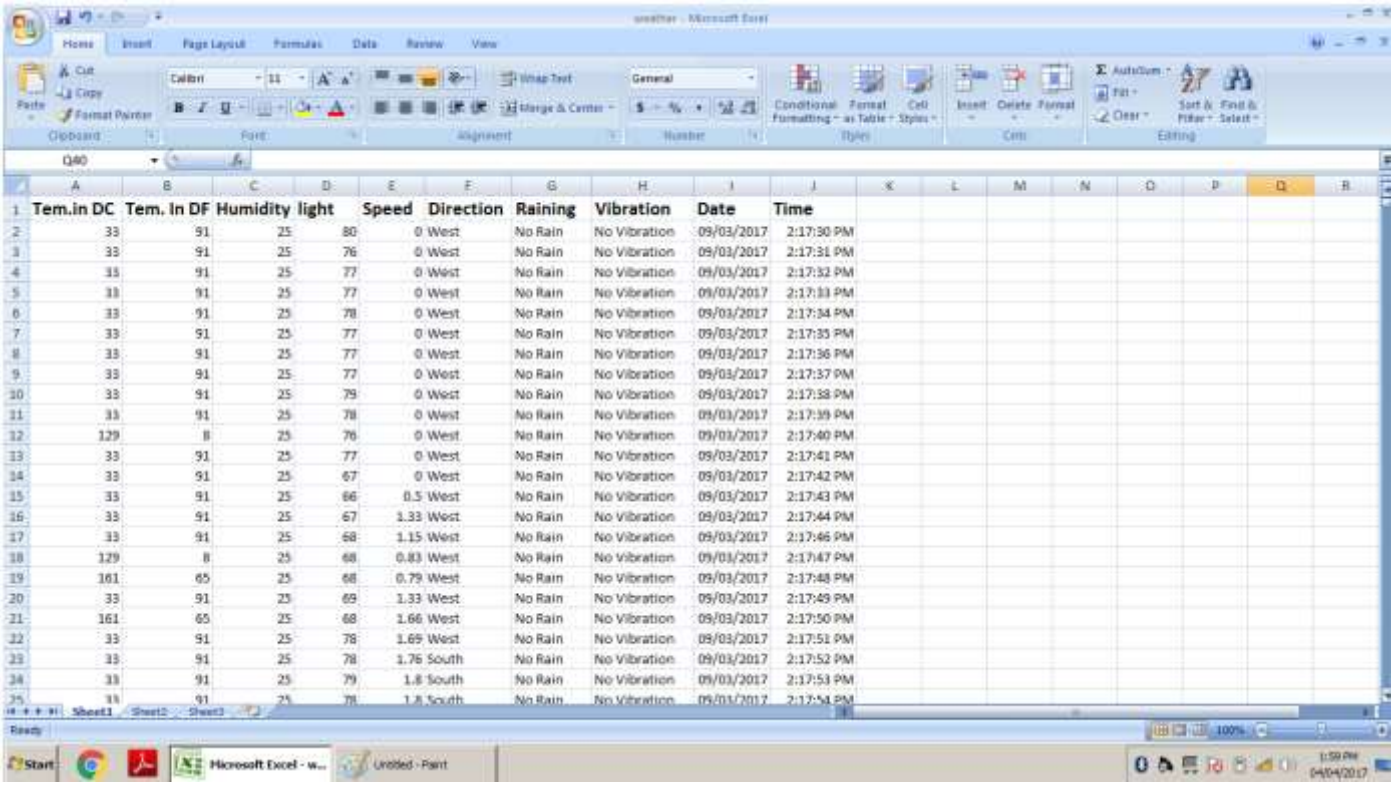


Fig. 2: Flowchart

IV. RESULTS & DISCUSSION

Above figure shows the weather monitoring parameters consist of temperature for sensor 1 & 2 in degree ferenhite. Another sensor indicates humidity and speed of wind, its direction.



Tem.in DC	Tem. In DF	Humidity	light	Speed	Direction	Raining	Vibration	Date	Time
33	91	25	80	0	West	No Rain	No Vibration	09/03/2017	2:17:30 PM
33	91	25	76	0	West	No Rain	No Vibration	09/03/2017	2:17:31 PM
33	91	25	77	0	West	No Rain	No Vibration	09/03/2017	2:17:32 PM
33	91	25	77	0	West	No Rain	No Vibration	09/03/2017	2:17:33 PM
33	91	25	78	0	West	No Rain	No Vibration	09/03/2017	2:17:34 PM
33	91	25	77	0	West	No Rain	No Vibration	09/03/2017	2:17:35 PM
33	91	25	77	0	West	No Rain	No Vibration	09/03/2017	2:17:36 PM
33	91	25	77	0	West	No Rain	No Vibration	09/03/2017	2:17:37 PM
33	91	25	79	0	West	No Rain	No Vibration	09/03/2017	2:17:38 PM
33	91	25	78	0	West	No Rain	No Vibration	09/03/2017	2:17:39 PM
129	8	25	76	0	West	No Rain	No Vibration	09/03/2017	2:17:40 PM
33	91	25	77	0	West	No Rain	No Vibration	09/03/2017	2:17:41 PM
33	91	25	67	0	West	No Rain	No Vibration	09/03/2017	2:17:42 PM
33	91	25	66	0.5	West	No Rain	No Vibration	09/03/2017	2:17:43 PM
33	91	25	67	1.33	West	No Rain	No Vibration	09/03/2017	2:17:44 PM
33	91	25	68	1.15	West	No Rain	No Vibration	09/03/2017	2:17:46 PM
129	8	25	68	0.83	West	No Rain	No Vibration	09/03/2017	2:17:47 PM
161	65	25	68	0.79	West	No Rain	No Vibration	09/03/2017	2:17:48 PM
33	91	25	69	1.33	West	No Rain	No Vibration	09/03/2017	2:17:49 PM
161	65	25	68	1.66	West	No Rain	No Vibration	09/03/2017	2:17:50 PM
33	91	25	78	1.69	West	No Rain	No Vibration	09/03/2017	2:17:51 PM
33	91	25	78	1.76	South	No Rain	No Vibration	09/03/2017	2:17:52 PM
33	91	25	79	1.8	South	No Rain	No Vibration	09/03/2017	2:17:53 PM
33	91	25	78	1.8	South	No Rain	No Vibration	09/03/2017	2:17:54 PM

Weather data can be analysis and available for analysis. Above is the database for all sensors with their practical values and used for analysis.

VI CONCLUSION & FUTURE SCOPE

The measurements and observations outlined in this booklet can form the basis of many interesting constructional and experimental projects and are probably the only ones that can be made without taking on a lot more work and/or expense.Measurements of the more-esoteric weather elements are of limited value in teaching anyway. Although it is fun to make your own instruments (and thus highlight principles of operation), home-made devices are rarely robust enough to stand up well to continuous outdoor use. For making measurements over a long period, simple commercial instruments are worth the additional expense. A flick through the catalogues of educational suppliers will show that a good number of simple weather instruments are available ex-stock âAS and

instruments can also be bought in garden centres and over the counter in High Street shops. Simple instruments are advertised, too, in the Christmas catalogues of charities.

Adding of more sensors to monitor other environmental parameters such as Soil PH Sensor, CO2 and oxygen Sensor while allowing the replacing of current sensors if a wider range of measurements is desired. And also Integration of additional monitoring devices such as a Wi-Fi camera to monitor growth of agricultural product. And also the data can be uploaded to web server continuously.

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